

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**ATOMIC SAFETY AND LICENSING BOARD**

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In the Matter of: )

U.S. Department of Energy )

(License Application for Geologic Repository )  
at Yucca Mountain) )

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January 16, 2009

Docket No. 63-001

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**ANSWER OF THE U.S. DEPARTMENT OF ENERGY TO  
THE STATE OF NEVADA'S PETITION TO INTERVENE**

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**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD**

In the Matter of:	)	January 16, 2009
	)	
U.S. Department of Energy	)	
	)	Docket No. 63-001
(License Application for Geologic Repository at Yucca Mountain)	)	
	)	

**ANSWER OF THE U.S. DEPARTMENT OF ENERGY TO  
THE STATE OF NEVADA’S PETITION TO INTERVENE**

**I. INTRODUCTION**

In accordance with 10 C.F.R. § 2.309 and 10 C.F.R. Part 63, and the Advisory Pre-Application Presiding Officer (PAPO) Board Order of June 17, 2008, the U.S. Department of Energy (DOE or the Department) hereby files its Answer to the State of Nevada’s (Nevada) Petition to Intervene (Petition), filed on December 19, 2008.<sup>1</sup> The Petition responds to the U.S. Nuclear Regulatory Commission’s (NRC or Commission) Notice of Hearing and Opportunity to Petition for Leave to Intervene on an Application for Authority to Construct a Geologic Repository at a Geologic Repository Operations Area at Yucca Mountain, published in the *Federal Register* on October 22, 2008 (73 Fed. Reg. 63,029) (Hearing Notice). The Hearing

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<sup>1</sup> DOE is filing this Answer in advance of the deadline set by the Commission in its Hearing Notice. DOE recognizes, however, that Petitioners have the full time allotted by the Hearing Notice to file their replies. DOE's early filing does not affect the deadlines set by the Commission.

Notice concerns DOE's License Application (Application or LA) for authorization to construct a geologic repository at Yucca Mountain, Nevada for the disposal of spent nuclear fuel (SNF) and high-level radioactive waste (HLW).

To be admitted as a party to this proceeding, under 10 C.F.R. § 2.309, Nevada must: (1) be in substantial and timely compliance with the Licensing Support Network (LSN) requirements imposed by 10 C.F.R. § 2.1003 at the time of its request for participation in the proceeding as provided in 10 C.F.R. § 2.1012(b)(1), and be in compliance with all orders of the Pre-License Application Presiding Officer (PAPO) regarding electronic availability of documents; (2) have legal standing to intervene in the proceeding pursuant to 10 C.F.R. § 2.309; and (3) submit at least one admissible contention in accordance with 10 C.F.R. § 2.309(f)(1). In addition to the NRC's contention admissibility requirements in 10 C.F.R. § 2.309(f), environmental contentions must also meet the requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326. As discussed in detail below, Nevada has failed to demonstrate that it is in substantial and timely compliance with its LSN obligations.

Nevada, which is represented by experienced nuclear counsel and has had the benefit of considerable time, access to the LSN, and experts, has submitted a lengthy Petition with 229 contentions. While Nevada has legal standing as the host state for the geologic repository operations area pursuant to 10 C.F.R. § 2.309(d)(2)(iii), DOE respectfully submits that Nevada has failed to file any admissible contentions.

DOE has reviewed all of Nevada's contentions and addresses each one in considerable detail in Section V. below. During DOE's careful review of Nevada's contentions, it became apparent that, apart from unique deficiencies identified in particular contentions, there are common and repetitive failures to meet the mandatory requirements for admissibility under 10

C.F.R. § 2.309 (and for National Environmental Policy Act of 1969 (NEPA)-based contentions) 10 C.F.R. §§ 51.109 and 2.326 as well. To assist the Atomic Safety and Licensing Board in reviewing the large volume of documentation presented by both Nevada and DOE, summarized below are some of the consistent and repetitive deficiencies in Nevada’s contentions that render such contentions inadmissible. Each of these deficiencies is discussed in more detail later in this Answer.

- Nevada frequently alleges errors, omissions, inadequate data, faulty assumptions, or improper modeling by DOE but rarely, if ever, describes the *implications* quantitatively or even qualitatively of those alleged deficiencies, if proven true, in terms of the applicable regulatory requirements. As such, in these instances, Nevada has failed to demonstrate that there is any genuine dispute of material fact or law, contrary to 10 C.F.R. § 2.309(f)(1)(vi).
- Many of Nevada’s criticisms are not based on an adequate factual basis or expert opinion. In numerous instances, criticisms and assertions are not supported by a technical reference. In some cases, there is no reference at all. In others, the reference, upon review, does not support the criticism or assertion. Furthermore, when Nevada purports to rely on an expert affidavit, the affidavit does no more than broadly state that the affiant “adopts” certain portions of the contention prepared by counsel. This practice falls far short of the requirement to provide a reasoned basis, and explanation of the rationale, for the expert’s opinion. Furthermore, in many instances, the alleged expert clearly lacks the qualifications to render an opinion on the subject of the contention. All of this is contrary to 10 C.F.R. § 2.309(f)(1)(v).

- Many of Nevada’s contentions allege deficiencies in DOE’s postclosure modeling but fail to demonstrate how the contention either independently or cumulatively in combination with other contentions could result in an increase in the mean dose above regulatory limits and thus be material to this proceeding. While, as DOE shows, Nevada has the ability to quantify the impacts of its contentions on dose and at a minimum to provide a qualitative analysis of how the contention would affect the model, including the likely range of impacts on dose, it has failed to provide any such analysis.
- Nevada frequently alleges that “uncertainties” exist in DOE’s postclosure analyses. Part 63 explicitly recognizes that such uncertainties will exist in predictions of long-term, postclosure performance (*see, e.g.*, 10 C.F.R. §§ 63.101 and 63.102) and incorporates the reasonable expectation standard to reflect this recognition. Mere allegations of such uncertainties are, in effect, improper challenges to the regulations and are, therefore, outside the scope of the proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iii).
- In the case of its NEPA contentions, Nevada fails to address any of the mandatory requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326. Specifically, Nevada did not submit the affidavit of a qualified expert in support of any of its NEPA contentions that separately addresses each of the factors under § 2.326, including a demonstration that its contention, if proven to be true, would or would likely result in a materially different outcome in the proceeding.
- Many of Nevada’s NEPA contentions challenge DOE’s transportation decisions and the environmental analyses on which they are based, notwithstanding the fact

that DOE's transportation decisions and the environmental analyses upon which these decisions are based are beyond the scope of this proceeding. Any such challenges may be pursued only through a petition for review to a federal court of appeals.

Nevada has an opportunity to file a Reply to this Answer and may attempt to “cure” these and other deficiencies in its Petition. DOE notes, however, that it is well recognized that “[r]eplies must focus narrowly on the legal or factual arguments first presented in the original petition or raised in the answers to it.” *Nuclear Mgmt Co., L.L.C.* (Palisades Nuclear Plant), CLI-06-17, 63 NRC 727, 732 (2006) (citing cases); see *La. Energy Servs., L.P.* (National Enrichment Facility), CLI-04-25, 60 NRC 223, 225 (2004)(citing Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2203 (Jan. 14, 2004)). Replies should not be used to “*expand the scope of the arguments set forth in the original hearing request,*” nor should they be used to *introduce new bases* for contentions submitted with the original petition. See *Nuclear Mgmt Co., L.L.C.*, CLI-06-17, 63 NRC at 732 (emphasis added). Additionally, the Advisory PAPO Board explicitly stated that “[r]eplies shall be limited to addressing points that have been raised in answers.” *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 9) (June 20, 2008). DOE reserves the right to file motions to strike or to seek other appropriate relief if Nevada expands the factual or legal bases for its contentions in its Reply.

## II. BACKGROUND

Provided below is a brief background section that addresses, among other things, an overview of repository operations, the NRC regulatory framework governing the Construction Authorization, and the NRC technical review and hearing processes.<sup>2</sup>

### A. Submittal of the License Application

On June 3, 2008, pursuant to section 114 of the Nuclear Waste Policy Act, as amended (NWPA), 42 U.S.C. § 10134, 10 C.F.R. Part 63 and 10 C.F.R. § 2.101, DOE submitted an application to the NRC seeking authorization to construct a HLW repository at a geologic repository operations area (GROA) at Yucca Mountain, in Nye County, Nevada. On September 8, 2008, the NRC Staff docketed the Application. The NRC published the Notice of Hearing in the *Federal Register* on October 22, 2008.

The NWPA establishes a comprehensive policy and program for the safe, permanent disposal of commercial SNF and other HLW in one or more geologic repositories. Specifically, the NWPA charges DOE with: (1) establishing criteria for recommending sites for repositories; (2) “characterizing” (investigating) the Yucca Mountain site to determine its suitability for a repository; (3) if the site is found suitable, recommending it to the President, who would submit a recommendation to the Congress if he agreed that the site was qualified; and (4) seeking permission from the NRC to construct and operate a repository at the approved site. This proceeding only concerns DOE’s request that the NRC issue a construction authorization pursuant to 10 C.F.R. § 63.31. A license to receive and possess radioactive material at a GROA

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<sup>2</sup> In addition, DOE has also attached a 28-page document prepared for the public by DOE entitled “The Safety of a Repository at Yucca Mountain.” Attachment 1; LSN Participant Acc. No. ALA.20090115.0636. DOE believes review of that document may enhance the Licensing Board’s ability to efficiently disposition the Petitions before it. A color copy of this document is available at [www.ocrwm.doe.gov/ym\\_repository/license/docs/safety\\_of\\_a\\_repository.pdf](http://www.ocrwm.doe.gov/ym_repository/license/docs/safety_of_a_repository.pdf).

at the Yucca Mountain site will require separate NRC approval, which DOE will seek at a later date pursuant to 10 C.F.R. § 63.41.

**B. The Yucca Mountain Site**

In February 2002, the Secretary of Energy recommended that the President approve the Yucca Mountain site following more than two decades of scientific investigations. As required by the NWPA, the Secretary submitted the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (FEIS) with his recommendation. On July 23, 2002, the President signed into law a joint congressional resolution, Pub. Law 107-200, designating the Yucca Mountain site for development as a geologic repository for the disposal of SNF and HLW. That action concluded the site selection process required by the NWPA, thereby enabling DOE to proceed with a construction authorization application.

The Yucca Mountain site is in a remote area of the Mojave Desert in Nye County in southern Nevada, about 145 kilometers (90 miles) northwest of Las Vegas, Nevada. The site is isolated from concentrations of human population and human activity and is likely to remain so. It is on land controlled by the Federal Government. Further information regarding the site is provided in the Application.

**C. Proposed Repository Operations**

The following is a brief summary of the proposed repository operations that are detailed in the Application. If authorized by the NRC, DOE would build a geologic repository at Yucca Mountain to receive, possess, handle and dispose of SNF and HLW.

Waste handling surface operations and repository subsurface operations are the two major repository operations. The handling and disposal of SNF and HLW at the repository

would take place in the GROA. The surface portion of the GROA would include the facilities necessary to receive, package, and support emplacement of SNF and HLW in the repository. Some commercial SNF would be aged to reduce its thermal output, in order to manage temperatures within and between emplacement drifts. This would be accomplished by placing NRC-approved transportation, aging, and disposal (TAD) canisters and other designated canisters into aging overpacks and placing the overpacks on aging pads at the Aging Facility. When heat output declines to an appropriate level, the canisters would be placed in waste packages for disposal. Those TADs not placed on the aging pads would be placed directly in waste packages for disposal, as would canisters containing DOE-origin SNF and HLW. The surface facilities would also have the capability to load uncanistered commercial SNF into TADs in the Wet Handling Facility.

The subsurface portion of the GROA would include the facilities necessary for waste emplacement and disposal. These facilities would consist primarily of an underground network of horizontal tunnels, or “emplacement drifts” as referred to above. The drifts would total about 42 miles in length and would be able to accommodate about 11,000 waste packages containing a total of 70,000 metric tons of heavy metal (MTHM) of SNF and HLW. DOE would emplace waste packages containing SNF and HLW at least 700 feet below the ground surface and approximately 1,000 feet above the water table. The natural features of the site and engineered barriers would provide a total system to help ensure the long-term isolation of the materials from the accessible environment after the repository has been closed.

## **D. NRC Regulatory Framework for Repository Construction Authorization**

### **1. The NRC's Safety Review**

10 C.F.R. Part 63, applicable only to a DOE application for a geologic repository at Yucca Mountain, Nevada, contains risk-informed, performance-based licensing criteria for disposal of SNF and HLW.<sup>3</sup> Part 63 specifies those performance objectives that must be met through permanent closure and those performance objectives that must be met after permanent closure. Part 63 requires the use of both a preclosure safety analysis (PCSA) and a postclosure performance assessment to evaluate the effect of events and other factors on the performance objectives. The performance objectives in Part 63 must be consistent with the standards established by the U.S. Environmental Protection Agency (EPA) for a Yucca Mountain repository.<sup>4</sup>

Part 63 requires DOE to perform a systematic examination of the potential hazards during the operations period to ensure that all relevant hazards that could result in unacceptable radiological consequences are adequately evaluated, and that protective measures are identified so that the repository will comply with the preclosure performance objectives. The PCSA systematically examines the site, the design, potential hazards, initiating events and their consequences, and the potential dose consequences to workers and the public (so as to limit such doses to acceptable risk levels). The PCSA considers the probabilities and uncertainties

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<sup>3</sup> In finalizing its Part 63 regulations, the NRC emphasized that risk-informed, performance-based regulation is an approach in which risk insights, engineering analysis and judgment, and performance history are used to: (1) focus attention on those activities most important to performance; (2) establish objective criteria based upon risk insights for evaluating performance; (3) develop measurable or calculable parameters for monitoring system and licensee performance; and (4) focus on the results as the primary basis for regulatory decision making. Final Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, NV, 66 Fed. Reg. 55,732 (Nov. 2, 2001).

<sup>4</sup> A portion of the EPA and NRC regulations were vacated in *Nuclear Energy Inst., Inc. v. Env'tl. Protection Agency*, 373 F.3d 1251 (D.C. Cir. 2004) (*NEI*), and proposed rules were subsequently issued by EPA and NRC. EPA published its final rule on October 15, 2008 and the NRC is in the process of issuing conforming regulations.

associated with potential hazards. DOE understands that the NRC's preclosure review seeks to confirm that repository design, construction, and operation will meet the performance objectives (exposure limits), including a review of risk-significant systems, structures, and components important to safety. Final Report, Yucca Mountain Review Plan, NUREG-1804, Rev. 2 at xvi (July 2003) (YMRP).

Part 63 also requires DOE to conduct a performance assessment to demonstrate compliance with the postclosure performance objectives (the Total System Performance Assessment, or TSPA). It is DOE's understanding that the NRC's postclosure performance objectives will focus on items most important to waste isolation, including a review of the natural and engineered barriers identified by DOE as important to waste isolation. *Id.* DOE has identified those features, events, and processes (FEPs) that are most risk-significant to repository safety, and has considered whether the repository design will assure that, when considering these risks-significant FEPs, radiological exposures to the reasonably maximally exposed individual (RMEI) will remain within the applicable limits specified in Part 63. The postclosure performance objectives also protect ground water by limiting the radioactivity in a representative volume of ground water and require an assessment of performance under conditions of human intrusion.

To facilitate its technical review of the Application, the NRC Staff has issued the Yucca Mountain Review Plan (YMRP), NUREG 1804. The YMRP includes the areas of review, review methods, acceptance criteria, evaluation findings, and references the NRC Staff will use for its review. It also includes sections for reviews of general information, repository safety before permanent closure, repository safety after permanent closure, the research and development program to resolve safety questions, the performance confirmation program, and

administrative and programmatic requirements. Like Part 63, the YMRP guidance also is risk-informed and performance-based.

## **2. The NRC's National Environmental Policy Act Responsibilities**

The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. § 4321 *et seq.*, requires Federal agencies, as part of their decision-making process, to consider the environmental impacts of major Federal actions. For the licensing of a geologic repository for the disposal of SNF and HLW, the NRC's responsibilities under NEPA are expressly prescribed and limited by the NWPA.

In particular, section 114(f)(4) of the NWPA addresses the obligations of the NRC with respect to an environmental impact statement (EIS) prepared by DOE in connection with a proposed repository. As reflected in the legislative history of the NWPA, section 114(f)(4) was “intended to avoid the duplication caused as a result of the applicability of NEPA to the actions of both the Secretary [of Energy] and the Commission regarding the preparation of an environmental impact statement.” H.R. REP. No. 97-785, pt. 1 at 69 (1982). The statute provides that:

Any environmental impact statement prepared in connection with a repository proposed to be constructed by the Secretary under this part shall, *to the extent practicable, be adopted by the Commission* in connection with the issuance by the Commission of a construction authorization and license for such repository.

42 U.S.C. § 10134(f)(4) (emphasis added). Section 114(f)(4) further provides that to the extent NRC adopts any such DOE EIS, that adoption satisfies NRC's NEPA responsibilities and “no further consideration shall be required” under NEPA.

On September 8, 2008, the NRC Staff concluded, pursuant to section 114(f)(4) of the NWPA that it is practicable to adopt, with some further supplementation, the 2002 Repository

FEIS, as well as the *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Waste at Yucca Mountain, Nye County, Nevada* June 2008 (Repository SEIS) and the *Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada-Nevada Rail Transportation Corridor* June 2008 (Rail Corridor SEIS).<sup>5</sup>

In particular, in its Adoption Report, the NRC Staff determined that the proposed action described in the FEIS, Repository SEIS, and the Rail Corridor SEIS, with the exception described below, met NRC completeness and adequacy requirements in 10 C.F.R. § 51.91 and in 10 C.F.R. Part 51, Subpart A, Appendix A and was generally consistent with NRC's NEPA guidance in NUREG 1748. U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain, September 5, 2008, *available at* ADAMS Accession No. ML082420342 (Adoption Report). The NRC Staff determined that supplementation was warranted to address certain additional repository-related impacts on

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<sup>5</sup> On April 8, 2004, DOE issued a Record of Decision (ROD) announcing its selection, both nationally and in the State of Nevada, of the mostly rail scenario as the primary means of transporting spent nuclear fuel and high-level radioactive waste to the repository. *See Record of Decision on Mode of Transportation and Nevada Rail Corridor for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye, County, NV*; 69 Fed. Reg. 18,557, April 8, 2004. In the same ROD, DOE also selected the Caliente rail corridor as the corridor in which to study possible alignments for a rail line to connect the repository site at Yucca Mountain to an existing rail line in the State of Nevada. Subsequently, in July 2008, DOE issued the Repository SEIS, the Nevada Rail Corridor SEIS, and the *Final Environmental Impact Statement for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada* (Rail Alignment EIS). On October 10, 2008, DOE issued a ROD announcing its decisions to construct and operate a railroad along a rail alignment within the Caliente corridor and to allow shipments of general freight on the rail line. *See Record of Decision and Floodplain Statement of Findings-Nevada Rail Alignment for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, NV*, 73 Fed. Reg. 60,247 (Oct. 10, 2008).

groundwater, or from surface discharges of groundwater, and requested that DOE prepare a plan for the preparation of a supplement. Adoption Report at ES-1, 3-15.

On October 3, 2008, DOE provided its Notification of Plan for Supplementing the FEIS, and on October 24, 2008, DOE issued a Notice of Intent to prepare the requested supplement. Notice of Intent to Supplement to the Environmental Impact Statements for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, 73 Fed. Reg. 63,463 (Oct. 24, 2008).

**E. Commencement of the NRC Staff's Technical Review and the Hearing Process**

The NRC formally accepted the Application as sufficiently complete to perform its detailed technical review, and docketed the Application under 10 C.F.R. Part 63 on September 8, 2008. On October 22, 2008, the NRC published in the *Federal Register* a notice that the NRC will hold a hearing on the Application and that interested persons must file a petition for leave to intervene pursuant to 10 C.F.R. § 2.309, including contentions that satisfy the admissibility standards in § 2.309, no later than 60 days after the date of publication of the notice. *See* Hearing Notice, 73 Fed. Reg. at 63,029. The matters of fact and law to be considered are whether DOE's Application satisfies the applicable safety, security, and technical standards of the Atomic Energy Act of 1954, as amended (AEA), the NWPA, the NRC's standards in 10 C.F.R. Part 63 for a construction authorization for a high-level waste geologic repository, and also whether the applicable requirements of NEPA and the NRC's NEPA regulations, 10 C.F.R. Part 51, have been met. Specifically, under 10 C.F.R. § 63.31, after review and consideration of DOE's application, the NRC may authorize construction of a geologic repository operations area (GROA) at Yucca Mountain if it determines: (1) there is reasonable assurance that the types and amounts of radioactive materials described in the application can be received and processed

in the GROA without unreasonable risk to the health and safety of the public; and (2) there is reasonable expectation that the material can be disposed of without such unreasonable risk.

As noted above, on December 19, 2008, Nevada submitted its Petition, to which DOE herein responds. As discussed in Section I above, the three prerequisites to participation as a party to this proceeding are: (1) a showing that Nevada is in “substantial and timely compliance” (see 10 C.F.R. § 2.1012) with the LSN requirements imposed by 10 C.F.R. § 2.1003(d); (2) a demonstration of legal standing; and (3) the submission of at least one admissible contention. Section III below addresses Nevada’s LSN compliance. Section IV addresses Nevada’s legal standing. Finally, Section V addresses the admissibility of Nevada’s proffered contentions.

### III. COMPLIANCE WITH LSN REQUIREMENTS

As a threshold matter, a petitioner seeking to participate in the licensing proceeding must demonstrate that it is in compliance with the NRC’s LSN requirements.<sup>6</sup> Specifically, 10 C.F.R. § 2.1012(b)(1) states that:

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<sup>6</sup> 10 C.F.R. § 2.1003 (a) requires that “each other potential party, interested governmental participant or party shall make available [on the LSN] no later than ninety days after the DOE certification of compliance under 2.1009(b) – an electronic file including bibliographic header for all documentary material . . . generated by, or at the direction of, or acquired by, a potential party, interested governmental participant or party.”

Each potential party, interested governmental participant or party is required thereafter to “continue to supplement its documentary material made available to the other participants via the LSN with any additional material created after the time of initial certification in accordance with [§ 2.1003(a)] until the discovery period in the proceeding has concluded.” 10 C.F.R. § 2.1003(e).

10 C.F.R. § 2.1009 prescribes the following additional LSN requirements:

- (a) Each potential party, interested government participant, or party shall –
  - (1) Designate an official who will be responsible for the administration of its responsibility to provide electronic files of documentary material;
  - (2) Establish procedures to implement the requirements of § 2.1003;
  - (3) Provide training to its staff on the procedures for implementation of the responsibility to provide electronic files of documentary material;
  - (4) Ensure that all documents carry the submitter’s unique identification number;
  - (5) Cooperate with the advisory review process established by the NRC under § 2.1011(d).
- (b) The responsible official designated under paragraph (a)(1) of this section shall certify to the [PAPO] that the procedures [specified above] have been implemented and that . . .the documentary material specified

A person, including a potential party given access to the [LSN] under this subpart, may not be granted party status under [10 C.F.R.] § 2.309 or status as an interested governmental participant under [10 C.F.R.] § 2.315, if it cannot *demonstrate substantial and timely compliance* with the requirements of [10 C.F.R.] § 2.1003 at the time it requests participation in the HLW licensing proceeding under § 2.309 or § 2.315.

Emphasis added.

Section 2.1012(c) additionally provides that the “Presiding Officer *shall not* make a finding of substantial and timely compliance pursuant to paragraph (b) of this section for any person who is not in compliance with all applicable orders of the [PAPO Board].” 10 C.F.R. § 2.1012(c) (emphasis added).<sup>7</sup>

Further, 10 C.F.R. § 2.309(a) states that, in ruling on a petition to intervene in this proceeding, the presiding officer shall consider “any failure of the petitioner to participate as a potential party in the pre-license application phase” governed by 10 C.F.R. Part 2, Subpart J.<sup>8</sup>

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in § 2.1003 has been identified and made electronically available. The initial certification must be made [within 90 days of the DOE certification of compliance].

Each potential party also is “responsible for obtaining the computer system necessary to comply with the requirements for electronic document production and service.” 10 C.F.R. § 2.1011(b)(1).

<sup>7</sup> The PAPO Board has issued a series of Case Management Orders that impose certain requirements regarding privilege claims for documentary material on the LSN. One of those orders also requires each participant to supplement its LSN production each month with newly created or discovered documentary material, and to file a certification with the PAPO Board when the monthly supplement is made. Revised Second Case Management Order § VI(A) (July 6, 2007).

<sup>8</sup> Compliance with LSN requirements is crucial to the efficient conduct of this proceeding, insofar as the LSN is designed to enable “the comprehensive and early review of the millions of pages of relevant licensing material by the potential parties to the proceeding, so as to permit the earlier submission of better focused contentions resulting in a substantial saving of time during the proceeding.” Final Rule, Submission and Management of Records and Documents Related to the Licensing of a Geologic Repository for the Disposal of High-Level Radioactive Waste, 54 Fed. Reg. 14,925, 14,926 (Apr. 14, 1989) (amending hearing rules for adjudication on application for a license to receive and possess HLW and establishing basic LSN procedures) (Final Rule, Documents Related to the Licensing of Geologic Repository). It also is intended to facilitate the sharing of information between DOE, the NRC Staff, and the admitted parties throughout the licensing process. *See* Final Rule, Licensing Proceeding for a High-Level Radioactive Waste Geologic Repository: Licensing Support Network, Submissions to the Electronic Docket, 69 Fed. Reg. 32,836, 32,840 (June 14, 2004) (“[A]n LSN participant does have an obligation to maintain its existing LSN collection intact and available for the balance of the construction authorization proceeding.”) (Final Rule, LSN, Submissions to the Electronic Docket).

The Board should deny Nevada's Petition because Nevada has not demonstrated that it is in substantial and timely compliance with the foregoing requirements. Nevada asserts that it has substantially and timely complied (Petition at 3-4), but its assertion is wholly conclusory. Nevada provides no factual support, by affidavit or otherwise, to substantiate its assertion and demonstrate that it has complied with Subpart J and the PAPO Board's orders.

Nevada's conclusory assertion is inadequate. Although a "potential party" in the pre-license application phase was required only to "certify" its good-faith compliance with LSN requirements, a "petitioner" is to be denied party status if it fails to "demonstrate" its substantial and timely compliance. The burden thus is on Nevada at this stage of the proceeding to demonstrate that it is in compliance. As the PAPO Board held, 10 C.F.R. § 2.1012(b)(1) "operates to deny a person party status *unless it shows* substantial and timely compliance with the requirements of § 2.1003." *U.S. Dep't of Energy* (High-Level Waste Repository: Pre-Application Matters), LBP-04-20, 60 NRC 300, 315 n.28 (2004) (emphasis added).

Nevada's conclusory assertion that it has complied fails to carry that burden. The record of Nevada's LSN production raises genuine and material doubt that Nevada has made a substantial, good-faith effort to identify and make available all three classes of documentary material, and prevents reliance on Nevada's unsubstantiated assertion of compliance as the basis to find that Nevada has complied, for the following reasons.

**1. Supporting Documentary Material.** Nevada's proposed contentions are replete with references to allegedly supporting information for which Nevada has neither provided a LSN accession number nor attached copies to its Petition, as required by the Advisory PAPO Board's Case Management Order. These instances are identified in DOE's individual responses to specific contentions, but the following examples are illustrative:

- NEV-SAFETY-85 relies on alleged results of “numerous tests made by laboratories engaged in testing of titanium for corrosion applications.” Petition at 461. Nevada does not cite or attach the referenced data.
- NEV-SAFETY-91 states that “it is known that the [nitrate/chloride] ratio does not exert the control DOE claims under the conditions of low pH that commonly occur during unsaturated zone dripping and evaporation.” Petition at 496. Nevada does not cite or attach data to support this assertion.
- NEV-SAFETY 114 alleges that “the general concentration of sorbing minerals in the Calico Hills formation is far greater than what might be found in welded tuff fracture networks.” Petition at 607. Nevada does not cite or attach the referenced data.

Such information referenced in Nevada’s contentions clearly qualifies as documentary material, and Nevada’s failure to provide a citation or otherwise attach it raises a serious question whether Nevada has made available all supporting information in its possession (including the possession of its experts and consultants). Nevada’s conclusory assertion of compliance fails to address these omissions and thus fails to demonstrate that Nevada has made available all its supporting documentary material.

**2. Non-Supporting Documentary Material.** The record likewise raises genuine and material doubt whether Nevada has identified and made available all non-supporting information in its possession. In particular, it appears that Nevada either did not review its documents to identify non-supporting information following submittal of the LA or used an unduly restrictive standard for identifying non-supporting information, or both. The PAPO Board’s order denying DOE’s motion to strike Nevada’s initial LSN certification in January, 2008 provides the context for this issue.

In denying DOE's motion, the PAPO Board accepted Nevada's argument that it was not required to identify and make available its non-supporting documentary material at the time of its initial LSN certification. Nevada was not required to make its non-supporting information available at that time, the PAPO Board reasoned, because Nevada did not yet have access to the LA. According to the PAPO Board, the existence of non-supporting information is dependent on the potential party's intended positions in the licensing proceeding, and since Nevada was not required to have positions until after the LA was submitted, Nevada had no obligation to identify non-supporting information when it made its initial LSN certification. *U.S. Dep't of Energy* (High Level Waste Repository: Pre-Application Matters), LBP-08-05, 67 NRC 205, 212-16 (2008), *aff'd*, CLI-08-22 (2008).

Indeed, Nevada maintained before the PAPO Board that it had been unable to form intended positions because of its alleged lack of access to DOE's information. Nevada stated that DOE's actions had made "framing focused or meaningful contentions impossible." State of Nevada's Response to DOE's Motion to Strike Nevada's LSN Certification (February 8, 2008) [Nevada Response] at 21. Nevada claimed that, as a result, the formulation of its contentions at the time of its initial LSN certification was "embryonic" (*id.* at 20) and that it did not have "a *single* final contention" at that time. *Id.* at 19 (emphasis in original).

In accepting Nevada's position, however, the PAPO Board made clear that Nevada would have the ability--and the concomitant obligation--to identify and make available all its non-supporting information after the LA was filed. That would require Nevada to review the documents in its possession following submittal of the LA and make available all of those documents with non-supporting information in light of its intended contentions. As the PAPO Board held:

Such material [*i.e.*, Nevada’s non-supporting information] will first exist only after the application is filed and then docketed. At that point, Nevada’s obligation to file contentions addressed to the application will surface. With it will arise the need to make publicly available any documentary material in its possession that either supports or counters such contentions as, upon review of the license application, Nevada deems warranted in light of its position in the proceeding reflected by its filed contentions.

*Dep’t of Energy*, 67 NRC at 213.

The need for this subsequent review and production was especially urgent because Nevada’s procedures and training prior to initial certification were facially inadequate to capture all of its non-supporting information. Nevada’s document production was anchored by two “Call Memos”--a short one in 2004 and a more extensive and substantive one in June 2007 that was “the centerpiece of Nevada’s document collection and production effort.” *Id.* at 217 (Karlin, dissenting). The June 2007 Call Memo, however, is “riddled with errors in its interpretation of Non-supporting [documentary material]” that “serve to omit and categorically exclude Non-supporting [documentary material].” *Id.* at 217. Those errors include:

- Use of an overly narrow “relevance standard” that improperly limits the scope of the information that qualifies as non-supporting documentary material.
- Use of a definition of non-supporting documentary material that omits an alternative formulation provided in the regulatory definition and thus further limits improperly the scope of information that qualifies as non-supporting documentary material.
- Use of a “decision tree” with examples that erroneously conclude that documents do not contain non-supporting information and that allow documents to be excluded from the LSN without proper consideration.

*Id.* at 217.<sup>9</sup>

The training that Nevada provided prior to its initial certification exacerbated those deficiencies. Nevada maintained before the PAPO Board that it supplemented the Call Memos with oral instruction about Nevada's LSN obligations, but by Nevada's own concession in its response and accompanying affidavits, that instruction focused on the identification of supporting information only. It did not address the identification and production of non-supporting information. As Judge Karlin recounts:

Nevada declares that its expert consultants were repeatedly cautioned that "anything they might possibly eventually *rely on* in forming opinions or writing reports or testifying in connection with the licensing proceeding must be on the LSN." Response, Charles J. Fitzpatrick Decl. ¶ 12 [Fitpatrick Decl.] (emphasis added). Likewise, Ms. Lynch speaks only of [documentary material] that Nevada's experts might "*rely on*." Lynch Decl. ¶ 6 (emphasis added). Nevada's Response alleges that it repeatedly instructed its experts to gather and produce "anything which they might possibly eventually *rely upon*." Response at 6.

Conspicuously absent from Nevada's Response and declarations is any suggestion that it gathered and produced Non-supporting [documentary material]. Nevada's counsel acknowledged that his declaration did not address non-supporting [documentary material].

*Id.* at 217.

Therefore, in order to comply with Subpart J and the PAPO Board order denying DOE's Motion to Strike, Nevada was required to review the documents in its possession (including those in the possession of its experts and consultants) following submittal of the LA. Nevada was required to review those documents using the proper standard for non-supporting

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<sup>9</sup> Although these deficiencies were detailed in a dissenting opinion, the other members of the PAPO Board did not disagree with these criticisms of the June 2007 Call Memo. Further, these deficiencies are apparent on the face of the June 2007 Call Memo.

documentary material, and it was required to make available on the LSN all such documents that meet that standard. It is apparent for three reasons, however, that Nevada did not do that.

First, Nevada's Call Memos do not provide for any such review. The Call Memos do not direct Nevada's experts, consultants and staff to conduct a review of their documents following submittal of the LA and to identify all documents that qualify as non-supporting documentary material. Rather, the Call Memos instructed their recipients to make productions in 2004 and 2007 and are silent about any additional review of existing documents after the LA is submitted and as Nevada develops its contentions.<sup>10</sup>

Second, Nevada did not state in its Petition that it performed such a review following submittal of the LA. Nor did Nevada state that it had corrected the deficiencies in the June 2007 Call Memo to ensure that its production was compliant.

Third, Nevada's production of documents on the LSN since its initial certification belies any reasonable possibility that Nevada undertook a substantial, good-faith effort to identify and make available all non-supporting information after submittal of the LA. A review of the documents Nevada has added to the LSN since its initial certification demonstrates this in several respects:

- Nevada has added approximately 573 documents to its LSN collection since its initial certification (less than 500 of which were added after the LA was submitted).<sup>11</sup> That is

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<sup>10</sup> Copies of the two Call Memos are Exhibits G and H to The Department of Energy's Motion to Strike the January 17, 2008 Licensing Support Network Certification by the State of Nevada (January 28, 2008). Also instructive is a 2008 memorandum to Nevada's experts regarding preparation of contentions. The memorandum is silent about the obligation to review documents to identify non-supporting information as they prepare contentions. LSN participant accession # NEV0004601, April 18, 2008 External Memorandum from M.C. Thorne to Technical Experts.

<sup>11</sup> Nevada's LSN collection contains two series of participant accession numbers. As of January, 2008, when Nevada made its initial certification, one series went up to at least NEV0004544 and the other went up to at least NEV5000244. As of December, 2008, those series ended with NEV0005028 and NEV5000335. There are gaps in the series of participant accession numbers assigned to Nevada's post-certification production, and

an extraordinarily small number of documents considering that Nevada has been acquiring information regarding the Yucca Mountain repository since 1985 and has had for several years a team of more than 40 experts and consultants on a wide array of scientific and technical disciplines who have been preparing for the licensing proceeding. *Dep't of Energy*, 67 NRC at 217 (Karlin, dissenting). Even assuming that all 573 documents are non-supporting documentary material--a proposition that is not credible as discussed below--it strains credulity that a substantial, good-faith effort to identify non-supporting information would have identified so few documents from among two decades of information.<sup>12</sup>

- It appears that Nevada added few, if any, of the 573 documents in its post-certification production because they contain non-supporting information. Rather, Nevada's supplemental production consists largely of documents with information that Nevada believes supports its contentions, such as (1) articles that Nevada cites in its Petition;<sup>13</sup> (2) reports that Nevada cites in its Petition;<sup>14</sup> (3) charts, graphs and other data files from corrosion tests and soil and rock samples that Nevada relies on in its Petition;<sup>15</sup> (4)

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when those gaps are taken into account, the number of documents Nevada with new participant accession numbers that Nevada added to the LSN since January, 2008 does not exceed 573. Some of these documents appear to be duplicates of documents that other participants have made available on the LSN. The number of unique documents that Nevada added to the LSN since its initial certification, therefore, is less than 573.

<sup>12</sup> Nevada has maintained that its experts' work regarding Yucca Mountain before 2001 was performed for a purpose other than for use in the licensing proceeding. Nevada Response at 2. That distinction is irrelevant. The definition of documentary material in 10 C.F.R. § 2.1001 does not depend on the purpose for which the information was generated or acquired. If information in the possession of Nevada and its experts and consultants does not support Nevada's contentions, Nevada is required to make it available on the LSN regardless of why Nevada and its experts and consultants obtained it.

<sup>13</sup> Nevada's supplemental production contains at least 83 documents that are published articles.

<sup>14</sup> Nevada's supplemental production contains at least 193 documents that Nevada characterizes as reports in their bibliographic headers.

<sup>15</sup> At least 130 of the documents in Nevada's supplemental production are charts, graphs and photographs generated in connection with the corrosion experiments that Nevada commissioned at the Institute of Metals

documents by Nevada's transportation expert, Robert Halstead, that repeat his views about transportation issues discussed in Nevada's Petition;<sup>16</sup> and (5) Nevada's public comments on various regulatory documents prepared by DOE.<sup>17</sup> That Nevada's supplemental production largely consists of these kinds of documents further suggests that Nevada did not undertake to review the documents in its possession following LA submittal to identify non-supporting documentary material.

- Nevada's supplemental production is largely devoid of documents such as emails and internal memoranda by its experts and consultants that are likely sources of non-supporting documentary material. In fact, Nevada's supplemental production appears to contain only 19 internal memoranda from its experts, most of which Nevada cites in its Petition and therefore presumably are not non-supporting information. Moreover, Nevada's entire supplemental production contains a single email. It is a 2008 email from a Nevada contractor regarding the Caliente rail line. LSN participant accession # NEV0004981, email from R. Moore to R. Halstead (January 2, 2008).<sup>18</sup>

The production of only 1 additional email raises a significant concern that Nevada has failed to review emailed documentation or documentary material. As the PAPO Board held in ordering DOE to complete the review of 10 million of its emails, emails "might very well be of the most importance to persons who may want to question or to challenge" an adversary's

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Research in China, and on which Nevada relies in its proposed contentions. Another 18 documents are graphic files generated in connection with other tests or experiments commissioned by Nevada.

<sup>16</sup> At least 19 of the documents in Nevada's supplemental production are presentations or reports by Halstead regarding transportation issues.

<sup>17</sup> *E.g.*, LSN participant accession # NEV0005005, State of Nevada Agency for Nuclear Projects Comments on the 2/23/2007 Outline for OCRWM's National Transportation Plan.

<sup>18</sup> One of Nevada's documents, LSN participant accession # NEV5000293, includes a January 6, 2003 email from Chuck Marks to Aaron Barkatt. That email is a duplicate of an email that was in Nevada's original production at LSN participant accession # NEV5000105.

position. *U.S. Dep't of Energy* (High Level Waste Repository: Pre-Application Matters), LBP-04-20, 60 NRC 300, 323 (August 31, 2004). Yet, Nevada's original LSN production included "fewer than 114 emails from its multi-year, multi-disciplinary, multi-million dollar effort." *Dep't of Energy*, 67 NRC at 217 (Karlin, dissenting). Those emails basically were provided by only one of Nevada's many experts, consultants, and staff who have worked on Yucca Mountain over the past two decades. *Id.*

A substantial, good-faith effort to identify non-supporting documentary material, therefore, would have included a review of the emails authored by Nevada's experts, consultants and staff in light of Nevada's now developed positions to augment the paucity Nevada originally produced. It is obvious from Nevada's production of only 1 additional email since its initial certification, however, that Nevada did not conduct such a review following its receipt of the LA and as it formulated its positions.<sup>19</sup>

- Nevada's supplemental production is largely devoid of documents authored by its experts who vouch for the State's proposed contentions.<sup>20</sup> In fact, four of those experts are not

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<sup>19</sup> The emails that Nevada had to review date back to at least 2004. Nevada's 2004 Call Memo states that Nevada instructed its experts and consultants starting in December, 2003 to retain all their Yucca Mountain related emails. DOE Motion to Strike, Exhibit G, at 2. Moreover, the Yucca Mountain-related activities of the Nevada Agency for Nuclear Projects and many of Nevada's experts date back to the 1980s. Nevada was obligated by at least 2004 to preserve any earlier emails related to those efforts, as by Nevada's own admission it reasonably anticipated litigation by that date. Nevada should thus have preserved a body of emails that pre-date 2004 that it was required to review as well following submittal of the LA. If Nevada did not in preserve these documents, it would not be in substantial and timely compliance for this reason as well.

<sup>20</sup> The following Nevada experts who provided affidavits as part of Nevada's petition have no documents of any kind in Nevada's supplemental production: Adrian H. Bath; Allen Messenger; Brenda J. Little; Doug F. Hambley; Hugh Horstman; Howard S. Wheeler; Jonathan Overpeck; Robert A. Cottis; Richard E. Chandler; and James McMaster. The following Nevada experts have only 1 or 2 documents in Nevada's supplemental production: Adrian P. Butler; Lawrence Phillips; Stephan Matthäi; Maurice E. Morgenstein; and, Steven A. Frishman.

shown as recipients of the Call Memos, raising the question whether they even were asked to review and produce their documents.<sup>21</sup>

In sum, it appears that Nevada did not make a substantial, good-faith effort to identify all non-supporting information in the possession of its experts, consultants and staff. Nevada's production after its initial certification augmented (in a limited way) its supporting information, but that was all. It appears that Nevada did not perform the review required by the PAPO Board's order to identify all its non-supporting information.

A petitioner party cannot demonstrate that it is in substantial and timely compliance if it has not properly looked for all its documentary material. That principle was made clear when Nevada successfully struck DOE's LSN certification in 2004.

Nevada argued, and the PAPO Board agreed, that DOE was not compliant at that time because it had not completed its review of emails and other documents. The PAPO Board did not require Nevada to identify specific emails and other documents that DOE should have made available but did not. Rather, the PAPO Board held that DOE's production effort could not be considered reasonable if it had not performed a proper collection and review effort. *Dep't of Energy*, 60 NRC at 321-26.

That is the situation here. Nevada has not made a proper effort to collect and review its documents. Accordingly, the Board cannot find for that reason alone that Nevada has substantially and timely complied with its LSN obligations.

**3. Reports and Studies.** Nevada's conclusory assertion of compliance also cannot be accepted with respect to Nevada's obligation to make available reports and studies. This is demonstrated by Nevada's prior assertions of compliance which were demonstrably unreliable.

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<sup>21</sup> Those four experts are: Doug F. Hambley; James A. McMaster; Robert A. Cottis; and, Richard E. Chander.

Nevada previously certified as part of its initial LSN certification in January, 2008 that it had made available all extant reports and studies on the LSN. However, Nevada's subsequent production includes at least 75 documents that pre-date 2008 and that Nevada itself characterizes in their bibliographic headers as reports by its experts and consultants. Most of these documents are several years old, many dating back into the 1980s. *E.g.*, LSN participant accession # NEV0004822, July Report of Yucca Mountain Paleoenvironments Project (August 1, 1988).

A potential party's obligation to make reports and studies available on the LSN is not dependent on a reliance criterion. *U.S. Dep't of Energy* (High Level Waste Repository: Pre-Application Matters), CLI-06-5, 63 NRC 143, 152-53 (2006). Thus, Nevada could not have withheld these reports from the LSN at the time of its initial LSN certification on the ground that it had not yet formed its intended positions. Nevada's Petition does not explain why Nevada produced these reports after its certifications.

Indeed, it appears that Nevada's production of reports and studies is still incomplete. For example, Professor Eugene Smith of the University of Nevada, Las Vegas, is one of Nevada's principal experts, adopting nine of Nevada's proposed contentions in the area of geology and volcanism. As reflected in his curriculum vitae that is attached to Nevada's Petition, Professor Smith has conducted research for the Nevada Agency for Nuclear Projects since 1985. Smith C.V. at 4 (identifying various grants from the Nevada Agency for Nuclear Projects) and 5 (identifying as current research volcanic hazard studies related to placing a nuclear waste repository at Yucca Mountain). Reflecting his extensive research in this area, Professor Smith's curriculum vitae states that he has prepared "over 300 reports" to the Nevada Nuclear Project Office, U.S. Navy's Geothermal Project Office and the Bureau of Land Management. *Id.* at 27. That is in addition to the numerous published reports identified in his curriculum vitae.

Nevada's LSN collection does not contain reports from Professor Smith covering the years that he performed work for Nevada from 2005. The last report from Professor Smith to the Nevada Agency for Nuclear Projects that Nevada has made available is from 2005. Yet, both Nevada and Professor Smith have stated that his work for Nevada continued into at least 2007.<sup>22</sup>

The documents concerning Professor Terry Plank provide another example. Professor Plank began to work on Yucca Mountain-related projects for Nevada in 2005. *See* LSN participant accession # NEV0002916, Geoscience Consultants Progress Report (April 30, 2005) at 1. Nevada's LSN collection contains only three documents from Professor Plank--progress reports for January, February, and March, 2008--which Nevada cites in its Petition.<sup>23</sup> It is clear from the context of those reports that they are interim reports, and that other reports precede and follow the three Nevada has provided. Nevada, however, appears to have selectively made available only three of Professor Plank's reports because Nevada cites those in its Petition.

It thus appears that Nevada's production reflects a fundamental misunderstanding of a potential party's obligation to make available reports and studies. Nevada appears to have limited its production of recent reports to those it intends to cite or rely on in the licensing proceeding. That is unduly restrictive, as Nevada was required to make available all reports and studies by its experts, regardless of whether those reports and studies have supporting or non-supporting information.

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<sup>22</sup> Nevada did make available a report from Dr. Smith, dated November, 2008, that was prepared pursuant to a contract with Clark County. LSN participant accession # NEV0004948. Nevada has not made available, however, any reports from Dr. Smith for work he performed for Nevada since 2005.

<sup>23</sup> Yucca Mountain Project Terry Plank Lamont-Doherty Earth Observatory, Report on Activities from December 26, 2007 - January 26, 2008 (LSN participant accession # NEV5000331); Yucca Mountain Project Terry Plank Lamont-Doherty Earth Observatory, Report on Activities from January 26, 2008 - February 26, 2008 (LSN participant accession # NEV5000332); Yucca Mountain Project Terry Plank Lamont-Doherty Earth Observatory, Report on Activities from February 26, 2008 - March 27, 2008 (LSN participant accession # NEV5000333).

For all these reasons, the Board cannot find that Nevada has demonstrated timely and substantial compliance with its LSN obligations. Nevada’s conclusory assertion in its Petition cannot satisfy Nevada’s burden in light of the record concerning Nevada’s LSN collection.<sup>24</sup>

#### **IV. LEGAL STANDING**

Because the Commission has stated that it will “permit intervention by the State of [Nevada]” as long as “the contention requirements in 10 CFR 2.309(f) are satisfied with respect to at least one contention” Hearing Notice, 73 Fed. Reg. at 63,031, DOE has no objection to Nevada’s legal standing.

#### **V. ADMISSIBILITY OF CONTENTIONS**

##### **A. Applicable Legal Standards and Relevant NRC Precedent**

##### **1. Petitioner Must Submit at Least One Admissible Contention to be Admitted as a Party**

To be admitted as a party in the Yucca Mountain licensing proceeding, a petitioner must proffer at least one admissible contention. *See* 10 C.F.R. §§ 2.309(a), 2.309 (d)(2)(iii). The NRC will deny a petition to intervene from a petitioner who has complied with the LSN requirements and has demonstrated standing to intervene, but who has not proffered at least one admissible contention. *See generally Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), CLI-01-17, 54 NRC 3, 5 (2001). As the Commission has observed, “[i]t is the responsibility of the Petitioner to provide the necessary information to satisfy the basis

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<sup>24</sup> 10 C.F.R. § 2.1012(b)(1) is clear that a potential party “may not be granted” party status or participate under 10 C.F.R. § 2.315(c) if it cannot demonstrate substantial and timely compliance “at the time it requests participation.” 10 C.F.R. § 2.1012(b)(2) makes clear that the time to cure any such failure to meet LSN requirements is *after* party status or the right to participate has been “denied,” and not in any such Reply.

As discussed in Section I. above, Nevada may not “cure” this or any other defect in its Petition in its Reply pursuant to 10 C.F.R. § 2.309(h)(2).

requirement for the admission of its contentions and demonstrate that a genuine dispute exists within the scope of this proceeding.” *Baltimore Gas & Elec. Co.* (Calvert Cliffs Nuclear Power Plant, Units 1 and 2), CLI-98-14, 48 NRC 39, 41 (1998). “A contention’s proponent, not the licensing board, is responsible for formulating the contention and providing the necessary information to satisfy the basis requirement for the admission of contentions.” *Statement of Policy on Conduct of Adjudicatory Proceedings*, CLI-98-12, 48 NRC 18, 22 (1998). Finally, “government entities seeking to litigate their own contentions are held to the same pleading rules as everyone else.” *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-05-24, 62 NRC 551, 568 (2005).

**2. Petitioner in this Proceeding Has a Heightened Obligation to Proffer Well Pled and Adequately Supported Contentions Given the Availability of the LSN**

As the Commission has noted, this proceeding involves a number of “unique facts and circumstances” – one of those being the development of the LSN as a substitute for traditional document discovery. In developing this system, the NRC sought both to streamline the discovery process *and* to facilitate submittal of well-pled contentions:

Another efficiency the [LSN] provides is reducing the effort consumed in carrying out document discovery and allowing more effort to be spent in case preparation. Because access to these documents is provided *before* the application is docketed, each party can focus on formulating meaningful contentions before the licensing hearing begins. *There should be no excuse for poorly crafted contentions, and the licensing board can reduce hearing delays by readily rejecting or otherwise disposing of unfocused or unsupported contentions.* Likewise, the [LSN] rule places tighter restrictions on amending or adding contentions late in the hearing processes because the [LSN] affords the parties an opportunity to raise and resolve issues earlier than what traditionally has been possible.

SECY-95-153, Memorandum from James M. Taylor, Executive Director of Operations, to the Commissioners, “Licensing Support System Senior Management Team Recommendations on Direction of the Licensing Support System,” June 14, 1995, *available at* LEGACY ADAMS Accession No. 9506280652 (emphasis added).

In issuing the final LSN rule nearly a decade later, the Commission noted that “the history of the LSN and its predecessor . . . makes it apparent it was the Commission’s expectation that the LSN, among other things, would provide potential participants with the opportunity to frame focused and meaningful contentions” and avoid potential discovery-related delays. Final Rule, LSN, Submissions to the Electronic Docket, 69 Fed. Reg. at 32,843. The Commission added that “[t]hese objectives are still operational.” *Id.* In fact, in a recent adjudicatory order related to this proceeding, the Commission reaffirmed these objectives:

The use of the LSN was intended, among other things, to “enabl[e] the comprehensive and early review of the millions of pages of relevant licensing material by the potential parties to the proceeding, so as to permit the earlier submission of better focused contentions resulting in a substantial saving of time during the proceeding.”

*U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters), CLI-08-12, 67 NRC \_\_ (slip op. at 8) (June 17, 2008).

And in fact, DOE’s production of documentary material on the LSN fulfilled those objectives. DOE first made documentary material available on the LSN in 2004, when it publicly released approximately 1.3 million documents. Transcript of Record at 540, *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters), ASLBP No. 04-8239-01-PAPO (July 12, 2005). DOE made another 2.1 million documents publicly available on the LSN in April, 2007—more than a year before it submitted the LA. Policy Issue Information Memorandum, SECY-07-0130, August 7, 2007, *available at* ADAMS No. ML071930440 at 5.

DOE regularly added documents to the LSN each month thereafter, and in October, 2007, DOE certified that all its extant documentary material was available on the LSN. The Department of Energy submitted its Certification of Compliance on October 19, 2007. DOE has since then updated its LSN production each month with new documentary material that it has generated, received, or identified. *See, e.g.*, The Department of Energy’s Certification of Licensing Support Network Supplementation (November 1, 2007); *see also* Revised Second Case Management Order, ASLBP No. 04-829-01-PAPO (July 6, 2007) at 21 (requiring monthly supplemental production on LSN of documentary material created or discovered after party’s initial LSN certification).

Altogether, DOE has made more than 3.5 million documents available on the LSN. *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters), LBP-08-01, 67 NRC \_\_ (slip op. at 11) (January 4, 2008) (stating that “it is not disputed that DOE has made available a massive amount of documentary material—3.5 million documents, amounting to over 30 million pages, including redacted versions of some privileged documents and privilege logs for hundreds of others”). That production includes documents that DOE cites and relies upon in the LA. It includes extensive underlying calculations, data, and other material on which those documents are based. Further, as required by regulation, it also includes documents with information that does not support the information DOE intends to cite or rely upon in the licensing proceeding. 10 C.F.R. § 2.1001 (definition of “documentary material”).

DOE’s extensive production substantially heightens Nevada’s ability—and *its corresponding obligation*—to proffer focused and adequately supported contentions in this proceeding. As the Commission observed in rejecting a challenge to DOE’s initial LSN certification, “potential parties had access to millions of DOE documents upon which to begin

formulating meaningful contentions” during the period following that certification, as contemplated by the Commission’s regulations. *U.S. Dep’t of Energy*, CLI-08-12, 67 NRC \_\_\_ (slip op. at 9). Indeed, because of DOE’s early production of documentary material on the LSN starting four years before LA submittal, every potential party has had a greater opportunity than the regulations contemplate to use those materials to develop contentions.

Nevada, in particular, has been in a position to avail itself of that documentary material to develop contentions. By its own description, “the State of Nevada, specifically the Nevada Agency for Nuclear Projects, has been engaged in a comprehensive program for monitoring, overseeing, and intervening in the federal Yucca Mountain project” for over two decades. Report and Recommendations of the Nevada Commission on Nuclear Projects (December 2006) [2006 Nev. Comm. Report] at 25 [Exhibit A to the Department of Energy’s Motion to Strike the January 17, 2008 Licensing Support Network Certification by the State of Nevada [DOE Motion to Strike] (January 28, 2008)]. The Agency has conducted “[m]ajor technical research” as part of “a sustained and concerted research effort to address key technical and scientific issues that are expected to be important to the State’s licensing intervention.” *Id.* at 25, 32. As it has acknowledged, Nevada has received \$78 million from DOE for those efforts as of 2004 (to say nothing of the State funds expended). Affidavit of Robert R. Loux (March 19, 2004) at ¶ 11 [DOE Motion to Strike, Exhibit B].

To further that effort, Nevada hired outside counsel for the licensing proceeding in 2001 and thereafter identified a group of at least 25 experts for the proceeding. Statement of Joseph R. Egan, before the House Subcommittee on the Federal Workforce and Agency Organization (April 5, 2005) [Egan Statement] at 1 [DOE Motion to Strike, Exhibit C]; Petition by the State of Nevada under Atomic Energy Act Section 274 and 10 C.F.R. § 63.63 for Financial Assistance in

the Licensing Review of the Yucca Mountain Nuclear Waste Repository (May 10, 2004) [Petition for Funds] at 6 [DOE Motion to Strike, Exhibit D]; “Nevada’s Scientific Experts,” Petition for Funds, Attachment 1 [DOE Motion to Strike, Exhibit E]. These attorneys and experts are said to have been “diligently” preparing over the past several years a “rigorous, substantive and effective” opposition to the LA. 2006 Nev. Comm. Report at 31. They have been “performing a thorough evaluation of the scientific and legal integrity of the work done by DOE and its contractors at Yucca.” Egan Statement at 1 & 3.

Nevada’s team of experts and counsel “intensified” their preparation in 2004 when DOE first made documents available on the LSN. 2006 Nev. Comm. Report at 25. That intensified effort included “assembling data and information on key technical issues that will form the basis of Nevada’s prospective challenge to any license application DOE may submit to the NRC for Yucca Mountain and undertaking new research that may be required to support the State’s licensing contentions . . . .” *Id.*

To do that, Nevada’s experts have been “combing” DOE’s LSN collection since 2004. Egan Statement at 3. In May, 2007, they reportedly divided among themselves for review the additional documents DOE made available on the LSN at that time. DOE Motion to Strike, Exhibit F at 1. One of Nevada’s experts has described a “routine,” which was suggested to Nevada’s experts by the Agency’s director of technical projects, of regularly reviewing DOE’s Analysis Model Reports as they became available. *E.g.*, DOE Motion to Strike, Exhibit O at O-54, O-56, O-58. The Analysis Model Reports are, by Nevada’s own description, “the basic building blocks” of the LA. Declaration of Mike Thorne, ¶ 3 [attached to State of Nevada’s Motion to Strike DOE’s October 19, 2007 LSN Recertification and to Suspend Certification Obligation of Others Until DOE Validly Recertifies (October 29, 2007)].

Nevada's access to this material on LSN enabled it to begin early the preparation of contentions. Indeed, Nevada advised the PAPO Board in 2005 that it was already drafting contentions. Declaration of Mike Thorne, ¶ 3 [attached to State of Nevada's Motion to Strike DOE's October 19, 2007, LSN Recertification and to Suspend Certification Obligation of Others Until DOE Validly Recertifies (October 29, 2007)].

Based on the above circumstances, Nevada must be held to a particularly heightened burden to proffer well-pled and adequately supported contentions. Nevada is a well-funded participant that has had the legal and technical resources to review DOE's documentary material to develop contentions.

**3. Proffered Contentions Must Meet All of the Contention Admissibility Requirements of 10 C.F.R. § 2.309(f)(1) as Well as the Requirements of the Applicable June 20, 2008 and September 29, 2008 Case Management Orders**

Section 2.309(f)(1) requires a petitioner to "set forth with particularity the contentions sought to be raised," and to satisfy the following six criteria: (1) provide a specific statement of the legal or factual issue sought to be raised; (2) provide a brief explanation of the basis for the contention; (3) demonstrate that the issue raised is within the scope of the proceeding; (4) demonstrate that the issue raised is material to the findings the NRC must make to support the licensing action that is the subject of the proceeding; (5) provide a concise statement of the alleged facts or expert opinions, including references to specific sources and documents that support the petitioner's position and upon which the petitioner intends to rely; and (6) provide sufficient information to show that a genuine dispute exists with regard to a material issue of law or fact. *See* 10 C.F.R. § 2.309(f)(1)(i)-(vi). *A failure to comply with any one of the six admissibility criteria is grounds for rejecting a proffered contention. See* Final Rule, Changes to

Adjudicatory Process, 69 Fed. Reg. 2182, 2221 (Jan. 14, 2004); *see also Private Fuel Storage L.L.C.*, (Independent Spent Fuel Storage Installation) CLI-99-10, 49 NRC 318, 325 (1999).

The purpose of these six criteria is to “focus litigation on concrete issues and result in a clearer and more focused record for decision.” Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. at 2202. The current contention admissibility standards are “strict by design,” *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001), *recons. denied*, CLI-02-1, 55 NRC 1 (2002), and were intended to “raise the threshold for the admission of contentions.” Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168 (Aug. 11, 1989); *see also Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 334 (1999). As explained above, the availability of the LSN further raises this threshold for the admission of a contention in this proceeding. In revising its Part 2 rules in 2004, the Commission reiterated that the standards are “necessary to ensure that hearings cover only genuine and pertinent issues of concern and that the issues are framed and supported concisely enough at the outset to ensure that the proceedings are effective and focused on real, concrete issues.” Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. at 2189-90 (stating that the NRC “should not have to expend resources to support the hearing process unless there is an issue that is appropriate for, and susceptible to, resolution in an NRC hearing”); *id.* at 2202.

Strict application of these contention admissibility criteria in this proceeding is critically important. The vast number of contentions submitted and the “rigorous schedule” imposed by the Appendix D to Part 2 present unprecedented challenges to the conduct of a timely, effective, and focused adjudication. Recognizing these challenges, the Advisory PAPO Board, with the Commission’s express approval, issued its Case Management Order “to help both potential

parties and licensing boards address the admissibility of contentions in any HLW proceeding effectively and efficiently.” *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 3) (June 20, 2008) (Case Management Order).<sup>25</sup> That Order imposes numerous format requirements for proffered contentions. Failure to adhere to these format requirements may provide an additional basis for rejection of proffered contentions should a potential party significantly and in bad faith ignore these requirements. *Id.* at 3, 5-9.

The six contention admissibility criteria set forth in 10 C.F.R. § 2.309(f)(1), and the related pleading requirements contained in the Case Management Order, are discussed further below.

**a. Petitioner Must Specifically State the Issue of Law or Fact to Be Raised**

Section 2.309(f)(1)(i), the first admissibility criterion, requires that a petitioner “provide a specific statement of the issue of law or fact to be raised or controverted,” by “articulat[ing] at the outset the specific issues [it] wish[es] to litigate as a prerequisite to gaining formal admission as [a party].” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 338. To be admissible, a contention “must explain, with specificity, particular safety or legal reasons requiring rejection of the contested [application].” *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 359-60. Section 2.309(f)(1)(i) “bar[s] contentions where petitioners have only ‘what amounts to generalized suspicions, hoping to substantiate them later.’” *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-03-17, 58 NRC 419, 424 (2003) (quoting *Duke Energy Corp.*, CLI-99-11, 49 NRC at 337-39). Elaborating further on this

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<sup>25</sup> A second case management order was issued. *See* Order (Regarding Contention Formatting and Tables of Contents) (unpublished) (September 29, 2008).

requirement, the June 20, 2008, Case Management Order for this proceeding requires “narrow, *single-issue* contentions” that are “sufficiently specific as to define the relevant issues for eventual rulings on the merits, and not require” extensive narrowing or clarification by the parties or boards. *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6) (emphasis added).

In this regard, Nevada’s individual contentions typically cite and rely on certain specific portions of the LA, but then repeatedly add the phrase “and similar subsections,” without specifically identifying any of those subsections. This lack of specificity is insufficient to constitute a valid statement of the “issue of law or fact to be raised or controverted” contrary to 10 C.F.R § 2.309(f)(1). Accordingly, Nevada may not rely, in its Reply (or otherwise), on these unspecified subsections to support admission or litigation of its contentions.

**b. Petitioner Must Briefly Explain the Basis for the Contention**

Section 2.309(f)(1)(ii) requires that a petitioner provide “a brief explanation of the basis for the contention.” *See also* Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170. This includes “sufficient foundation” to “warrant further exploration.” *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC 395, 428 (1990) (footnote omitted). A petitioner’s explanation serves to define the scope of a contention, as “[t]he reach of a contention necessarily hinges upon its terms coupled with its stated bases.” *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-899, 28 NRC 93, 97 (1988), *petitions denied in part, granted in part, Massachusetts. v. U.S. Nuclear Regulatory Comm’n*, 924 F.2d 311 (D.C. Cir. 1991), *cert. denied*, 502 U.S. 899 (1991). The Board, however, must determine the admissibility of the contention itself, not the admissibility of individual “bases.” *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 379 n.45 (2002).

**c. Petitioner Must Demonstrate that the Issue Raised in the Contention is Within the Scope of the Proceeding**

Section 2.309(f)(1)(iii) requires that a petitioner demonstrate “that the issue raised in the contention is within the scope of the proceeding.” The scope of the proceeding is defined by the Commission’s Notice of Hearing and the NRC regulations governing review and approval of the Application. *See, e.g., Duke Power Co.* (Catawba Nuclear Station, Units 1 and 2), ALAB-825, 22 NRC 785, 790-91 (1985). Contentions are necessarily limited to issues that are germane to the specific application pending before the Board. *Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), CLI-98-21, 48 NRC 185, 204 n.7 (1998). Any contention that falls outside the specified scope of this proceeding – as discussed further below – must be rejected. *See, e.g., Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-04-36, 60 NRC 631, 639 (2004).

A contention that challenges an NRC rule is outside the scope of this proceeding because, absent a waiver, “no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding....” 10 C.F.R. § 2.335(a). This includes contentions that advocate stricter requirements than agency rules impose or that otherwise seek to litigate a generic determination established by a Commission rulemaking. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159 (2001), *aff’d on other grounds*, CLI-01-17, 54 NRC 3.

Similarly, any direct or indirect challenge to the current EPA standard or NRC implementing rule is a collateral attack and is outside the scope of the proceeding. Moreover, Nevada challenged the EPA rule in federal court and thus this proceeding is the wrong forum to raise such a challenge.

In addition, any contention that collaterally attacks applicable statutory requirements or the basic structure of the NRC regulatory process must also be rejected by the Board as outside the scope of the proceeding. *Carolina Power & Light* (Shearon Harris Nuclear Power Plant Units 1), LBP-07-11, 65 NRC 41, 57-58 (citing *Philadelphia Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974)). Accordingly, a contention that simply states the petitioner's views about what the regulatory policy should be does not present a litigable issue. See *Philadelphia Elec. Co.*, ALAB-216, 8 AEC at 20-21, 21 n.33. Similarly, challenges to the adequacy of the NRC Staff's safety review process, including the contents of its SER, are outside the scope of this proceeding. "The NRC has not, and will not, litigate claims about the adequacy of the Staff's safety review in licensing adjudications." *AmerGen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), CLI-08-28, 68 NRC \_\_ (slip op. at 13-14) (Nov. 6, 2008).

Nevada has proffered numerous contentions expressing that generalized "uncertainties" exist in postclosure models or data, without showing in any way, how or why those uncertainties call into question the conclusions reached by DOE, or findings NRC must make in its review of the LA. To merely assert the existence of such uncertainties, without specifying their impact on a finding NRC must make in its issuance of the construction authorization, amounts to an improper challenge to Part 63, which explicitly recognizes that such uncertainties exist and cannot be eliminated. The Commission, in the Statements of Consideration accompanying Part 63, expressly rejected requests made by several commenters to define an acceptable level of uncertainty in Part 63, finding it "neither practical nor appropriate." Final Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, NV, 66 Fed. Reg. 55,732, 55,747-748 (Nov. 2, 2001). The Commission "decided to adopt EPA's

preferred criterion of ‘reasonable expectation’ for purposes of judging compliance with the postclosure performance objectives [since] ... a standard of ‘reasonable expectation’ allows it the necessary flexibility to account for the inherently greater uncertainties in making long-term projections of a repository's performance.” *Id.* at 55,740. This flexibility encompasses consideration of the use, as appropriate, of cautious but reasonable approaches consistent with present knowledge in lieu of bounding or more conservative approaches. *See, e.g.*, 10 C.F.R. § 63.305(c).

In this regard, Nevada has made no effort to demonstrate and has not even asserted that DOE has failed to satisfy the reasonable expectation standard identified by 10 C.F.R. § 63.101 as the general standard for postclosure matters. The following examples from 10 C.F.R. § 63.101 are illustrative of the reasonable expectation standard:

- “Proof that the geologic repository will conform with the objectives for postclosure performance is not to be had in the ordinary sense of the word because of the uncertainties inherent in the understanding of the evolution ....”
- “[W]hat is required is reasonable expectation, making allowance for the ... uncertainties involved, that the outcome will conform with the objectives for postclosure....”
- “[D]emonstration of compliance must take uncertainties and gaps in knowledge into account so that the Commission can make the specified finding....”

10 C.F.R. § 63.304 describes the characteristics of reasonable expectation by stating that reasonable expectation:

- Requires less than absolute proof because absolute proof is impossible to attain for disposal due to the uncertainty of projecting long-term performance;

- Accounts for the inherently greater uncertainties in making long-term projections of the performance of the Yucca Mountain disposal system;
- Does not exclude important parameters from assessments and analyses simply because they are difficult to precisely quantify to a high degree of confidence; and
- Focuses performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

In addition, 10 C.F.R. § 63.305(c) makes clear that, in the context of reasonable expectation, conservative means the use of cautious but reasonable assumptions consistent with present knowledge.

Given the obligation of the Commission under section 801(b) of the Energy Policy Act of 1992 (EPACT) to modify its technical requirements and criteria under section 121(b) of the NWPA to be consistent with the radiological protection standards promulgated by the Environmental Protection Agency (EPA) under section 801(a) of EPACT, the proper application of the reasonable expectation standard must take into account the statements by EPA in promulgating the standards required by EPACT.<sup>26</sup> These statements make clear that, while reasonable assurance and reasonable expectation are similar concepts, the evaluation of the Yucca Mountain repository requires a different level and type of technical proof than required

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<sup>26</sup> See Final Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 66 Fed. Reg. 32,074, 32,101-03 (June 13, 2001) (section III.B.2.c titled “What Level of Expectation Will Meet Our Standards?”); see also Proposed Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 70 Fed. Reg. 49,014, 49,020-21 (August 22, 2005) (section I.A.1.c titled “What is “Reasonable Expectation?”); Final Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 73 Fed. Reg. 61,256, 61,271-73 (October 15, 2008) (section III.A.4 titled “How Did We Consider Uncertainty and Reasonable Expectation?”).

for reactors and other situations licensed by NRC in the past.<sup>27</sup> Reasonable expectation recognizes that, in the context of the Yucca Mountain repository, “unequivocal numerical proof of compliance is neither necessary nor likely to be obtained,”<sup>28</sup> and while some “sources of uncertainty can be addressed, or at least accounted for while in other [data or model] areas our knowledge may be too limited to even characterize the uncertainty, much less explicitly account for it.”<sup>29</sup> Identifying postclosure uncertainties, without specifying their impact on whether the reasonable expectation standard is met, does not provide an adequate basis to admit a contention.

Therefore, in formulating its contentions, the initial burden is on Nevada to explain the implications of alleged uncertainties and show why, if true, they exceed the range of acceptable (and unavoidable) uncertainties clearly reflected in the regulations, particularly the reasonable expectation standard set forth in 10 C.F.R. § 63.101. Nevada has frequently not addressed this pleading requirement, and when Nevada has so attempted to address this it has failed. Any contention attempting to shift that burden to the applicant is an improper challenge to 10 C.F.R. § 2.309. *See Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Power Station), LBP-06-23, 64 NRC 257, 358-59 (2006). DOE’s responses to specific contentions identify where Nevada has violated these pleading requirements.

**d. Petitioner Must Demonstrate That Each Contention Raises a Material Issue**

Section 2.309(f)(1)(iv) requires that a petitioner “[d]emonstrate that the issue raised in the contention is *material* to the *findings the NRC must make to support the action* that is involved in

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<sup>27</sup> See Final Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 66 Fed. Reg. at 32,101.

<sup>28</sup> Proposed Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 70 Fed. Reg. at 49,021.

<sup>29</sup> Final Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 73 Fed. Reg. at 61,256, 61,271 (Oct. 15, 2008).

the proceeding.” Emphasis added. As the Commission has observed, “[t]he dispute at issue is ‘material’ if its resolution would ‘make a difference in the outcome of the licensing proceeding.’” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34; *see also* Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,172. Thus, each contention must be one that, if proven, would entitle the petitioner to relief. *Yankee Atomic Elec. Co.* (Yankee Power Station), CLI-96-7, 43 NRC 235, 244 (1996). The Case Management Order states that this criterion “requires citation to a statute or regulation that, explicitly or implicitly, has not been satisfied by reason of the issue raised in the contention.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7).

The “findings the NRC must make to support” the issuance of a construction authorization for a geologic repository are set forth in 10 C.F.R. § 63.31. To authorize construction of the repository, the NRC must determine that:

- there is reasonable assurance that the types and amounts of radioactive materials described in the application can be received and possessed in a geologic repository operations area of the design proposed without unreasonable risk to the health and safety of the public;
- there is reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public; and
- there is reasonable assurance that the activities proposed in the application will not be inimical to the common defense and security.

In short, the NRC must determine the validity of DOE’s conclusions concerning the ability of the repository design to limit exposure to radioactivity, both during the construction and operation phase of the repository (*i.e.*, preclosure phase) and during the phase after the repository has been filled, closed, and sealed (*i.e.*, postclosure phase).

In making these determinations, the NRC must evaluate DOE’s compliance with the applicable provisions of Part 63, including, among other things, whether DOE has described the

proposed geologic repository as specified in § 63.21, and whether the site and design comply with the Part 63 performance objectives and requirements. Proposed safety contentions that fail to raise issues that are material to these findings are inadmissible. For example, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as *mean* doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively fail to demonstrate an increase in the mean dose *above regulatory limits* are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

**e. Petitioner Must Demonstrate that Each Contention is Supported by Adequate Factual Information and/or Expert Opinion**

Section 2.309(f)(1)(v) requires a petitioner to present the factual information or expert opinions necessary to support its contention adequately, and failure to do so requires the Board to reject the contention. *See also Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (in referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309, the Commission stated that petitioners must present “claims rooted in fact, documents, or expert opinions”). A petitioner is “obligated to put forward and support contentions when seeking intervention, based on the application and information available” by examining the application and publicly available information. *Consumers Energy Co. (Palisades Nuclear Power Plant)* CLI-07-18, 65 NRC 399, 414 n.46 (2007).

As explained above, the LSN heightens a petitioner’s already “ironclad” obligation to furnish adequate support because “early access to . . . documents in an electronically searchable form [has] allow[ed] for a thorough and comprehensive technical review of the license application by all parties and potential parties to the HLW licensing proceeding.” Final Rule,

LSN, Submissions to the Electronic Docket, 69 Fed. Reg. at 32,837. Thus, where a petitioner neglects to provide the requisite support for its contentions, the Board may not—and in this case absolutely should not—make assumptions of fact that favor the petitioner or supply information that is lacking. *See Ariz. Pub. Serv. Co.* (Palo Verde Nuclear Generating Station, Unit Nos. 1, 2, and 3), CLI-91-12, 34 NRC 149, 155 (1991).

Vague references to documents are not permissible. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Moreover, the mere incorporation of massive documents by reference is unacceptable. *See Tenn. Valley Auth.* (Browns Ferry Nuclear Plant, Units 1 and 2), LBP-76-10, 3 NRC 209, 216 (1976). Consistent with these requirements, the Case Management Order directs petitioners to ensure that documentary references “be as specific as reasonably possible.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7). Additionally, it requires that supporting documents (with the exception of readily available legal authorities, copyright-restricted material, and LSN documentary material), be electronically attached to the petition. In citing LSN documents, petitioners must include the LSN accession number as well as the title, date, and relevant pages of the document.

A petitioner also must explain the significance of any factual information upon which it relies. *See Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 204-05 (2003). With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Any supporting material provided by a petitioner, including those portions

thereof not relied upon, is subject to Board scrutiny, “both for what it does and does not show.” See *Yankee Atomic Elec. Co.*, LBP-96-2, 43 NRC 61, 90 (1996), *rev’d in part on other grounds and remanded*, CLI-96-7, 43 NRC 235 (1996). The Board should examine documents to confirm that they support the proposed contention(s). See *Vt. Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 48 (1989), *vacated in part on other grounds and remanded*, CLI-90-04, 31 NRC 333 (1990). The petition must provide analysis, references, calculations, or some other support for its contention. *Dominion Nuclear Conn., Inc.* (Millstone Power Station, Unit 3), CLI-08-17, 68 NRC \_\_ (slip op. at 11) (August 31, 2008). Mere reference to articles or documents without “explanation or analysis” does not supply an adequate basis for admitting a contention. See *USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). Nor can a petitioner’s imprecise reading of a document be the basis for a litigable contention. See *Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995).

Furthermore, “an expert opinion that merely states a conclusion (*e.g.*, the application is ‘deficient,’ ‘inadequate,’ or ‘wrong’) without providing a *reasoned basis or explanation* for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion” alleged to provide a basis for the contention. See *USEC*, CLI-06-10, 63 NRC at 472 (emphasis added) (quoting *Private Fuel Storage*, LBP-98-7, 47 NRC at 181). A contention cannot stand merely on an expert’s unsupported assertion the expert rejects the applicant’s representations and calculations as inadequate, without any specific challenge to the relevant analysis in the application. See *Dominion Nuclear Conn., Inc.*, CLI-08-17, 68 NRC \_\_ (slip op. at 11). Conclusory statements cannot provide “sufficient” support for a contention, even if they are proffered by an alleged expert. See *USEC*, CLI-06-10, 63 NRC at

472. In summary, a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000) (*GPU*)).

Nevada’s Petition falls well short of these standards. As will be demonstrated in response to individual contentions, Nevada’s bases for numerous contentions are unsubstantiated arguments of counsel that lack an adequate factual basis or rely upon alleged expert opinions that, in fact, do not exist in the affidavits submitted for that very purpose.<sup>30</sup>

Speculation does not provide adequate factual and/or expert opinion to support admitting a contention. *Dominion Nuclear Conn., Inc.*, CLI-08-17, 68 NRC \_\_ (slip op. at 11). Furthermore, for all but two of its experts, Nevada merely proffers an empty affidavit in which the expert adopts the entirety of statements and arguments contained in paragraph 5 of designated contentions. The affidavits of these experts consistently provide no additional factual information or analysis to support the legal argument reflected in the referenced paragraph 5 of the contention.<sup>31</sup>

The Atomic Safety and Licensing Board has criticized this very approach – the wholesale endorsement of contentions – and the Board has cautioned that a petitioner should distinguish its

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<sup>30</sup> For example, Nevada’s contention NEV-Safety-34 challenges DOE’s calculation of storm durations for modeling of net infiltration of rainfall. Nevada contends that DOE’s hydrological calculations are “flawed” and “inappropriate” because they allegedly ignore the “possibility” of short duration, high intensity rainfalls. Petition at 208-9. With respect to the requirement to provide adequate factual support, Nevada identifies no contrary data, studies, or scholarly references in support of that statement. On that basis alone, the contention does not satisfy section 2.309(f)(1)(v). Without any factual support – and without even pretense of explanation or analysis – Nevada simply concludes that this may lead to “potentially significant changes” to corrosion, radionuclide release and transport, and radiological impacts. *Id.* at 209.

<sup>31</sup> As just one example of many, Nevada relies on the affidavit of Adrian Butler (Attachment 6 to the Petition) to provide the requisite support for its contention NEV-Safety-34, but Mr. Butler’s affidavit adds no further information or analysis to buoy this contention. Instead, he merely adopts wholesale the statements contained in paragraph 5 of the contention.

legal pleadings from the substantive facts and opinions expressed by its expert. *See Entergy Nuclear Vermont Yankee LLC and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station), LBP-04-28, 60 NRC 548, 560 n.16 (2004). Having provided no “reasoned basis or explanation” for the experts’ conclusions, Nevada’s expert affidavits “deprive[] the Board of the ability to make the necessary, reflective assessment of the opinion” alleged to provide a basis for the contention. *See USEC, CLI-06-10, 63 NRC at 472.* Nevada takes this approach even further by indicating multiple experts that have adopted the same paragraph 5 for a single contention, leaving it unclear as to which expert is being proffered to support various portions of the contention.

An expert’s nominal imprimatur, however, cannot cure a contention’s failure to provide factual or other support for the claims therein. *USEC, CLI-06-10, 63 NRC at 472.* An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *Id.* Absent any tangible information or substance – let alone a “reasoned basis or explanation” – an affidavit is completely insufficient, rendering the contention inadmissible. *Fansteel, CLI-03-13, 58 NRC at 203.* DOE’s responses to the individual contentions point out those contentions that suffer from this deficiency. Those contentions, therefore, should be rejected.

**f. Petitioner Must Demonstrate that the Contention Raises a Genuine Dispute With Respect to a Material Issue of Law or Fact**

With regard to the final requirement, that a petitioner “provide sufficient information to show . . . a genuine dispute . . . with the applicant . . . on a material issue of law or fact, 10 C.F.R. § 2.309(f)(1)(vi), the Commission has stated that the petitioner must “read the pertinent portions of the license application, . . . state the applicant’s position and the petitioner’s opposing view,” and explain why it disagrees with the applicant. Rules of Practice for Domestic Licensing

Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 358.

In claiming that the Application fails to address adequately a material issue, a petitioner must “explain why the application is deficient.” Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Ariz. Pub. Serv. Co.*, CLI-91-12, 34 NRC at 156. An allegation that some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. See *Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). Put another way, a contention that does not *directly controvert a position taken by the applicant in the application* is subject to dismissal. See *Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992) (emphasis added). For example, if a petitioner submits a contention of omission, but the allegedly missing information is, in fact, contained in the license application, then the contention does not raise a genuine dispute.

Another repeated and critical flaw in Nevada’s contentions, particularly those relating to the TSPA and postclosure analysis, is the failure of Nevada to explain the significance of the errors, omissions, and uncertainties it alleges to the repository’s ability to meet regulatory standards, Nevada repeatedly states, in the context of its postclosure contentions, that:

Because the TSPA is a complex non-linear model, and changes in the approach adopted are likely to result in changes in the results obtained that vary both as a function of time postclosure and from realization to realization within a modeling case, a determination whether acceptance of this contention would necessarily lead to calculated doses in excess of EPA’s dose standards would require DOE to perform a substantial number of additional modeling cases

that are not included in the LA and that are beyond the practical ability of anyone else to perform.

While Nevada proclaims its inability to ascertain the significance of its allegations of errors and omissions, Dr. Thorne—an expert Nevada has retained for the past several years—is clearly on record as stating that Nevada acquired the tools to produce just such results.

In his own words, Dr. Thorne is “qualified and experienced in performing risk assessments for nuclear waste disposal facilities.” Declaration of Mike Thorne ¶ 1 (available on the LSN at participant accession # NEV5000160). He has undertaken an “extensive review of documents relating to the Yucca Mountain project” and is “familiar with DOE’s approach to developing its Total Systems Performance Assessment or ‘TSPA,’ which is [DOE’s] effort to assess quantitatively the combined performance of the natural and engineered systems at Yucca Mountain and compare the results with dose standards established or to be established by the EPA.” *Id.* ¶¶ 1 and 2.

In that regard, Dr. Thorne acquired GoldSim by 2004. GoldSim “is a software tool that serves as the architecture for integrating the TSPA data and models and performing the necessary multiple Monte Carlo simulations or calculations of dose (or runs).” *Id.* ¶ 6. Nevada, through Dr. Thorne, has expended “significant resources” in the ensuing years “acquiring relevant GoldSim expertise and in scrutinizing previous versions of the TSPA ....” August 13, 2007 Memorandum from Mike Thorne to A. Messenger et al. at 3 (available on the LSN under participant accession # NEV5000136).<sup>32</sup>

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<sup>32</sup> The previous versions of the TSPA that Dr. Thorne analyzed were prepared in connection with DOE’s Site Recommendation in 2002 and the draft Yucca Mountain Supplemental Environmental Impact Statement (Draft SEIS) that DOE issued in 2007. Notably, DOE provided Nevada with an external hard drive in connection with the Draft SEIS. That hard drive contained approximately 150 Gigabytes of TSPA data files that Dr. Thorne admitted would be “fundamental to scrutinizing the adequacy of the TSPA-LA.” Declaration of Mike Thorne ¶ 5. *See also* Affidavit of Peter Swift, ¶¶ 3-6 (Attachment 2).

Nevada apparently undertook this effort to enable it to quantify the impact of its contentions on the TSPA-LA, the version of the TSPA that supports the LA. *See* January 1, 2004 Memorandum from Mike Thorne at 2 (“Indeed, the State has acquired and *implemented* the DOE Total System Performance Assessment model *for the purpose of carrying out variant calculations* to investigate the issues that it has identified as requiring further consideration.”) (available on the LSN under participant accession # NEV5000140) (emphasis added). As Dr. Thorne states: “my own review of the GoldSim documentation indicates that GoldSim will be a convenient system within which to *modify* the DOE model and *examine implications* of such modifications.” January 1, 2002 Memorandum from Mike Thorne at 4 (available on the LSN at participant accession # NEV5000152) (emphasis added). Dr. Thorne has further opined: “If the TSPA-LA can be scrutinized and run on a single PC, the State should have *no difficulty* in understanding the model scrutiny and diagnostic calculations required to inform its evaluation of the DOE model.” October 15, 2007 Memorandum from Mike Thorne to R. Loux at 4 (available on the LSN at participant accession # NEV5000176) (emphasis added).

Nevada has since confirmed that the TSPA-LA can be scrutinized and run on its PCs. DOE gave Nevada hard drives in June 2008 that contained the data files for the TSPA-LA. *See* attached Affidavit of Peter Swift ¶ 8,<sup>33</sup> *see also* Petition at 851 (“The TSPA model was made available to the State of Nevada on an external hard drive.”) DOE additionally held a “tutorial” for Nevada regarding the TSPA-LA, and assisted Dr. Thorne in making the TSPA-LA operational on his computers and in troubleshooting problems he encountered. *See* August 13 and 18, 2008 emails from C. Fitzpatrick to M. Shebelskie (informing DOE of problem Dr.

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<sup>33</sup> Dr. Peter Swift’s curriculum vitae is Attachment 3 to this Answer.

Thorne encountered in running the TSPA-LA on his PCs and subsequently informing DOE that the “fix” it proposed worked) (LSN# DEN001607193 and LSN# DEN001607200, respectively).

Indeed, Nevada also obtained from the NRC Staff a copy of its independently derived Total Performance Assessment (TPA) model, which the Staff intends to use to review the TSPA-LA. October 8, 2007 Memorandum from Mike Thorne to R. Loux at 3 (available on the LSN at participant accession # NEV5000172). Dr. Thorne also installed that model on his computers and, according to Nevada’s records, has used it to perform test calculations to assist in analysis of the TSPA. *Id.*

The fact that Nevada had the ability to provide qualitative and quantitative assessments of the effects of its alleged errors and deficiencies in DOE's modeling as a result of this information is clearly demonstrated in the attached affidavit of Dr. Peter Swift. As Dr. Swift explains, DOE has provided Nevada with the calculation files for the TSPA model version that supports the LA and that allows execution of the TSPA model. Swift Aff. ¶¶ 7 and 8. Those files would permit Nevada to run full and partial realizations of the TSPA (assuming Nevada has a license for the GoldSim software, which Dr. Thorne has said Nevada does). Swift Aff. ¶ 10. Even without running TSPA executions, those calculation files, along with the Analysis Model Reports and associated files on the LSN, enable Nevada to provide at least a qualitative assessment, and in many cases a quantitative assessment, of the effect of its alleged errors and deficiencies on the repository's ability to meet regulatory standards. Swift Aff. ¶ 14. Nevertheless, despite its ability to do so, Nevada has failed to produce any such qualitative or quantitative results to show that its contentions might raise genuine disputes with respect to material issues of law or fact.

As this record demonstrates, Nevada had the ability to provide at a minimum, qualitative assessments from its experts describing the effect of its alleged errors and deficiencies on the

repository's performance. As discussed below, Nevada, by failing to present such information, fails to meet its burden at the contention admissibility stage.

That Nevada is required to explain the *implications* of the deficiencies it alleges, and to describe alternative results that differ materially from DOE's conclusions is made clear in the applicable NRC case law. In *Duke Energy*, the Board rejected as inadmissible a subpart of a petitioner's contention that the applicant relied upon "unreasonable and unsupported" assumptions in calculating accident consequences and that the applicant "understates" the "consequences" of accidents. *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), LBP-03-17, 58 NRC 221, 238 (2003), *aff'd on other grounds*, CLI-03-17, 58 NRC 419 (2003). In rejecting the subpart of this contention, the Board stated:

[T]he Intervenor[s] have made no showing either that the models used by [the applicant] are defective or incorrect for the purpose used or that those models were used incorrectly by Duke. Nor have the Intervenor[s] demonstrated that the models they are recommending are superior in any way to those employed by [the applicant]. The Intervenor[s] merely point out that, by using their models in the manner they are recommending, a different result would be achieved. This is an insufficient basis to formulate a valid contention.

*Id.*

With respect to a separate subpart of the contention at issue in *Duke Energy*, the Commission affirmed the licensing board's decision against the petitioner, where petitioner alleged that the applicant's severe accident mitigation analysis (SAMA) was "not supported" by a complete probabilistic risk assessment (PRA) model and, as a result, petitioner was unable to challenge the results of the applicant's analysis. LBP-03-17, 58 NRC at 229, *aff'd*, CLI-03-17, 58 NRC 419. The Commission found "generous support" for the Board's decisions, relying, for

instance, on testimony that with the PRAs provided by the applicant, the petitioner “could very easily ... do a SAMA evaluation for virtually anything.” *Duke Energy Corp.*, CLI-03-17, 58 NRC at 425. Despite the ability to perform “any kind of ‘independent calculations’ or analysis to point out anything lacking or wrong in the available PRA information” petitioner did not attempt to do so. *Id.* at 426. Nevada’s similar assertions are equally specious, considering its expert’s admitted capability to understand and modify the model’s diagnostic calculations.

Nevada frequently alleges that DOE omitted particular data or factors in its postclosure analysis without providing any insight into the *ramifications* of the omissions if Nevada's assumptions were correct and DOE’s were wrong. Such bare assertions, “without any specific source of evidence concerning the importance of the alleged omission,” do not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990).<sup>34</sup> The Petitioner in *Fla. Power and Light* alleged that a proposed editorial change to the facility’s technical specifications “increases the probability of operator error which could *result* in missed surveillances and unsafe plant operation.” *Id.* at 521 (emphasis added). The Board ruled on the admissibility of this contention and found that petitioner failed to “offer any facts,” “expert sources,” or a “reasoned statement” in support of its position. *Id.* The petitioner did not meet its burden to raise a genuine issue of fact and the contention was dismissed. *Id.* Likewise, quite recently in *Entergy Nuclear*, the Board, in

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<sup>34</sup> A petitioner must allege not only that “more accurate input data could be used,” but that the use of the data “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006). In *Entergy*, the petitioner alleged errors in Pilgrim’s SAMA analysis but also established that the use of “probabilistic modeling and incorrect parameters in [Entergy’s] SAMA analysis’ *results* in the downplaying of the likely consequences” of a severe accident. *Id.* at 324. The Board held that, when balanced alongside the “limited amount of detail” provided in the Application, petitioner met its burden. *Id.* at 339. Unlike the petitioner in *Entergy*, Nevada has failed to demonstrate that the alleged errors in DOE’s model could alter the results. What’s more, DOE’s over 8,000 page Application and several million documents filed on the LSN do not suffer from a lack of “detail.”

dismissing a contention as inadmissible on the ground that it failed to demonstrate a genuine dispute, said: “Riverkeeper [petitioner] has failed to make the minimal demonstration, as required by contention admissibility rules, that Entergy’s ER [Environmental Report] analysis fails to meet a statutory or regulatory requirement. *Presentation of an alternative analysis is, without more, insufficient* to support a contention alleging that the original analysis failed to meet applicable requirements.” *Entergy Nuclear Ops., Inc.* (Indian Point Nuclear Generating Units 2 and 3), LBP-08-13, 67 NRC \_\_ (slip op. at 183-84) (July 31, 2008) (emphasis added), *reconsideration denied*, LBP-08-13, 68 NRC \_\_ (slip op. at 7) (Dec. 18, 2008).

Nevada must also demonstrate how the use of a model different from the TSPA would change the results, and then tie those changes to a regulatory requirement that was not met. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff’d*, CLI-03-14, 58 NRC 207 (2003). In *Dominion Nuclear Conn.*, the petitioner alleged that Dominion’s proposed changes to the facility’s technical specifications regarding fuel-handling could modify containment closure and spent fuel pool ventilation requirements.” LBP-03-12, 58 NRC at 83. Accordingly, “*if ... containment penetrations are left open ... there is a greater likelihood of a release of radioactivity that might have an impact on those who live nearby.*” *Id.* (emphasis added). Although the Board found the above circumstances sufficient to show standing, they indicated that contention admissibility standards are “considerably more stringent.” *Id.* at 93. In dismissing the contention, the Board held that “mere allegation[s]” that increased levels of radiological effluents “will be ‘significant’” did not exhibit a genuine issue when: (1) “Petitioner has not specifically or directly challenged whether the Applicant meets the requirements of section 50.67(b)(2) or section 50.36...”; (2) “stated

with any specificity *how* any increases would occur”; (3) or “raised any challenge to the specific dose calculations.” *Id.* at 93-94 (emphasis in original).

On appeal to the Commission, the petitioner in *Dominion Nuclear Conn.* presented the same “general and speculative statements” absent “alleged facts” and “expert opinion” that it made before the Board. CLI-03-14, 58 NRC at 213. The Commission affirmed the Board’s decision and made the following pertinent findings:

- “it was [petitioner’s] burden to point out how the application is deficient. [Petitioner’s] contention, however, never challenges any of [Dominion’s] accident analyses, dose calculations, or its conclusion that postulated radiological releases from a fuel handling accident would not exceed applicable limits....” *Id.* at 215.
- “A contention alleging that an application is deficient must identify each failure and the supporting reasons for the petitioner’s belief.” *Id.* at 216
- “[Petitioner] never directly challenges [Dominion’s] accident analyses or dose calculations, *never provides any accident or dose analysis of its own, and therefore never indicates how a ‘significant’ radiological release may occur as a result of the proposed changes.*” *Id.* at 217 (emphasis added).

As will be demonstrated in response to individual contentions, on numerous occasions Nevada alleged that DOE’s model contained “uncertainties,” but it did not include any additional factual information or analysis regarding their impact on postclosure. The Commission recognizes that “uncertainties” may exist in DOE’s postclosure model. *See* Final Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, NV, 66 Fed. Reg. at 55,747-748. The Commission, however, has not found that the existence of “uncertainties,” by itself, is grounds for accepting a contention. For instance, in *Duke Energy Corp.*, LBP-03-17, 58 NRC at 236-38, *aff’d*, CLI-03-17, 58 NRC 419, the Board rejected as inadmissible the contention that Duke failed to take adequate account of uncertainties and their effect on the results of its analysis. LBP-03-17, 60 NRC at 234. The underlying question is not whether uncertainties exist, but, more importantly, whether the applicant “has satisfied

applicable NRC guidance with respect to such uncertainty analyses” or, in the alternative, “performed a qualitative analysis.” *Id.* at 236; *see also Fla. Power and Light Co.* (Turkey Point Nuclear Generating Plant), LBP-89-15, 29 NRC 493 (1989) (denying contention based upon allegations of errors and uncertainties in analysis). As noted previously, the applicable requirements for this proceeding have been codified in Part 63 and, in particular, 10 C.F.R. § 63.101(a)(2) that adopts the reasonable expectation standard established by EPA and § 63.304 that sets forth the characteristics of reasonable expectation.

DOE’s responses to the individual contentions, particularly those related to alleged errors, omissions or uncertainties in the TSPA modeling identify where Nevada’s contentions suffer from these critical flaws.

**4. Environmental Contentions Addressing DOE’s Final Environmental Impact Statement and its Supplements Must Also Meet the Requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326**

In its Hearing Notice, the Commission reaffirmed that proposed environmental contentions are subject to substantially heightened admissibility standards. In addition to the NRC’s contention admissibility requirements in 10 C.F.R. § 2.309(f), environmental contentions must also meet the requirements of 10 C.F.R. § 51.109 and the requirements of 10 C.F.R. § 2.326. These two sections impose the following admissibility standards on environmental contentions:

1. Contentions must allege that it is not practicable to adopt the DOE EIS for one of two reasons:

“(1)(i) The action proposed to be taken by the Commission differs from the action proposed in the license application submitted by [DOE]; and (ii) the difference may significantly affect the quality of the human environment;<sup>35</sup> or

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<sup>35</sup> Because the action proposed to be taken by the NRC does not differ from the action proposed in DOE’s application, this first factor has no relevance to this proceeding and will not be discussed further.

(2) Significant and substantial new information or new considerations render such [EIS] inadequate.” 10 C.F.R. § 51.109(c).

2. The contention must address a “significant” environmental issue. 10 C.F.R. § 2.326(a)(2).
3. The contention must demonstrate that, if true, “a materially different result would be or would have been likely . . . .” 10 C.F.R. § 2.326(a)(3).
4. The contention must be supported by affidavits that set forth the factual and/or technical basis for the movant’s claims and must be given by competent individuals with knowledge of the facts or by experts in the appropriate disciplines. 10 C.F.R. § 2.326(b).<sup>36</sup>

These additional admissibility standards are discussed in greater detail below.

**a. The 10 C.F.R. § 51.109 Criteria**

Given the *sui generis* nature of this proceeding, neither the Commission nor its boards have applied § 51.109 in the context of an adjudication. Nevertheless, existing Commission decisions and federal case law under NEPA provide guidance with respect to how the criteria under § 51.109 should be applied in this proceeding.

First, the Commission has made clear that its adjudicatory boards should not “automatically assume” that a proffered environmental contention—though cognizable as a “new consideration” under the D.C. Circuit’s decision in *Nuclear Energy Inst. v. Env’tl. Protection Agency*—contains “significant and substantial information” that, if true, would render the DOE EIS and its supplements “inadequate” under NEPA. 373 F.3d 1251 (D.C. Cir. 2004) (*NEI*). Letter from Bradley W. Jones, Esq., Assistant Gen. Counsel, U.S. Nuclear Regulatory Comm’n, to Martin G. Malsch, Esq., “Request By Nevada For Reconsideration and Clarification of Notice of Denial,” March 20, 2008, *available at* ADAMS Accession No. ML080810175 (Jones Letter). This approach is consistent with well-established NEPA principles, as applied by the federal

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<sup>36</sup> In addition, evidence in the affidavits must meet NRC admissibility standards and each criteria in 10 C.F.R. § 2.326 must be addressed separately.

courts, under which reviewing courts have held that the identification of a deficiency in an EIS does not necessarily render that EIS “inadequate.” For example, the D.C. Circuit so held in denying Nevada’s challenge to the transportation-related portions of DOE’s 2002 FEIS. *Nevada v. Dep’t of Energy*, 457 F.3d 78, 93 (D.C. Cir. 2006) (rejecting alleged inadequacies in the FEIS relating to environmental impacts on cultural resources, floodplains and archaeological and historic impacts and stating “we do not think that the inadequacies to which Nevada points make the FEIS inadequate” or render DOE’s selection of the Caliente Corridor “arbitrary and capricious.”). The D.C. Circuit in this prior proceeding emphasized that courts “will not ‘flyspeak’ an agency’s environmental analysis, looking for any deficiency no matter how minor.” *Id.* (citing *Fuel Safe Wash. v. Fed. Energy Regulatory Comm’n*, 389 F.3d 1313, 1323 (10th Cir. 2004); *Half Moon Bay Fishermans’ Mktg. Ass’n v. Carlucci*, 857 F.2d 505, 508 (9th Cir. 1988)).

The Commission, for its part, has indicated that this same standard applies in its licensing proceedings. As the Commission explained:

NEPA’s twin goals are to inform the agency and the public about the environmental effects of a project. At NRC licensing hearings, petitioners may raise contentions seeking correction of *significant inaccuracies and omissions* in the [applicant’s environmental report (“ER”) or agency’s EIS]. Our boards do not sit to ‘flyspeak’ environmental documents or to add details or nuances. If the ER (or EIS) on its face “comes to grips with all important considerations” nothing more need be done.<sup>37</sup>

*Sys. Energy Res., Inc.* (Early Site Permit for Grand Gulf Site), CLI-05-4, 61 NRC 10, 13 (2005) (quoting *Hydro Res., Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31,

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<sup>37</sup> See also *Duke Energy Corp.*, CLI-03-17, 58 NRC at 431 (“NRC adjudicatory hearings are not EIS editing sessions. Our busy boards do not sit to parse and fine-tune EISs.”). The Commission’s admonition against the “flyspecking” and “fine-tuning” of EISs is particularly apt here, given that DOE has “primary responsibility” for consideration of environmental matters under the NWPA. Final Rule, NEPA Review Procedures for Geologic Repositories for High-Level Waste, 54 Fed. Reg. 27,864, 27,865 (July 3, 1999) (codified at 10 C.F.R. § 51.109). In contrast, under the NWPA, the NRC’s NEPA-related responsibility in this proceeding is limited to determining whether adoption of DOE’s EIS, as supplemented, is “practicable.” *Id.*

71)) (emphasis added). A petitioner's claim must "suggest *significant environmental oversights* that warrant further inquiry at an evidentiary hearing." *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005) (emphasis added). Thus, as the D.C. Circuit recognized in *NEI*, there must be significant "substantive defects" in the FEIS. *Id.* at 1314.

Under NEPA, an EIS is not inadequate merely because a reviewing court or other adjudicatory tribunal might have reached a different conclusion. As the U.S. Supreme Court has explained, "[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions." *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE's EIS. Specifically, in promulgating 10 C.F.R. § 51.109, the NRC stated that "the adoption of the [DOE] statement does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy." Proposed Rule, NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed. Reg. 16,131, 16,142 (May 5, 1988). Thus, in accordance with 10 C.F.R. § 51.109(d), insofar as the presiding officer determines that NRC adoption of DOE's EIS is "practicable" under § 51.109(c), "such adoption shall be deemed to satisfy all responsibilities of the Commission under NEPA and no further consideration under NEPA or this subpart shall be required."

In this proceeding, DOE submits that boards should apply § 51.109 consistent with the above referenced well established NEPA case law and decisions of the Commission.

**b. The 10 C.F.R. § 2.326 Criteria and Procedures**

Section 51.109(a)(2) directs the presiding officer, “to the extent possible,” to use the “criteria and procedures that are followed in ruling on motions to reopen under § 2.326.” In its Hearing Notice, the Commission reiterated that a presiding officer should, to the extent possible, apply the reopening procedures and standards set forth in § 2.326. *See* Hearing Notice, 73 Fed. Reg. at 63,031.

By explicitly directing presiding officers to use the criteria and procedures contained in § 2.326, the Commission reaffirmed its longstanding intent to avoid, in accordance with the NWPA, “the wide-ranging independent examination of environmental concerns that is customary in NRC licensing proceedings.” Proposed Rule, NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed. Reg. at 16,136; *see also* Final Rule, 54 Fed. Reg. 27,864, 27,865 (July 3, 1999) (codified at 10 C.F.R. § 51.109) (“[W]e believe it to be a fair reading of Congressional intent that NRC can adequately exercise its NEPA responsibility with respect to a repository by relying upon DOE’s environmental impact statement.”). Specifically, the Commission has noted that the test for reopening a closed record—the same test to be applied by the Board in ruling on the admissibility of environmental contentions in this proceeding—is a “stiff test” that imposes a “strict” burden. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-06-3, 63 NRC 19, 22, 25 (2006); *see also Fla. Power & Light Co.* (Turkey Point, Units 3 and 4), LBP-87-21, 25 NRC 958, 963-64 (stating that “a party seeking to reopen the record has a ‘heavy burden’ to bear”) (quoting *Kan. Gas and Elec. Co.* (Wolf Creek Station, Unit No. 1), 7 NRC 320, 338 (1978)). Parties seeking to reopen a closed record must raise a “significant” safety or environmental issue and demonstrate that “a materially different result [is] ‘likely’ as a result of the new evidence.” *Private Fuel Storage,*

CLI-06-3, 63 NRC at 25. In applying this test, the Commission has further noted that “[n]ew information is not enough, *ipso facto*, to reopen a closed hearing record,” and that “the information must be significant and plausible enough to require reasonable minds to inquire further.” *Private Fuel Storage* (Independent Spent Fuel Storage Installation), CLI-05-12, 61 NRC 345, 350 (2005).

The Commission has further noted that the supporting material required by § 2.326(b) “must be set forth with a degree of particularity *in excess of* the basis and specificity requirements contained in 10 C.F.R. [§ 2.309] for admissible contentions. Such supporting information must be more than mere allegations; it must be tantamount to evidence.” *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-89-1, 29 NRC 89, 93 (1989) (emphasis added) (quoting *Pacific Gas and Elec. Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-775, 19 NRC 1361, 1366 (1984), *aff’d sub nom. San Luis Obispo Mothers for Peace v. U.S. Nuclear Regulatory Comm’n*, 751 F.2d 1287 (D.C. Cir. 1984), *aff’d on reh’g en banc*, 789 F.2d 26 (1986), *cert. denied*, 479 U.S. 923 (1986)). An intervenor’s mere “belief” is insufficient to satisfy § 2.326(b). *Fla. Power & Light Co.*, LBP-87-21, 25 NRC at 963.

In short, “the Commission expects its adjudicatory boards to enforce the [§ 2.326] requirements rigorously—*i.e.*, to reject out-of-hand [] motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989) (citing *La. Power & Light Co.* (Waterford Steam Electric, Unit 3), CLI-86-1, 23 NRC 1 (1986); *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), CLI-86-7, 23 NRC 233 (1986), *aff’d sub nom. Ohio v. U.S. Nuclear Regulatory Comm’n*, 814 F.2d 258 (6th Cir. 1987)).

In the *Private Fuel Storage* decision (CLI-06-3) discussed above, the Commission applied the § 2.326 standard in ruling on a motion to reopen the record (after the Commission had rendered its final adjudicatory decision and authorized license issuance) to litigate a proposed environmental contention. The Commission’s ruling is illustrative and underscores the heavy burden imposed by § 2.326.<sup>38</sup> For example, the Commission emphasized “the high threshold” for reopening a record as established by “longstanding regulations and precedent.” *Private Fuel Storage*, CLI-06-3, 63 NRC at 22; *see id.* at 25 (stating that the NRC does “not lightly reopen [its] adjudicatory proceedings”). The Commission found that the intervenor had failed to meet substantive and evidentiary requirements of § 2.326, stating that “we cannot say on the current record that a materially different result in our licensing proceeding is so ‘likely’ that we must reopen the adjudicatory proceeding for additional hearings and findings.” *Id.* at 26-27. Consequently, the Commission rejected the intervenor’s request that the entire project be placed on hold.

In the context of the Yucca Mountain proceeding, the requirement that the petitioner must demonstrate that a materially different outcome would likely result means that the contention, if true, would severely impact the EIS such that it could not be adopted unless formally supplemented by NRC or DOE.

In summary, given the considerably heightened admissibility standards applicable here, DOE submits that in this proceeding a presiding officer should admit *environmental* contentions in this proceeding only under very limited circumstances. Under 10 C.F.R. §§ 51.109(c) and

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<sup>38</sup> In recently denying a motion to reopen the record, the Commission emphasized the “deliberately heavy” burden associated with § 2.326. *See AmerGen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), CLI-08-28, 68 NRC \_\_ (slip op. at 13-14) (Nov. 6, 2008) (“The burden of satisfying the reopening requirements is a heavy one, and proponents of a reopening motion bear the burden of meeting all of [these] requirements.”) (internal quotation marks and citations omitted).

2.326, an environmental contention must present *evidence* concerning a “significant” environmental issue. Under those same provisions, that information must be so “substantial” as to demonstrate that the alleged inadequacy in the DOE EISs is “likely” to dictate a “materially different result.” As the Commission explained in *Private Fuel Storage*, this means that any “new information” proffered by a petitioner must present a “seriously different picture of the environmental landscape,” such that it would “be likely to change the outcome of the proceeding or affect the licensing decision in a material way.” CLI-06-3, 63 NRC at 19, 23.

**5. Contention Subjects That Are Outside the Scope of, or Immaterial to the NRC’s Required Findings in, the Yucca Mountain Licensing Proceeding**

As discussed above, a petitioner seeking admission of a proposed contention must, among meeting other requirements, demonstrate that the issue raised in the contention is within the scope of the proceeding and material to the findings that the NRC must make to support issuance of a repository construction authorization to DOE. A non-exclusive discussion of certain categories of contentions that clearly fall outside the proper scope of this proceeding and/or lack a material nexus to the Staff’s required findings is provided below.

**a. Contentions Relating to Transportation of Spent Nuclear Fuel (SNF) and High Level Radioactive Waste (HLW) Are Beyond The Scope of This Proceeding**

**(1) The NRC has no regulatory authority over transportation of SNF or HLW.**

Under the AEA and the Energy Reorganization Act (ERA), NRC does not have regulatory authority over DOE’s facilities and activities except as specifically provided by statute. 42 U.S.C. § 5851. Section 202 of the ERA provides the NRC with licensing and related regulatory authority over certain specific facilities of the DOE, including facilities for the disposal of SNF and HLW. 42 U.S.C. § 5842. However, neither section 202 of the ERA, nor the

NWPA, nor any other statute provides NRC with authority over the transportation by DOE of SNF and HLW.

DOE's transportation of SNF or HLW therefore is not subject to NRC regulation and the NRC has recognized the limited scope of its regulatory authority. For example, in its discussion of proposed amendments to its regulations regarding GROA Security and Material Control and Accounting Requirements, the NRC explained that the rulemaking did not cover transportation of HLW to the GROA because "the NRC's regulatory authority is limited to the operations at a GROA." GROA Security and Material Control and Accounting Requirements, 72 Fed. Reg. 72,522, 72,527 (Dec. 20, 2007). DOE is required by the NWPA to use NRC certified casks for shipment of SNF or HLW to the repository.<sup>39</sup> 42 U.S.C. § 10175. That certification, however, is separate and distinct from the repository licensing action being undertaken by the NRC under Part 63. The requirements for such a certification are set forth not in Part 63, but instead in 10 C.F.R. Part 71.

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<sup>39</sup> Similarly, in a May 10, 2002, response to a March 22, 2002, letter from Senator Richard Durbin, asking what role the NRC would play regarding transportation of spent fuel to Yucca Mountain, NRC Chairman Richard Meserve stated:

If DOE takes custody of the spent fuel at the licensee's site, *DOE regulations would control the actual spent fuel shipment*. Under such circumstances, the NRC's primary role in transportation of spent fuel to a repository would be certification of the packages used for transport.

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As stated previously, if DOE takes custody of the spent fuel at the reactor site the only involvement NRC will have in the transport will be the certification of the transport cask.

Letter from Richard Meserve, Former Chairman of the NRC, to Sen. Richard J. Durbin at 2 (May 10, 2002) available at ADAMS Accession No. ML21060662 (emphasis added). DOE's plan is to take custody of the spent fuel at the reactor site.

**(2) Contentions challenging DOE’s Records of Decision concerning transportation of materials to Yucca Mountain are outside the scope of this proceeding and are within the original and exclusive jurisdiction of the Courts of Appeals.**

In addition to the NRC’s lack of regulatory authority over transportation of SNF and HLW, under the NWPA, any challenges to DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, section 119 of the NWPA expressly provides that the United States Courts of Appeals shall have original and exclusive jurisdiction over any civil action for review of any final decision or action of the Secretary of Energy as well as of any civil action alleging the failure of the Secretary “to make any decision, or take any action, required under this subtitle.” 42 U.S.C. § 10139(a)(1)(C). Any such action must be initiated through a petition for review filed with a court of appeals within 180 days of the decision or action or failure to act involved. 42 U.S.C. § 10139(c).

Relevant to this proceeding, on October 10, 2008, DOE issued a Record of Decision (ROD) documenting DOE’s decision to construct a railroad in the State of Nevada in an alignment within the Caliente corridor along various segments together with various support facilities as detailed in the ROD. As discussed below, any challenge to the ROD accordingly must be initiated through a petition for review to a court of appeals – not through the NRC contention process.

In *Nevada v. Dep’t of Energy and Nuclear Energy Inst. v. Env’tl. Protection Agency*, the D.C. Circuit anticipated that DOE would in the future be issuing transportation related decisions. For example, in *NEI*, 373 F.3d at 1312, the Court stated:

Section 114(f)(4) of the NWPA provides, in relevant part, that the DOE’s FEIS “shall, to the extent practicable, be adopted by [NRC] in connection with the issuance by [NRC] of a construction

authorization and license for such repository.” 42 U.S.C. § 10134(f)(4). To the extent NRC adopts the FEIS, NRC’s responsibilities under the National Environmental Policy Act shall be deemed satisfied and “no further consideration shall be required.” *Id.* In addition, DOE is expected to use the FEIS to support one or more future decisions related to Yucca Mountain, including the selection of an alternative for transporting waste to the site.

Emphasis added.

On April 8, 2004, DOE issued a ROD addressing transportation matters. Subsequently, following issuance of DOE’s April 8, 2004 ROD, Nevada filed a petition for review with the D.C. Circuit pursuant to section 119 of the NWPA seeking review of the ROD and the transportation-related portions of the 2002 FEIS on which it was based. The ROD announced DOE’s selection, both nationally and in Nevada, of the mostly rail scenario analyzed in the 2002 FEIS as the primary means of transporting SNF and HLW to the repository. The ROD also selected the Caliente rail corridor from several corridors considered in the 2002 FEIS as the corridor in which to study possible alignments for a rail line connecting the Yucca Mountain site to an existing rail line in Nevada. *See* ROD on Mode of Transportation and Nevada Fuel and High-Level Radiation Waste at Yucca Mountain, Nye County, NV, 69 Fed. Reg. 18,557 (Apr. 8, 2004). Nevada claimed that “in selecting a national transportation mode and Nevada rail corridor for the movement of waste to Yucca, DOE violated NEPA and NEPA implementing regulations” and acted in an arbitrary and capricious manner and contrary to law. Petitioner’s Final Opening Brief at 2-4.

The D.C. Circuit took jurisdiction of the State’s petition for review and rejected the State’s claims on their merits (with the exception of certain contingency plans which the court

held were not ripe for review).<sup>40</sup> The Court held, among other things, that DOE had taken the “requisite hard look” at the potential rail corridor environmental impacts and that “DOE’s analysis of the environmental impacts of rail corridor selection in its FEIS is adequate.” *Nevada*, 457 F.3d at 89-93. The D.C. Circuit also held that “[w]e summarily deny any claims not specifically addressed in this opinion,” which included all the issues raised in the State’s briefs. *Id.* at 94 n.10.

This decision is res judicata as to Nevada and the preclusive effect of this decision applies not only to those NEPA claims decided by the court of appeals but also to those which could have been raised. *W. Radio Servs. Co. v. Glickman*, 123 F. 3d 1189 (9th Cir. 1997) (concluding that “any cognizable claims should have been raised in *Western Radio I*, and are thus barred by res judicata”). Of course, any person who failed to file a challenge within 180 days would be time barred pursuant to NWSA section 119(c) among other defenses. Further, as the Commission has recognized, a party does not have the option of postponing judicial review under section 119 of the NWSA, by instead trying to raise transportation-related environmental issues before the NRC. In particular, the NRC rejected this approach when it was raised in comments to the proposed 10 C.F.R. § 51.109 in 1989. In their comments to the Commission, certain environmental organizations stated that “affected parties may decide for reasons of litigative strategy” to raise environmental issues “in NRC licensing proceedings rather than by going to court.” Final Rule, NEPA Review Procedures for Geologic Repositories for High-Level Radioactive Waste, 54 Fed. Reg. at 27,866. The Commission responded by stating that such a “unilateral decision” would “circumvent the clear policy of the NWSA....” *Id.*

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<sup>40</sup> The Court of Appeals noted that “[a]lthough much of the FEIS concentrated on the Yucca site, it also analyzed alternatives for, and the ‘potential environmental consequences’ of, transporting nuclear waste from the many production sources throughout the country to the repository at Yucca.” *Nevada*, 457 F.3d at 82.

The same path of review followed in 2004 is appropriate with respect to challenges to DOE's transportation decisions set forth in the Department's October 10, 2008 ROD. The fact that the NRC construction authorization proceeding, which is limited to activities at the GROA, now has commenced does not alter the requirement under section 119 of the NWPA that final DOE decisions must be appealed to the courts of appeals whose jurisdiction is "original and exclusive" over such matters. 42 U.S.C. § 10139(a)(1).

In summary, challenges to the April 2004 ROD, and the transportation related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, both as a result of the expiration of the 180 day period to challenge that ROD set forth in section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**(3) Consideration by NRC of transportation impacts under NEPA is limited.**

Under section 114 of the NWPA, the Commission must adopt DOE's FEIS to the extent practicable. In considering the environmental impacts of transportation decisions made by DOE, the role of the NRC here is similar to that adopted by the Commission in *Pub. Serv. Co. of N.H.*, (Seabrook Station, Units 1 and 2), CLI-78-1, 7 NRC 1, 25 (1978), and affirmed by the court of appeals in *New England Coalition on Nuclear Pollution v. U.S. Nuclear Regulatory Comm'n*, 582 F.2d 87 (1st Cir. 1978). In that case, the petitioners argued that NEPA did not permit the NRC to adopt EPA findings made under the Federal Water Pollution Control Act (FWPCA) without an independent inquiry of the effects a proposed nuclear power plant would have on the aquatic environment. As the Commission noted, Congress had amended the FWPCA to avoid

duplicative reviews, and left to the EPA the decision as to the water pollution control criteria to which a nuclear power plant's cooling system would be held. The NRC was not free to ignore considerations of aquatic impact; "it would have to consider them, but only as part of its overall 'balancing judgment' on whether it is in the public interest to grant the requested permit." *Pub. Serv. Co. of N.H.*, CLI-78-1, 7 NRC at 25. The NRC, further, could not "go behind" the EPA's determination. *Id.* at 26.

Similarly, in this proceeding, the NRC should decide whether to issue construction authorization for the repository given the transportation impacts as determined by DOE (and potentially as reviewed by the court of appeals). Accordingly, contentions challenging the accuracy or adequacy of DOE's NEPA analysis of the impacts of transporting SNF or HLW are not proper subjects for contentions in this proceeding.

**b. Contentions Relating to the Proposal by DOE to Accept SNF in TADs Are Beyond The Scope of This Proceeding**

Certain Nevada contentions relate to DOE's proposal to accept a substantial amount of commercial SNF for transportation and disposal in Transportation Aging and Disposal canisters (TADs) rather than dual purpose canisters (DPCs). These contentions would have NRC second-guess DOE's management decision to accept up to as much as 90% of commercial SNF in TADs and, in effect, would require DOE to accept a smaller percentage of commercial SNF in TADs. DOE will make its decisions concerning how to accept commercial SNF pursuant to contracts mandated by the NWPA, and NRC has no statutory or regulatory authority over those contractual decisions. While NRC can consider the effects of DOE's proposal to accept up to 90% of commercial SNF in TADs, it cannot go behind that proposal and, in effect, specify how much commercial SNF DOE can accept in TADs. Thus, any contention premised on such a change is beyond the scope of this proceeding.

**(1) The NRC has no regulatory authority over DOE SNF or HLW management outside the GROA.**

Under the AEA and the ERA, NRC does not have regulatory authority over DOE's facilities and activities except as specifically provided by statute. 42 U.S.C. § 5851. Section 202 of the ERA provides the NRC with licensing and related regulatory authority over certain specific facilities of the DOE, including facilities for the disposal of SNF and HLW. 42 U.S.C. § 5842. However, neither section 202 of the ERA, nor the NWPA, nor any other statute provides the NRC with authority over DOE's management of SNF and HLW outside the specified facilities, including the acceptance of SNF and HLW for disposal at the Yucca Mountain site. As noted previously, the NRC has recognized its "regulatory authority is limited to the operations at a GROA." GROA Security and Material Control and Accounting Requirements, 72 Fed. Reg. 72,522, 72,527 (Dec. 20, 2007). While DOE is required by the NWPA to use NRC certified casks for shipment of SNF or HLW to the repository, that requirement is separate and distinct from any contractual decisions that DOE may make in the future as to how much, if any, commercial SNF to accept in TADs.

**(2) DOE's decisions in the future on what percentage of commercial SNF to accept in TADs are contract decisions outside the scope of this proceeding.**

DOE's decisions on how much commercial SNF to accept in TADs are not subject to review by NRC. Section 302 of the NWPA is explicit that the acceptance by DOE of commercial SNF and HLW for disposal at the Yucca Mountain site is governed by the contract between DOE and the generator of the SNF and HLW and that DOE is responsible for establishing the terms and conditions of the contract. While section 302 makes such a contract a condition for the issuance or renewal by NRC of a license for a commercial power plant, neither section 302 nor any other statutory provision grants the NRC the authority to approve the terms

and conditions of the contract or regulate how the contract is implemented. Any questions concerning the implementation of a contract under section 302 must be resolved by DOE and the contractholder or by an appropriate court.

In addition, DOE's 2002 FEIS analyzed the impacts of the proposed action – the construction and operation of a geologic repository at Yucca Mountain for the disposal of SNF and HLW, including the transportation of commercial SNF to the repository. As part of the transportation analysis, DOE assessed the impacts of fuel packaging and loading activities at the commercial utility sites. DOE subsequently issued a ROD addressing transportation matters, including the selection of mostly rail as the national mode of transportation. In the Repository SEIS, DOE updated the FEIS to reflect changes in the design and operational details, including the use of TADs to accept, transport and dispose of up to 90 % of the commercial SNF. The SEIS also reflected DOE's transportation-related decisions made following the completion of the FEIS. DOE concluded in the final Repository SEIS that the potential impacts associated with the updated repository design and operational plans are similar in scale to the impacts analyzed in the 2002 FEIS. DOE did not modify the April 2004 ROD decision on the transportation mode.

**(3) Consideration by NRC of environmental impacts of DOE's decision to accept up to as much as 90 percent of commercial SNF in TADs is limited.**

For the same reasons discussed in sections 5.a.(2) and (3), challenges to DOE's proposal to accept up to as much as 90 % of commercial SNF in TADs and DOE's analysis of the environmental impacts of that proposal are not appropriately a part of this proceeding. Put simply, NRC must take DOE's proposal to accept up to as much as 90 percent of commercial SNF in TADs and DOE's analysis of the environmental impacts of that proposal as a given in

deciding whether to issue a construction authorization for the repository. *See* Pub Serv. Co. of N.H., CLI-78-1, 7 NRC at 25-26.

**B. DOE’s Answer Regarding the Admissibility of Petitioner’s Proposed Contentions**

**1. NEV-SAFETY-01 - Doe Integrity**

The LA cannot be granted because DOE lacks the requisite integrity to be an NRC licensee.

**RESPONSE**

In this contention Nevada alleges that DOE lacks the integrity to be issued a license by the NRC based upon alleged “material false statements and omissions and an elevation of schedule considerations over safety and compliance” over the last 20 years. Petition at 16. Nevada raises a very serious allegation about the general character and integrity of a federal agency, based on a small number of hand-selected quotations taken out of context. In doing so, Nevada does not accurately characterize the record or accomplishments of the United States Department of Energy, the OCRWM, or the Yucca Mountain Project.

Ultimately, this contention represents an attempt to redirect this proceeding away from an adjudication of the technical adequacy of the Application, as mandated by statute and regulation, towards an unauthorized inquiry into the general qualifications of the applicant. Even if such an inquiry were authorized—which it is not—Nevada has failed to present credible evidence of a legitimate integrity issue within DOE, OCRWM, or the Yucca Mountain Project. Instead, Nevada uses information taken out of context from a handful of documents in a failed effort to impugn the general character and integrity of DOE.

Nevada’s contention raises an issue which is outside the scope of this proceeding, is immaterial to any findings NRC must make in this proceeding, is without any adequate factual

premise and fails to raise a genuine dispute of law or fact; and for the reasons more fully discussed below, it should be denied.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding because the “character” requirements of Section 182a of the Atomic Energy Act of 1954 (AEA), 42 U.S.C. § 2011 *et. seq.*, do not apply to DOE, and because under the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10101 *et. seq.*, Congress has already designated DOE as the appropriate applicant. By challenging the character and integrity of the U.S. Department of Energy and its fitness to receive construction authorization, Nevada has attempted to redirect this proceeding away from an adjudication of the technical adequacy of the *application*,<sup>41</sup> towards an impermissible and wide-ranging inquiry into the general character and integrity of a department of the United States government, which is the statutory *applicant*.

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<sup>41</sup> The Commission’s Notice of Hearing, which defines the scope of this proceeding states, in pertinent part, that [t]he matters of fact and law to be considered are whether the *application* satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC’s standards in 10 CFR Part 63 for a construction authorization for a high-level waste repository . . . .” Hearing Notice, 73 Fed. Reg. 63,029 (Oct. 22, 2008) (emphasis added).

**(1) The “Character” Requirement in Section 182a of the AEA Does Not Apply to DOE or to this Proceeding**

This contention is outside the scope of this proceeding because Nevada mistakenly relies upon Section 182a of the AEA (42 U.S.C. § 2232a), in arguing that “an applicant’s integrity is a proper consideration in a licensing hearing.” *See* Petition at 16 (*citing Georgia Power Co.* (Vogtle Electric Generating Plant, Units 1 & 2), CLI-93-16, 38 NRC 25 (1993) (citing, in turn, to 42 U.S.C. § 2232a)).<sup>42</sup> Section 182a of the AEA requires an NRC license application to provide, among other things, sufficient information for the NRC to determine the “character of the applicant” for a license. 42 U.S.C. § 2232a. This aspect of Section 182a, however, does not apply to DOE, nor does the character inquiry apply to this proceeding.

First, Nevada misconstrues the purpose of NRC’s statutory authority to consider the “character of the applicant.” The legislative history makes clear that Congress intended this provision to provide the Atomic Energy Commission with the authority to ensure that *private* applicants possessed the requisite character to be licensed under the AEA. The Joint Committee on Atomic Energy’s Report on Amending the Atomic Energy Act of 1946 states that the AEA would permit “the Commission to license private industry to possess and use special nuclear materials. . . . [It] also permits private persons . . . to own reactors intended to produce and utilize such materials.” S. Rep. No. 1699-83, at 9 (1954). For security reasons, the Joint Committee was concerned, among other things, about retaining strict controls on access to information about nuclear power. *See id.* at 7 (“Clearance for access to restricted data has been contingent upon an investigation as to the *character*, associations, and loyalty of the individual.”) (emphasis added).

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<sup>42</sup> DOE also objects to Nevada’s routine practice of omitting page citations to Commission case law. This is contrary to the Advisory PAPO Board’s Case Management Order, which states that “references shall be as specific as possible.” LBP-08-10, slip op. at 7. DOE understands this directive to cover “legal authorities” as well. *See id.*

The same concerns motivated the previous “stringent prohibitions . . . against private participation in atomic energy.” *Id.* at 9. Thus, Section 182a specified that Commission licensees should possess the requisite “character.” 42 U.S.C. § 2232a.

Based on this provision, intended to safeguard the public from the unfettered *private* access to restricted information concerning nuclear power, Petitioner—the State of Nevada—now asks one agency of the federal government—NRC—to adjudicate sweeping allegations against the *general* character and “integrity” of another federal agency—DOE; an agency that Congress, through the AEA, the Energy Reorganization Act, the DOE Organization Act and other statutes, has assigned substantial national security responsibilities in this country and around the world. This is not what Congress had in mind when it determined that DOE “shall” apply for this license. 42 U.S.C. § 10134(b). This Board should decline Nevada’s invitation to redirect this proceeding away from the technical validity of the application towards this type of wide-ranging and unauthorized inquiry.

Moreover, in addition to the general provisions of AEA Section 182a, Section 121(b) of the NWPA provides more specific requirements for this license application proceeding. Specifically, NWPA Section 121(b) authorizes the Commission to “promulgate technical requirements and criteria that it will apply . . . in approving or disapproving *applications* for authorization to construct repositories . . . .” 42 U.S.C. § 10141(b) (emphasis added). This provision, unlike AEA Section 182a, omits any reference to an evaluation of character qualifications of the *applicant*, confirming that this proceeding is limited to an inquiry into the technical adequacy of the application, not the *general* character or integrity of the applicant.

## (2) Nevada Impermissibly Challenges the NWPA

In enacting the NWPA, Congress determined that DOE is the appropriate applicant for the license at issue in this proceeding and to exclude from this proceeding any wide-ranging inquiry into the technical qualifications of the applicant. Congress designated DOE as the applicant and it is not for the NRC to reconsider that designation. It is well established that a petitioner may not challenge applicable statutes as part of an adjudicatory proceeding. *Carolina Power & Light* (Shearon Harris Nuclear Power Plant), LBP-07-11, 65 NRC at 57-58 (2007) (citing *Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974)) (stating that any contention that collaterally attacks applicable statutory requirements must be rejected by the Board as outside the scope of the proceeding).

As explained in Section (1), above, NWPA Section 121(b) specifies an inquiry into the technical adequacy of the application, but not into the general qualifications of the applicant. *See* 42 U.S.C. § 10141(b). Further, NWPA Section 114(b) directs DOE to construct and operate a geologic repository for the disposal of HLW. 42 U.S.C. § 10134(b) (“If the President recommends to Congress the Yucca Mountain Site . . . the Secretary [of Energy] shall submit to the Commission an application for a construction authorization for a repository . . .”). In so doing, Congress concluded that DOE, as an agency of the federal government, not only possesses the requisite attributes of an applicant, but is the *only* appropriate applicant for this license. Nevada’s contention is an impermissible challenge to Congress’ specifications for this proceeding and choice of applicant and, as such, constitutes a collateral attack on the NWPA.

If Nevada’s contention were admitted, it would place the NRC in the untenable position of potentially denying the application, not because of any identified technical inadequacy, but because of a dispute over the alleged integrity of the applicant. In that case, the NRC would be

overruling Congress's choice of DOE as the applicant. *Cf. U.S. Dep't of Energy (Plutonium Export License)*, CLI-04-14, 59 NRC 357, 375 (2004). In *Plutonium Export*, the Commission held that, in the nuclear export arena, "the Executive Branch's noninimicality determinations involve 'strategic judgments' and foreign policy and national security expertise regarding the common defense and security of the United States, and the NRC may properly rely on those conclusions." *Id.* at 374. In this proceeding, the situation is even more compelling in that the determination that Nevada seeks to challenge—Congress' choice of DOE as the appropriate applicant for this license—has been made by the Legislative Branch and this decision carries with it the force of law.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As discussed above, Nevada's challenge to DOE's integrity and therefore its fitness to hold the construction authorization is not material to the findings the NRC must make in this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Even assuming that Nevada's "integrity" allegations are cognizable in this proceeding, they are still unsupported by adequate facts or expert opinion. The allegations rest primarily upon quotations from documents selectively taken out of context and then mischaracterized. As explained in the Legal Standards section above, Boards must carefully scrutinize factual allegations and the documents cited in support of contentions. This includes a review of the cited documents to confirm that they support the proposed contention. Section f(3), below, discusses each document cited by Nevada in support of its contention in more detail and explains why they fail, individually and collectively, to provide the requisite factual support for a

contention challenging DOE or OCRWM's integrity or character. Thus, this contention is not supported by references to sufficient facts.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Even if this contention were within the scope of this proceeding, it still fails to raise a genuine dispute on a material issue of fact or law.

**(1) General Legal Standards Governing Integrity-Related Allegations**

Historical actions by an applicant or licensee are not relevant to its current fitness as an applicant unless “there [is] some direct and obvious relationship between the [alleged] character issues and the licensing action in dispute.” *Dominion Nuclear Conn.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 365 (2001) (citation omitted); *see also Ga. Inst. of Tech.* (Georgia Tech Research Reactor), CLI-95-12, 42 NRC 111, 120 (1995) (stating that “[a]llegations of management improprieties or poor ‘integrity,’ of course, must be of more than historical interest: they must relate directly to the proposed licensing action”). As the Commission has noted,

To accept the Petitioners' reasoning [regarding alleged historical management deficiencies] would potentially insert management integrity issues into virtually all [licensing] proceedings at facilities with prior violations . . . . We cannot allow admission of contentions premised on a general fear that a licensee cannot be trusted to follow regulations of any kind . . . . [W]hen ‘character’ or ‘integrity’ issues are raised, we expect them to be directly germane to the challenged licensing action.

*Dominion Nuclear Conn.*, CLI-024, 54 NRC at 366-67.

Since the *Dominion Nuclear Conn.* case, the Commission has consistently followed this principle. For example, in *La. Energy Servs., L.P.* (National Enrichment Facility), the Commission upheld the Board's rejection of a contention alleging historical management

improprieties because the intervenors “nowhere linked these individuals [who were involved in past deficiencies] to [the applicant’s] *current* management personnel or practices, and thus they have not shown how these long-ago alleged historical events pertain to the proposed . . . facility.” CLI-05-28, 62 NRC 721, 724 (2005) (emphasis in original). Thus, the Board “correctly found that [the intervenors] did not demonstrate a direct and obvious relationship between the alleged management character issues and the licensing action at issue. *Id.* at 725 (citations and quotations omitted); *see also USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 464-65 (2006) (upholding the Board’s rejection of a similar contention alleging management incompetence and improprieties).

Accordingly, a petitioner may not use allegations of historical DOE deficiencies or alleged management improprieties as a basis for a contention. This is because “this proceeding cannot be a forum to litigate whether [the applicant] made mistakes in the past, but must focus on whether [the applicant] as presently organized and staffed can provide reasonable assurance of candor and willingness to follow NRC regulations.” *Ga. Inst. of Tech* (Georgia Tech Research Reactor), CLI-95-12, 42 NRC at 120-21; *see also Metro. Edison Co.* (Three Mile Island Nuclear Station, Unit No. 1), CLI-85-9, 21 NRC 1118, 1139 (1985) (“It is the qualifications of this management, not the management of 6 years ago, that the Commission is now evaluating.”).

Moreover, alleged errors—or even multiple violations of NRC requirements—are insufficient by themselves to raise a valid “management” contention. *Cf. USEC, Inc.*, CLI-06-10, 63 NRC at 465 (upholding the Board rejection of a management competence contention because intervenor’s claims did not “present any *ongoing* pattern of violations or disregard for regulations that might be expected to occur in the future”) (emphasis in original); *Union Elec. Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983) (a contention alleging a

systemic quality assurance breakdown must be “of sufficient dimensions to raise legitimate doubt as to the overall integrity of the facility and its safety-related structures”). The NRC also recognizes that applicants may make errors, so evaluations of character and integrity must include an evaluation of corrective actions. *Houston Lighting & Power Co.* (South Texas Project, Units 1 & 2), ALAB-799, 21 NRC 360, 373-74 (1985). In fact, an applicant’s corrective actions alone are evidence of good character, even without evidence that those corrective actions were effective. *Houston Lighting & Power Co.* (South Texas Project, Units 1 & 2), LBP-84-13, 19 NRC 659, 688 (1984), *aff’d* ALAB-799, 21 NRC 360 (1985) (“An applicant’s sincere attempts to correct deficiencies may be viewed as favorable from a character standpoint irrespective of success.”).

As explained in Section (2), below, all of Nevada’s integrity-related allegations relate to historical deficiencies, technical matters that have been corrected, or otherwise fail to raise any recognizable integrity issue.

**(2) Petitioners Face An Elevated Burden to Raise Integrity-Related Allegations In This Proceeding**

Even if this Board were to find that an integrity claim could conceivably be made in this proceeding, the petitioner would face an elevated burden of demonstrating its allegations through “clear evidence” that must be sufficient to rebut the presumption that DOE and its officials act with integrity.

DOE (and the specific organization responsible for this Application, OCRWM) is an agency of the United States government, and so therefore can be presumed to possess the requisite integrity to hold a license from another agency of the United States government. It is well-established that a “presumption of regularity attaches to the actions of Government agencies . . . .” *U.S. Postal Serv. v. Gregory*, 534 U.S. 1, 10 (2001) (citation omitted); *see also U.S. Dep’t*

*of Energy* (High-Level Waste Repository: Pre-Application Matters), CLI-08-11, 68 NRC \_\_ (slip op. at 8) (June 5, 2008). As the Commission has recognized in these proceedings, “[a]bsent clear evidence to the contrary, we presume that public officers will properly discharge their official duties.” *U.S. Dept. of Energy*, CLI-08-11, 68 NRC \_\_\_\_\_ (slip op. at 8) (internal quotations, brackets and citation omitted). Thus, Petitioners in this proceeding face an elevated burden, beyond that in the case law described in Section (1), above, of demonstrating their integrity-related allegations through clear evidence.

In attempting to rebut this presumption, Nevada fails to recognize that DOE is already an NRC licensee, and raises no specific integrity-related issues with respect to DOE’s conduct under its existing NRC licenses. For example, since 1999 DOE has held an independent spent fuel storage facility (“ISFSI”) license for the Three Mile Island-2 ISFSI (Materials License SNM-2508). *See also U.S. Dep’t of Energy*, CLI-04-17, 59 NRC at 375 (rejecting an intervention petition and authorizing issuance of a license to DOE to export 140 kg of plutonium oxide to France). Nevada fails to identify any inspection report documenting any integrity concerns from an NRC inspector, much less provide evidence of such integrity concerns that are sufficiently linked, in time and subject matter, to the instant proceeding.

Most importantly, in its claim that the Department lacks integrity, Nevada fails to address the fact that DOE is the agency that Congress has entrusted to undertake an enormous range of activities related to energy, the environment and the national defense, not the least of which is its charter “[t]o maintain the safety, reliability, and security of the United States nuclear weapons stockpile.” 50 U.S.C. § 2534(a)(1). It is therefore unreasonable to suggest that DOE does not have the character or integrity to build and operate this repository.

### **(3) None of Nevada’s Specific Allegations Raise a Genuine Dispute**

Ultimately, this contention is based on six discrete allegations that are intended to place DOE’s character and integrity into dispute. These allegations relate to isolated and dated events and therefore fail to show a systemic integrity breakdown across DOE, OCRWM, or the Yucca Mountain Project.

For perspective, there are well over three million documents currently in the LSN, the vast majority generated by DOE over the long life of this project. Nevada seizes upon isolated groups of these documents, reads them out of context, fails to provide any subsequent documents that might put in context the disjointed quotes it relies upon, and then extrapolates from those quotations a claim that the entire United States Department of Energy lacks the integrity to hold an NRC license. Thus, as explained in detail below, Nevada fails to raise any litigable issues regarding DOE’s integrity.

#### **(a) Safety-Conscious Work Environment**

Nevada begins its claim with vague allusions to the NRC’s emphasis on a “safety conscious work environment” (“SCWE”), and seeks to compare its allegations to certain NRC enforcement actions against other licensees, purportedly “[o]n grounds less compelling than those described below.” Petition at 17. Nevada, however, utterly fails to explain, with reference to any specific facts, how its allegations against DOE are more “compelling” than the facts of the various enforcement orders that it cites. *See id.* In any event, none of the alleged comparable cases cited by Nevada formed the basis for NRC to revoke or deny a license. In all of the cases cited by Nevada on this point, even though NRC enforcement was involved, the NRC nonetheless permitted continued licensed activities.

Moreover, SCWE is an NRC Staff policy, not a regulatory requirement. This is clear from Nevada's citations to a Staff Inspection Manual Chapter (for *operating reactors*) and an Inspection Procedure (again for *operating reactors*). Because SCWE is not a regulatory requirement, nor is it a licensing criterion under Part 63, SCWE-related claims are not litigable in this proceeding.

DOE nevertheless takes SCWE very seriously. Indeed, as discussed below, when read in context, the very documents Nevada cites in its remaining allegations primarily serve to illustrate the Yucca Mountain Project's deep commitment to healthy safety culture, including SCWE.

**(b) The 2004 PAPO Board Decision**

Nevada selectively quotes from the PAPO Board's decision overturning DOE's initial LSN certification, claiming this as an example of DOE "violati[on] of NRC regulations." Petition at 18. The cited PAPO Board decision resolved certain factual and legal disputes between Nevada and DOE over the regulations governing the LSN. *U.S. Dep't of Energy* (High-Level Waste Repository), LBP-04-20, 60 NRC 300 (2004) (PAPO Board Decision). At all times in the course of that proceeding DOE raised and argued its points in good faith, and nothing in Nevada's citation to this earlier dispute calls DOE's integrity into question.

Any deficiencies identified in the PAPO Board Decision have now been remedied. DOE has certified its LSN compliance, and the PAPO Board upheld that certification against Nevada's challenge. *See U.S. Dep't of Energy* (High-Level Waste Repository: Pre-Application Matters), LBP-08-01, 67 NRC \_\_ (January 4, 2008), *aff'd*, CLI-08-12, 67 NRC \_\_ (June 17, 2008). Historical deficiencies that have been subsequently corrected are insufficient to raise an integrity or management issue in an NRC proceeding. *Dominion Nuclear Conn.*, CLI-01-24, 54 NRC at 366; *see Houston Lighting & Power Co.*, ALAB-799, 21 NRC at 373-74.

In addition, Nevada fails to explain how the Board's statements that DOE's approach "strain[ed] credulity" or that "DOE and its agents did not get their act together in time" or identifying "fundamental and system-wide problem[s]" raise integrity, candor, or character issues. Petition at 18. Indeed, the parties did not raise, nor did the PAPO Board adjudicate, any such issues. Nevada essentially rewrites a narrow Board decision on disputed legal and factual matters. It does so by juxtaposing unfounded "integrity" allegations—allegations that the Board did not identify or address—against certain selected quotations from the Board's opinion.

**(c) Project Documents from 2006 and 2007**

Nevada identifies certain Yucca Mountain Project documents that, it argues, show that the project's June 30, 2008 LA submittal goal led to compromises on safety. Allegedly, the documents show that, "[e]xamples abound indicating that DOE abetted or tolerated, if not established, a culture in which meeting artificial schedules was more important than safety or compliance, and withheld material safety information from the NRC, with apparent willful intent." Petition at 18.

As explained in further detail below, the information cited by Nevada in support of its serious allegation fails to raise a genuine dispute for four reasons. First, Nevada unjustifiably draws general conclusions from its selective quotation of three LSN documents. Second, Nevada fails to explain how setting a schedule, by itself, indicates an integrity issue within the Yucca Mountain Project. Third, when the project's statements are looked at as a whole, they show that the Yucca Mountain Project has taken a balanced approach to safety, quality, and schedule. Finally, Nevada's allegations are unsupported by the very documents Nevada identifies.

Nevada claims that a federal agency lacks integrity based on quotations taken out of context from three documents that it has hand-picked from a collection of millions of DOE LSN documents. Nevada's examples are isolated events that are not symptomatic of a pattern of ongoing management deficiencies, much less of ongoing, safety significant, integrity-related regulatory violations. *Cf. USEC, Inc.*, CLI-06-10, 63 NRC at 465; *Union Elec. Co.*, ALAB-740, 18 NRC at 346. Nor has Nevada made or supported any reasonable argument demonstrating that such isolated events are symptomatic of a pattern of integrity deficiencies. As explained further below, Nevada fails to show such a pattern through the requisite clear evidence. *U.S. Dept. of Energy*, CLI-08-11, 68 NRC \_\_\_\_, (slip op. at 8).

Establishing time-minded goals and a management emphasis on schedule are not by themselves indicative of an integrity (or competence) issue. Simply because management establishes and holds its team to a schedule does not show that safety is compromised.

Moreover, in this contention, Nevada criticizes DOE's *current* project team for sticking to a schedule established by management. In NEV-SAFETY-02, however, Nevada takes the reverse approach: criticizing DOE management for failing to meet such deadlines in the past. *E.g.*, Petition at 32. That is, under NEV-SAFETY-01, if DOE meets the schedule it lacks the integrity to slow down and do it right, but under NEV-SAFETY-02, if it exceeds the schedule it lacks management competence. Read together, NEV-SAFETY-02 and this contention illustrate Nevada's willingness to contradict itself in an effort to "throw the kitchen sink" at DOE.

When looked at as a whole, DOE's project management team's statements show that the Yucca Mountain Project has taken an appropriate balance between safety, quality, and schedule. Nevada provides no specific example of where the Yucca Mountain Project gave priority to schedule over safety and quality. This is primarily because the project's management has

repeatedly emphasized, in its statements inside and outside the project, that safety, quality, and schedule discipline are all equally expected. For example, as Ward Sproat, the Director of OCRWM stated to Congress, “the concepts of safety, quality and schedule discipline are not mutually exclusive. This concept is demonstrated by world class nuclear organizations on a daily basis and I intend to hold my organization and its contractors to the same standards.” Hearing Before the Subcomm. on Energy and Air Quality of the H. Comm. on Energy and Commerce, 109th Cong. (July 19, 2006) (Statement of Edward F. Sproat III, Director, OCRWM, DOE) at 3 (*available at*: <http://archives.energycommerce.house.gov/reparchives/108/Hearings/07192006hearing1986/Sproat.pdf>) (Attachment NEV-SAFETY-01-1).

Finally, contrary to Nevada’s assertions, the documents Nevada cites in support of its contention are neither numerous nor do they clearly show that DOE, the Yucca Mountain Project, or its contractors placed an artificial schedule over safety or compliance. Rather, when read in their entirety, those documents demonstrate that DOE’s “Lead Lab,” Sandia National Laboratories (“Sandia”) and Bechtel SAIC Company, LLC, the management and operating (“M&O”) contractor for the Yucca Mountain Project, in cooperation with DOE, prepared safety analyses intended to support a credible and defensible License Application that DOE submitted to the NRC on June 3, 2008. Each of the documents cited by Nevada in this contention are addressed in detail below.

**(i) The First Document Does Not Support Nevada’s Contention**

The first document Nevada cites is an internal Sandia e-mail dated October 2, 2006, concerning Analysis Modeling Report (“AMR”) schedule status as of that date. LSN No. DN2002359161. As background, the AMRs, among other things, constitute the basis for the

Total System Performance Assessment (TSPA) form and function. What Nevada does not explain is that DOE and Sandia needed to have the TSPA form and function stable by December 15, 2006, in order to complete a TSPA to meet OCRWM's June 2008 date for submittal of a docketable Application. Nevada alleges that the referenced e-mail concerning AMRs "indicates that schedule clearly drives the product." Petition at 19.

This first document correctly asks its recipient(s) to identify what can and cannot be delivered by the December 2006 deadline. LSN No. DN2002359161 at 1 ("Delays are not acceptable. *Instead please identify in detail what can be delivered by the 12/15/06 dead line and what cannot.*") (emphasis added). Importantly, however, the document continues to focus on TSPA adequacy notwithstanding schedule targets in stating that "[w]e need to identify risks and then mitigate them in such a way that we have product that is docketable and adequately defensible for submittal in June of 08." *Id.* Thus, the author of this document is directing that the inputs to the TSPA be docketable and defensible, while simultaneously acknowledging the reality of an external schedule. Nothing in this e-mail suggests that its author—or the project in general—lacks the requisite integrity, candor, or character to obtain a license to construct the Yucca Mountain repository.

**(ii) The Second Document Does Not Support Nevada's Contention**

The second document Nevada cites is another internal Sandia e-mail dated October 10, 2006. LSN No. DN2002319598. It was sent by the Near-Field Environment ("NFE") Group manager to his group. For perspective, the NFE Group is responsible for the few postclosure analyses related to changes in chemistry within the emplacement drifts, the radionuclide source term, and coupled processes and seepage. Nevada focuses on three statements in this two-page document: (1) "My responsibility, as NFE Manager, is to ensure that the 3 priorities – schedule,

defensibility, credibility – in that order, are satisfied”; (2) “If we do not meet the June 30 deadline, ‘we are all out of a job’”; and (3) “Any slips in schedule will be recovered by cutting scope. There is no allowance for not meeting schedule.” Petition at 19-20.

Nevada ignores the remainder of the document which, when considered, refutes Nevada’s allegations. Specifically, Nevada ignores the fact that the NFE Group manager states that “Our mandate as a part of the Lead Lab organization is to produce a credible (i.e., technically competent) and defensible (i.e., compliant with 10 CFR 63 and traceable) License Application on or before June 30, 2008 (i.e., on schedule).” LSN No. DN2002319598 at 1. He also states that although *he* is focused on schedule, “[d]etailed technical direction, integration, and decisions about necessary work scope will be provided by the two Technical Leads . . . .” *Id.* at 2. These statements confirm what Mr. Sproat told Congress; namely, that the concepts of safety, quality, and schedule are not mutually exclusive.

It is also inappropriate for Nevada to construe the quote: “we are all out of a job” in an absolutely literal manner. The author of the second document obviously placed this phrase in quotes to make it clear that it was not a literal threat. LSN No. DN2002319598 at 1. Instead, the quoted language was intended to call attention to a belief that the entire Yucca Mountain project, already more than a decade behind schedule, risked losing Congressional and public support if it failed to show progress in meeting reasonable milestones. *Cf.* Petition at 32. The “we” is thus not the NFE Group (or the Sandia YM team as Nevada asserts), but rather the entire Yucca Mountain Project. In any event, by no stretch of logic can this one isolated statement by a single individual reasonably be interpreted to call into question the integrity of either DOE or the Yucca Mountain Project.

**(iii) The Third Document Does Not Support Nevada's Contention**

The third document is a *draft* technical work plan for the defensibility for technical products supporting the license application. LSN No. DN2002502865. Nevada uses the third document to speculate that “it was acceptable to DOE if the LA filed with the NRC included known but undisclosed ‘residual vulnerabilities’ in safety evaluations, but, if NRC Staff, Nevada, or some other stakeholder were to find out about them, DOE (with Sandia's assistance) would need to be ready with some explanation.” Petition at 20.

This allegation is also completely unfounded and derived from an out of context reading of the cited document. This document specifically states that *if* correcting an issue is not possible, then Sandia will attempt to “mitigate its impacts so that no important licensing considerations are compromised.” LSN No. DN2002502865 at Encl. at 1.<sup>43</sup> And if the issue cannot be appropriately mitigated, Sandia will raise it with DOE, “and will work with the DOE to arrive at a solution that is consistent with . . . public health and safety, and protection of the environment.” *Id.* In addition, Sandia is expected to “[p]erform a vulnerability assessment . . . and implement mitigation plans to eliminate identified vulnerabilities . . . .” *Id.* at 2.

Accordingly, this document provides evidence that Sandia planned to work diligently to ensure that the LA *would be credible and defensible* as required by 10 C.F.R. Part 63. Read as a whole and in context, it does not suggest, as Nevada speculates, that Sandia intended to ignore 10 C.F.R. § 63.11(a), but rather that Sandia worked to eliminate vulnerabilities through appropriate analyses.

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<sup>43</sup> The project could have accomplished this by incorporating additional conservatisms in the analysis in order to bound the uncertainty or problem that could not be quantitatively resolved due to financial or schedule constraints. For example, Sandia might hypothetically be able to resolve a problem with a \$50 million analysis that would take two more years to complete. Mitigating the risk by using additional conservatisms under such a circumstance would be the prudent thing to do. It would be neither improper, nor, as Nevada alleges, illegal.

In sum, Nevada selectively cites and mischaracterizes the three isolated Yucca Mountain Project documents it relies upon. Read as a whole, these documents do not, individually or collectively, raise any technical issues with respect to the Yucca Mountain LA, much less do they show a pattern of safety-significant “integrity” issues with respect to DOE, the Yucca Mountain Project, or its contractors.

**(d) “Earlier” E-mail Messages**

Nevada complains of certain “earlier e-mail messages [that] are even worse.” Petition at 20. All but one of these e-mails are more than ten years old, and all are more than six years old. *All of these statements are in e-mails involving a single individual*, and that same individual authored nearly all of the quoted statements. *See id.* at 20-21 (citing LSN Nos. DEN001231578 at 1, DEN001222278 at 1, DN2000734458 at 1, DEN001212230 at 1, DEN001225591 at 1, DN2001131123 at 4.<sup>44</sup> As noted above, to support a character or integrity contention, Nevada bears the burden of showing that its allegations are of “more than historical interest,” and of showing a “direct and obvious relationship between the character issues and the licensing action in dispute.” *E.g., Dominion Nuclear Conn., CLI-01-24*, 54 NRC at 365. Nevada fails to draw any such connection, either by showing that the specific individuals involved were in management positions or remain in management positions in the Yucca Mountain Project, or by showing that these incidents are part of a pattern of misconduct that impacts this project today. *See La. Energy Servs., L.P., CLI-05-28*, 62 NRC at 724 (proponents of a management contention bear the burden of linking the individuals involved in alleged historical deficiencies to current personnel or practices).

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<sup>44</sup> A cursory review of the cited e-mail messages also reveals that the author clearly felt free to express his opinions without fear of retribution, which attests to the SCWE of the project. The e-mails also focus on personalities.

**(e) Toxic Silica Allegations from the 1990s**

Nevada claims that, “because of concerns about schedule and possible litigation, DOE failed to implement any controls or respiratory protection” to protect workers at the Exploratory Studies Facility (“ESF”) from “toxic respirable silica” during the 1990s. Petition at 21. This issue fails to raise a genuine dispute on a material issue of law or fact because it is not relevant to this licensing proceeding. Nevada fails to demonstrate the requisite nexus, in time and subject matter, between these allegations and this licensing proceeding.<sup>45</sup> As described in Section (1), above, for an integrity or character-related contention to be admissible, there must be a “direct and obvious relationship between the [alleged] character issues and the licensing action in dispute.” *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff’d*, CLI-04-6, 60 NRC 631 (2004).

Nevada fails to show the requisite direct and obvious relationship between its toxic silica-related allegations and this proceeding. This is because non-radiological health and safety issues, including this type of occupational hazard, are not regulated by the NRC and are therefore generally not relevant to NRC proceedings. Specifically, the NRC does not regulate non-radiological hazards such as “local codes, OSHA regulations, or national standards on fire safety, occupational safety, and building safety.” *Curators of the Univ. of Mo.*, CLI-95-8, 41 NRC 386, 393 (1995). This is because the NRC “is not a general fire safety or occupational health agency.” *Id.* (internal quotations omitted); *see also Private Fuel Storage, LLC* (Independent

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<sup>45</sup> Moreover, some of Nevada’s representations related to this issue are not only unsupported but false. For example, Nevada asserts that the Nuclear Waste Technical Review Board (“NWTRB”) reported to Congress that “DOE failed to incorporate necessary engineering controls, dust management on the tunnel boring machine . . . despite knowing that silica dust would likely be a hazard to all in the tunnels.” Petition at 22 (citing LSN# DN2001635791, (“Underground Exploration and Testing at Yucca Mountain – A Report to Congress and the Secretary of Energy, Nuclear Waste Technical Review Board, October, 1993,”) at vii and 23). A review of the NWTRB’s report, however, reveals absolutely no discussion of dust controls or silica-related issues, much less any support for Nevada’s assertions.

Spent Fuel Storage Installation), LBP-00-35, 52 NRC 364, 388 (2000) (relying on *Curators* to reject Utah’s claim that the NRC should review the applicant’s Emergency Plan and fire-fighting capability for “all fires onsite, whether or not they result in a radiological release” and noting that the applicant would be subject to State, local, and Federal OSHA regulatory requirements).

These toxic silica-related allegations are also, as Nevada admits, merely of historical interest. The allegations relate to events that took place during the 1990s, or, as Nevada puts it, “during the ESF/ECRB construction period” Petition at 25, which ended some ten years ago. *See id.* at 24. Nevada even identifies how DOE addressed silica-related issues: by instituting a “Silicosis Screening Program” in 2004. *Id.* at 25. Thus, Nevada’s own pleading demonstrates that there is no ongoing health and safety issue, nor is there an ongoing integrity issue. *See Houston Lighting & Power Co.* (South Texas Project, Units 1 and 2), LBP-84-13, 19 NRC 659, 688 (1984), *aff’d* ALAB-799, 21 NRC at 360, 373-74 (1985) (evaluations of character and integrity must include an evaluation of corrective actions). Nevada cannot use “integrity” or “character” as a mechanism to bootstrap issues into this proceeding that would otherwise be far beyond its scope, or otherwise insufficiently related to the current Yucca Mountain Project management or the adequacy of the LA. Nevada seeks to use “integrity” as a Trojan horse to introduce into this proceeding historical OSHA-related issues with no direct and obvious relationship to the Application. The Board must reject Nevada’s invitation to turn this litigation into a sweeping inquiry into such extraneous topics.

**(f) The ORISE Infiltration Study**

Nevada cites to an April 30, 2008 study by Oak Ridge Institute for Science and Education (“ORISE”). LSN Nos. DEN001594989 and DEN001595302 (“ORISE Study”). Nevada alleges that the ORISE Study concludes that DOE’s “model report does not provide a technically

credible spatial representation of net infiltration at Yucca Mountain.” Petition at 26 (quoting ORISE Study at v). Nevada further alleges that, because SAR Section 2.3.1.3.2.1.3 does not “mention this report,” DOE has committed a “willful omission of important safety information.” Petition at 26. Like all of the previous allegations proffered in this contention, this claim has no merit and the Board should reject it.

DOE’s position is that the existing infiltration model and infiltration estimates underlying the LA are sufficiently conservative to address the matters raised in the ORISE Study. Nevada disagrees, and has submitted contentions that rely upon the ORISE Study. *See, e.g.*, DOE’s responses to NEV-SAFETY-20; NEV-SAFETY-23, NEV-SAFETY-25 below. Nevada’s disagreement with DOE’s technical judgments does not raise an “integrity” issue.

Indeed, DOE explained its technical position on this matter in its response to Nevada’s second unauthorized attempt to prevent the Application from being docketed. U.S. Department of Energy Response to the State of Nevada’s Supplemental Pre-Docketing Petition to Reject the Yucca Mountain License Application (July 31, 2008) at 14 n.57. Thus, Nevada was on notice that this was purely a technical disagreement, but nevertheless chose to again accuse DOE of “a lack of integrity” with respect to the ORISE Study. Petition at 26. Further confirming the baseless nature of Nevada’s claims of “willful omission,” DOE made no effort to conceal the ORISE Study or otherwise address its significance in anything less than a fully candid manner. The ORISE Study has been publicly available on the LSN since June 25, 2008 and therefore accessible to all parties and potential parties, including the NRC Staff and Nevada.

For all these reasons, none of the allegations made in this contention, either individually or collectively, raise a genuine dispute on a material issue of law or fact.

## **2. NEV-SAFETY-02 - Doe Management**

The LA cannot be granted because DOE lacks the requisite management ability to construct and operate a safe repository.

### **RESPONSE**

In this contention Nevada alleges that DOE lacks the requisite management ability to obtain a license from the NRC because of alleged instances of mismanagement of the Yucca Mountain Project and “other large projects.” Petition at 28.

This contention is Nevada’s second attempt, after NEV-SAFETY-01, to redirect this proceeding away from an adjudication of the technical adequacy of the application. Under the NWPA and the regulations in Part 63, this proceeding does not include an inquiry into the general management competence or “technical qualifications” of the applicant. Instead, Congress identified DOE as the applicant in this proceeding because of such qualifications. Even if such an inquiry were authorized in this proceeding—which, again, it is not—Nevada fails to present credible evidence of a systemic management competence issue within DOE, OCRWM, or the Yucca Mountain Project. On the contrary, this contention, like NEV-SAFETY-01, presents certain selected information, much of it years old or unrelated to this Application or both, that Nevada reads out of context in another failed effort to undermine DOE’s qualifications.

DOE is committed to having personnel with the requisite knowledge and experience in charge of the construction and operation of the Yucca Mountain repository and will comply with all NRC requirements in this regard. Nevada, however, seeks to go beyond those requirements and initiate an open-ended inquiry into DOE’s management record. Such an inquiry is outside

the scope of this proceeding. This contention also lacks an adequate factual premise and fails to raise a genuine dispute of law or fact; and, for the reasons more fully discussed below, it should be denied.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding because, as explained below, it impermissibly challenges the NWPA, 42 U.S.C. § 10101 *et seq.*, and the Commission's regulations, and because it impermissibly raises allegations of non-radiological harm. In sum, Nevada has attempted to redirect this proceeding away from an adjudication of the technical adequacy of the *application*,<sup>46</sup> towards an impermissible and wide-ranging inquiry into the general management competence of a department of the United States government, which is the statutory *applicant*.

**(1) Impermissible Challenge to the NWPA**

This contention is outside the scope of this proceeding because it impermissibly challenges Congress' determination, in the NWPA, that DOE is the appropriate applicant for the license at issue in this proceeding and that its general technical qualifications or management

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<sup>46</sup> The Commission's Notice of Hearing, which defines the scope of this proceeding states, in pertinent part, that "The matters of fact and law to be considered are whether the *application* satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC's standards in 10 CFR Part 63 for construction authorization for a high-level waste repository . . . ." Hearing Notice, 73 Fed. Reg. at 63,029 (emphasis added).

competence should not be further adjudicated. Congress designated DOE as the applicant, and it is not for the NRC to reconsider that designation. It is well established that a petitioner may not challenge applicable statutes as part of an adjudicatory proceeding. *Carolina Power & Light* (Shearon Harris Nuclear Power Plant Unit 1), LBP-07-11, 65 NRC 41, 57-58 (2007) (citing *Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974)) (stating that any contention that collaterally attacks applicable statutory requirements must be rejected by the Board as outside the scope of the proceeding).

Section 121(b) of the NWPA authorizes the Commission to “promulgate technical requirements and criteria that it will apply . . . in approving or disapproving *applications* for authorization to construct repositories . . .” 42 U.S.C. § 10141(b) (emphasis added). This provision, unlike the more general license application specifications in AEA § 182a (42 U.S.C. § 2232a), contains no reference to a general evaluation of the applicant’s management and technical qualifications, showing that this proceeding is limited to an inquiry into the technical adequacy of the application, not the management competence or general technical competence of the applicant.

Section 114(b) of the NWPA also directs DOE to apply for a license to construct and operate a geologic repository for the disposal of HLW. 42 U.S.C. § 10134(b) (“If the President recommends to Congress the Yucca Mountain Site . . . the Secretary [of Energy] shall submit to the Commission an application for a construction authorization for a repository . . .”). In so doing, Congress concluded that DOE, as an agency of the federal government, not only possesses the requisite attributes of an applicant, but is the *only* appropriate applicant for this license.

The legislative history of the NWPA confirms that Congress selected DOE because of its management and technical qualifications. During the debates on the NWPA in 1982, one of the key Senate sponsors of the bill explained the reason for the choice of DOE as the applicant for a high-level waste repository—and why no new independent agency was necessary:

There is no doubt in my mind that the current structure of the Department of Energy as is now established by statute is capable of carrying out the responsibilities that will be imposed upon them under this legislation . . . . [Further, DOE has] the administrative capability and the structural capability to deal with the administration of this program under the existing administrative framework.

128 Cong. Rec. S4127 (Apr. 28, 1992) (statements of Sen. McClure). Simply put, if Congress had doubts about DOE’s ability to manage this project, it could have created an independent agency. *See id.* However, after considering this option, Congress chose DOE. *Id.* Thus, the legislative history of the NWPA confirms that Congress selected DOE as the *only* applicant for this license *because of its unique technical and management qualifications*. Nevada’s contention directly and impermissibly attacks this Congressional judgment.

Nevada’s contention is therefore a challenge to Congress’ exclusion of generalized management inquiries from this proceeding and to its selection of DOE as the appropriately qualified applicant and, as such, constitutes an impermissible collateral attack on the NWPA.

If Nevada’s contention were admitted, it would place the NRC in the untenable position of potentially denying the application not because of any identified technical inadequacy, but because of a dispute over the general management qualifications of the applicant. In that case, the NRC would be overruling Congress’s choice of DOE as the applicant. *Cf. U.S. Dep’t of Energy, CLI-04-17, 59 NRC at 375.* In *U.S. Dep’t of Energy*, the Commission held that, in the nuclear export arena, the “Executive Branch’s noninimicality determinations involve ‘strategic

judgments’ and foreign policy and national security expertise regarding the common defense and security of the United States, and the NRC may properly rely on those conclusions.” *Id.* In this proceeding, the situation is even more compelling in that the determination that Nevada seeks to challenge—Congress’ choice of DOE as the appropriate applicant for this license—has been made by the Legislative Branch and this decision carries with it the force of law.

## (2) Impermissible Challenge to Commission Regulations

This contention is also outside the scope of this proceeding because it is an impermissible challenge to NRC’s regulations implementing the NWPA and the Atomic Energy Act of 1954 (“AEA”). As explained in Section (1), above, Section 182a of the AEA sets forth general requirements for NRC license applications. Congress provided more specific direction in this proceeding in NWPA § 121(b). As noted above, this provision authorizes the Commission to “promulgate *technical requirements and criteria* that it will apply . . . in approving or disapproving” this construction authorization license application. 42 U.S.C. § 10141(b) (emphasis added). It does not specify an adjudication of the general “technical qualifications of the applicant.”

In implementing these statutory directives, the NRC promulgated Part 63 without any reference to an evaluation of management competence or the general technical qualifications of the applicant. Such an evaluation would be unauthorized and unnecessary because, as explained in Section (1), above, Congress already determined that DOE possessed the requisite technical and management qualifications. In contrast to Part 63, Part 50 specifies that power reactor licensees must demonstrate their technical qualifications during the licensing process. *See* 10 C.F.R. § 50.34(a)(9) (requiring a showing of the technical qualifications of an applicant for a construction permit); *id.* § 50.34(b)(7) (requiring a showing of the technical qualifications of an

applicant for an operating license). Other NRC licensing regimes require a similar analysis of prospective licensees. *See id.* § 30.33(a)(3) (requiring the Commission to find that a byproduct material license applicant “is qualified by training and experience”); *id.* § 70.23(a)(2) (specifying a similar required finding for special nuclear materials license applicants); *id.* § 40.32(b) (specifying a similar required finding for source material license applicants). No such provisions appear in Part 63, however.

Thus, unlike proceedings under Part 50 and similar licensing regimes, in this proceeding there is no adjudication of the *general* technical and management qualifications of the applicant. The cases Nevada cites in support of its overly broad claim that “an applicant’s management competence is a proper consideration in a licensing proceeding,” Petition at 28, are all therefore inapposite, because they address licensing actions under these other regulations. *See Piping Specialists, Inc.* (Kansas City, Mo.), CLI-92-16, 36 NRC 351, 351 (1992) (Part 30); *La. Energy Servs., LP* (Claiborne Enrichment Center), LBP-91-41, 34 NRC 332, 332 (1991) (Part 70); *Sequoyah Fuels Corp.* (Sequoyah UF-6 to UF 4 Facility), CLI-86-17, 24 NRC 489, 489 (1986) (Part 40).

Part 63 does specify, like other regulatory regimes, that the LA must include a description of the Yucca Mountain Project’s “organizational structure,” its “key positions” with responsibility for safety, personnel qualifications, and other programmatic items. *See* 10 C.F.R. § 63.21(c)(22). As explained above, however, and in contrast to other NRC licensing regulations, Part 63 omits any more general inquiry into the applicant’s technical qualifications. Thus, although certain narrow aspects of the Yucca Mountain Project’s organizational structure

and specified other programmatic topics are within the scope of this proceeding, a wide-ranging inquiry into DOE's management competence is not.<sup>47</sup>

Thus, Nevada's contention impermissibly challenges Commission regulations, contrary to 10 C.F.R. § 2.335, and is outside the scope of this proceeding.

### **(3) Outside the Scope of the Notice of Hearing**

The Commission's Notice of Hearing, which defines the scope of this proceeding states, in pertinent part, that "The matters of fact and law to be considered are whether the application satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC's standards in 10 CFR Part 63 for construction authorization for a high-level waste repository . . . ." Hearing Notice, 73 Fed. Reg. at 63,029 (emphasis added). Like the regulations in Part 63, the Notice of Hearing limits the scope of this proceeding to an adjudication of the technical adequacy of the license application, as opposed to a wide-ranging inquiry into the general management competence or technical qualifications of the applicant. Thus, this contention is also outside the scope of this proceeding as defined in the Notice of Hearing.

#### **d. Whether the Issue is Material to the Findings that the NRC Must Make**

As discussed above, Nevada's challenge to DOE's general management competence goes beyond the information required by 10 C.F.R. § 63.21(c)(22) and, therefore, its general fitness to hold the construction authorization is not material to the findings the NRC must make in this proceeding.

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<sup>47</sup> In any case, the LA provides the information required under 10 C.F.R. § 63.21(c)(22) in the programmatic sections of the application, *i.e.*, Chapter 5 of the SAR. Nevada fails to identify any specific disputes with this information. Indeed, it admits that "no particular sections of the application are directly pertinent" to the issues raised in this contention. Pet. at 44. Thus, Nevada's contention could be construed as either a demand to produce information not required by regulation, or a demand that the Commission change its regulations. Neither claim is permissible. *See* 10 C.F.R. § 2.335.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Even assuming that Nevada's "management" allegations are cognizable in this proceeding, they are still unsupported by adequate facts or expert opinion. Many of Nevada's allegations are based on a misreading of documents or otherwise represent attempts to manufacture "management" issues where none exist. As explained in the Legal Standards section above, Boards must carefully scrutinize factual allegations and the documents cited in support of contentions. This includes a review of the cited documents to confirm that they support the proposed contention. Section f, below, discusses each of these documents in detail and explains why they fail, individually and collectively, to provide the requisite factual support for a contention challenging DOE or OCRWM's management competence. Thus, this contention is not supported by references to sufficient facts.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Again, even if this contention were not an improper challenge to the NWPA, NRC regulations, and the Commission's Notice of Hearing, it still fails to raise a genuine dispute on a material issue of fact or law. Nevada's principal allegation is that over the past 20 or more years, "DOE has been involved in a number of high-dollar, high profile projects, establishing an abysmal track record along the way, with schedule, cost, and contractor oversight particularly out of control." Petition at 30. Notably, this language fails to allege any clear connection between the Yucca Mountain Project and Nevada's accusations. Most of the claims in this contention have no direct relationship to radiological health and safety or the protection of the environment at the GROA. As explained below, the remaining claims are not symptomatic of an ongoing pattern of management incompetence.

**(1) Legal Standards Governing Management Competence-Related Allegations**

Historical actions by an entity are not relevant to its current fitness as an applicant unless “there [is] some direct and obvious relationship between the [alleged] character [or management] issues and the licensing action in dispute.” *Dominion Nuclear Conn.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 365 (2001); *see also Ga. Inst. of Tech.* (Georgia Tech Research Reactor), CLI-95-12, 42 NRC 111, 120 (1995) (stating that “[a]llegations of management improprieties or poor ‘integrity,’ of course, must be of more than historical interest: they must relate directly to the proposed licensing action”). Accordingly, a petitioner may not use allegations of historical DOE deficiencies or management improprieties as a basis for a contention. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 365-66 (2001), *recons. denied*, CLI-02-1, 55 NRC 1 (2002).

Since *Millstone*, the Commission has consistently followed this principle. For example, in *USEC, Inc.* (American Centrifuge Plant), the Commission upheld the Board’s rejection of a management contention because the intervenors failed to show that their allegations of improprieties were anything more than of historical interest, and because most of the intervenors’ allegations related to events at other facilities “5 to 8 years ago.” CLI-06-10, 63 NRC 451, 464 (2006); *see also La. Energy Servs., Inc.* (National Enrichment Facility), CLI-06-22, 64 NRC 37, 46 n.38 (2006) (quoting *Millstone* as follows: “We have placed strict limits on management and character contentions. . . . When character or integrity issues are raised, we expect them to be directly germane to the challenged licensing action.”) (citations and quotations omitted).

Moreover, a single violation of NRC requirements—or even multiple violations—are insufficient by themselves to raise a valid “management” contention. *See USEC, Inc.*, CLI-06-10, 63 NRC at 465 (upholding the Board rejection of a management competence contention

because intervenor's claims did not "present any *ongoing* pattern of violations or disregard for regulations that might be expected to occur in the future") (emphasis in original); *cf. Union Elec. Co.* (Callaway Plant, Unit 1), ALAB-740, 18 NRC 343, 346 (1983) (a contention alleging a systemic quality assurance breakdown must be "of sufficient dimensions to raise legitimate doubt as to the overall integrity of the facility and its safety-related structures"). The NRC also recognizes that applicants may make errors, so evaluations of competence must include an evaluation of corrective actions. *Houston Lighting & Power Co.* (South Texas Project, Units 1 & 2), ALAB-799, 21 NRC 360, 373-74 (1985).

Nevada also fails to recognize that DOE is already an NRC licensee, and raises no specific management-related issues with respect to DOE's conduct under its existing NRC licenses. For example, since 1999 DOE has held an independent spent fuel storage facility ("ISFSI") license for the Three Mile Island-2 ISFSI (Materials License SNM-2508). *See also Plutonium Export*, CLI-04-17, 59 NRC at 375 (rejecting an intervention petition and authorizing issuance of a license to DOE to export 140 kg of plutonium oxide to France). Nevada fails to identify any inspection report documenting any general management concerns from an NRC inspector, much less provide evidence of such management concerns that are sufficiently linked, in time and subject matter, to the instant proceeding.

Most importantly, Nevada fails to address in its claim that the department lacks management competence the fact that DOE is the agency that Congress has entrusted to undertake an enormous range of activities related to energy, the environment and the national defense, not the least of which is its charter to maintain the safety, reliability, and security of the United States nuclear weapons stockpile. 50 U.S.C. § 2534(a)(1). It is therefore nonsensical to suggest that it does not have the management competence to build and operate this repository.

As explained below, *all* of Nevada’s management competence-related allegations relate to historical deficiencies, technical matters that have been corrected, or otherwise fail to raise any recognizable management issue.

**(2) None of Nevada’s Allegations Raise a Genuine Dispute**

Ultimately, this contention is based on four types of allegations intended to place DOE’s general management competence into dispute. First, Nevada raises a series of historical allegations of poor DOE oversight of contractors. Most of these allegations do not directly relate to the Yucca Mountain Project. Petition at 30-35. Second, Nevada briefly describes three LSN documents purportedly showing instances of poor contractor oversight within the Yucca Mountain Project. *Id.* at 35-36. Then Nevada discusses—at length—various occupational health and safety-related allegations related to events at the ESF in the 1990s. *Id.* at 36-42. The contention ends with brief and vague discussions of four purported technical deficiencies in the application. *Id.* at 42-44. None of these allegations are specific, credible, or sufficiently connected to this project to show a systemic, ongoing management breakdown across DOE, OCRWM, or the Yucca Mountain Project, as required. *See USEC, Inc., CLI-06-10, 63 NRC at 465.*

**(a) Historical Allegations**

Nevada begins this contention with a recitation of historical GAO Reports, Congressional testimony, and other historical “admissions” of DOE incompetence by various unnamed individuals. Petition at 30-35. Most of these allegations are more than seven years old, and most do not specifically relate to the Yucca Mountain Project. *See generally id.* For example, Nevada cites to an unnamed “high ranking DOE official, who, “a decade ago,” opined in written and oral testimony to the U.S. Senate on the need to reform DOE. *Id.* at 30. The cited testimony

discusses DOE's record and recommended reforms in general terms, but Nevada seizes upon and quotes the only sentence in the entire 1996 report that mentions the Yucca Mountain Project. *Id.* at 31. None of these generalized historical allegations are permissible topics for litigation in this proceeding. *Ga. Tech*, CLI-95-12, 42 NRC at 120-121.

With respect to the Yucca Mountain Project, Nevada criticizes DOE for historical delays in submitting this application, and for not submitting the application in 2004. Petition at 31-2. The application has now been submitted, so any previous "repeated postponement[s]" fail to raise any current management issues. *Id.* at 32; *cf. Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC at 365-66; *South Texas Project*, ALAB-799, 21 NRC at 373-74. Moreover, since July 2006, when OCRWM set its application submittal schedule, it has met all of its milestones despite significant budget reductions from Congress.

Notably, in NEV-SAFETY-01, Nevada takes the opposite position from this contention. In NEV-SAFETY-01, Nevada criticizes DOE's *current* project team for adhering to a schedule to meet its statutory and regulatory obligations. Petition at 18-20. Under NEV-SAFETY-01, Nevada contends that if DOE meets the schedule it lacks the integrity to slow down and do it right, and then proceeds to contend under NEV-SAFETY-02 that if DOE exceeds the schedule it lacks management competence. As noted previously, when read together, NEV-SAFETY-01 and this allegation merely serve to illustrate Nevada's willingness to contradict itself in an effort to "throw the kitchen sink" at DOE.

Nevada also implies, based on hearsay from a newspaper article, that DOE gave a "multimillion dollar bonus" to its technical contractor for completing the Application, immediately before it "pulled the plug" on the 2004 Application submittal. Petition at 31.

Nevada does not, however, even allege that DOE's contractor *received* this "bonus for completing the License Application in a timely manner," nor does Nevada explain why DOE decided not to submit the 2004 application.

Finally, following a lengthy discussion of various GAO reports and other studies with no specific relationship to Yucca Mountain, Petition at 32-35, Nevada criticizes DOE for "ballooning" its cost estimates for Yucca Mountain. *Id.* at 35. Nevada fails to explain, however, how a 33% increase, over seven years, in the cost estimate for a major federal project provides any evidence of management incompetence or lack of technical qualifications. This is particularly true as the budget is subject to inflation and changing project objectives.

#### **(b) Contractor Oversight**

Next, Nevada focuses on certain instances of DOE's alleged "failed oversight" of contractors on the Yucca Mountain Project. Petition at 35-36. Specifically, Nevada alleges that Sandia "erred by hundreds of feet in locating geologic faults" near the aging facility, *id.* at 35, and that Lawrence Livermore National Laboratory ("LLNL") used "improperly calibrated Visaila temperature humidity probes," and "inept laboratory techniques" thereby undermining certain corrosion experiments. *Id.* at 36.

All of these purported deficiencies have been addressed by the Yucca Mountain Project. The document Nevada describes as demonstrating a "monumental" error in locating geologic faults actually states that, "*Preliminary data* from the recent drilling phase indicate the location of the Bow Ridge fault in northern Midway Valley *may* be farther east than projected." LSN No. DN2002502636 at 3 (emphasis added). Ultimately, this discovery led to a slight realignment and reconfiguration of the aging pads to reflect a small lateral change in the interpreted location of the fault. *See generally* LSN Nos. DN2002396259; DN2002438083; DN2002411969;

DN2002410591. Thus, the Yucca Mountain Project addressed this item, and Nevada fails to explain how the application that is before this Board does not adequately address the location of the Bow Ridge Fault. In other words, Nevada’s “contractor oversight” issue is a sham, developed by reading project documents out of context.

Nevada’s claims of DOE contractor oversight problems regarding LLNL are equally overstated. Following the QA audit documented in LSN No. DN2002478075,<sup>48</sup> the Yucca Mountain Project evaluated the problematic data and ultimately determined that they were no longer required to support analyses in the Application. *See* Letter from W. Boyle, OCRWM to A. Mohseni, NRC, “Response to U.S. Nuclear Regulatory Commission (NRC) Rely to U.S. Department of Energy (DOE) Response to the NRC Observation Audit Report (OAR) OAR-05-05, dated March 15, 2007,” (Apr. 10, 2008) at 2, *available at* ADAMS Accession No. ML081070408. Similarly, the Technical Work Plan (“TWP”) Nevada cites describes a deficiency that the Yucca Mountain Project recently self-identified and is in the process of correcting.

Notwithstanding the various subjective opinions offered by Nevada regarding corrosion experiments, Nevada has offered no evidence that such isolated events are representative of the entire Yucca Mountain Project, nor that such isolated events are supportive of Nevada’s broad claim of inadequate oversight by DOE.

In sum, the documents Nevada cites fail to show any pattern of problems in contractor oversight within the Yucca Mountain Project. Nevada should have submitted contentions

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<sup>48</sup> Nevada mis-cites this document as LSN No. DN20002478075.

challenging the resolution of these technical issues, but has not done so.<sup>49</sup> Nevada’s identification of a few historical instances—within a massive federal project—where potential deficiencies were identified and later corrected does not raise a genuine dispute in the form of a litigable “management competence” issue. *See USEC, Inc.*, CLI-06-10, 63 NRC at 465.

**(c) Toxic Silica Allegations from the 1990s**

Next, Nevada rehashes its “toxic silica” allegations from NEV-SAFETY-01 when it claims that, “DOE failed its duty to incorporate and implement engineering controls in order to protect the workers from the known silica-dust hazards that would result from dry-drilling the [ESF] tunnels in Yucca Mountain.” Petition at 36; *see also id.* at 36-42 (alleging more non-radiological health and safety and other project management deficiencies at the ESF in the 1990s, most related to the silica dust issue).

This issue fails to raise a genuine dispute on a material issue of law or fact because it is not relevant to this proceeding. Nevada fails to demonstrate the requisite nexus, in time and subject matter, between these allegations and the application.<sup>50</sup> As described in Section (1), above, for a management competence or technical qualification contention to be admissible, there must be a “direct and obvious relationship” between the alleged management issues and the licensing action in dispute. *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC at 365.

Non-radiological health and safety issues, including this type of occupational hazard, are not regulated by the NRC and are therefore generally not relevant to NRC proceedings.

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<sup>49</sup> Nevada has submitted a variety of corrosion-related contentions, *see* NEV-SAFETY-77 through -110, but does not appear to have submitted any specific single-issue technical contention regarding the impact of the Bow Ridge Fault on the aging facility. *See generally* DOE’s responses to these contentions below.

<sup>50</sup> Moreover, as in NEV-SAFETY-01, some of Nevada’s representations related to this issue are disingenuous. *Compare* Petition at 37-38 (falsely implying a connection between the NWTRB’s 1993 report, LSN No. DN2001635791, and Nevada’s toxic silica-related allegations) *with* note 45, above.

Specifically, the NRC does not regulate non-radiological hazards such as “local codes, OSHA regulations, or national standards on fire safety, occupational safety, and building safety.” *Curators of the Univ. of Mo.*, CLI-95-8, 41 NRC 386, 393 (1995). This is because the NRC is “not a general fire safety or occupational health agency.” *Id.* (internal quotations omitted); *see also Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), LBP-00-35, 52 NRC 364, 388 (2000) (relying on *Curators* to reject Utah’s claim that the NRC should review the applicant’s Emergency Plan and fire-fighting capability for “all fires onsite, whether or not they result in a radiological release” and noting that the applicant would be subject to State, local, and Federal OSHA regulatory requirements). Thus, Nevada fails to show the requisite direct and obvious relationship between its toxic silica claims and DOE’s technical qualifications with respect to radiological health and safety or protection of the environment.

Nevada also admits that its additional toxic silica-related allegations in this contention are merely of historical interest when it acknowledges that DOE corrected any purported problems *over nine years ago*: “DOE resorted to taking over construction management” at the ESF. Petition at 42 (citing LSN No. NEV000003547, dated *May 1, 1999* (emphasis added)). Thus, Nevada’s own petition demonstrates that there is no ongoing management competence issue. *E.g. USEC, Inc.*, CLI-06-10, 63 NRC at 465.

**(d) Technical Disputes with the Yucca Mountain License Application**

Nevada concludes this contention with a series of vague and wide-ranging technical challenges to various aspects of the Application. Nevada points to an alleged DOE admission that its “proposal to install some 11,000 drip shields” is “far from reality.” Petition at 42. It then criticizes DOE’s use of expert elicitation—ignoring the authorization to use expert elicitation in 10 C.F.R. § 63.21(c)(1), and failing to explain why it disputes such use, beyond the unsupported

assertions of Nevada's counsel. Next, Nevada takes issue with DOE's rock fall analyses by alleging, with no citation to any document, that DOE "failed" to "resolve" the Center for Nuclear Waste Regulatory Analysis' evaluation of potential degradation of emplacement drifts. Finally, it alleges that DOE's Probabilistic Volcanic Hazards Assessment ("PVHA") is inadequate because it fails to address an update to this expert elicitation document that was incomplete at the time the Application was filed. Petition at 43-44.

DOE's application addresses all of these issues. The design for the drip shields is described at length in SAR § 1.3.4. DOE's use of expert elicitation is described, in accordance with Part 63, in SAR § 5.4. DOE has analyzed the potential for emplacement drift degradation in detail in SAR § 1.3.4. DOE addresses PVHA-related issues in SAR § 2.2.2.2.<sup>51</sup> Nevada was authorized to submit specific, single-issue contentions challenging DOE's analysis on any or all of these topics. *See U.S. Dept. of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 6, 8); *see also U.S. Dept. of Energy* (High-Level Waste Repository: Pre-Application Matters), CLI-08-20, 68 NRC \_\_ (slip op. at 2) (2008) ("legal or factual challenges related to the application[] are appropriately considered as proposed contentions in the context of a merits hearing *on the application*") (emphasis added). Regardless of any purported dispute over these technical issues, Nevada's apparent disagreements with aspects of DOE's Application cannot support admission of a management competence contention.

For all these reasons, none of the allegations made in this contention, either individually or collectively, raise a genuine dispute on a material issue of law or fact.

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<sup>51</sup> DOE has subsequently received the final PVHA update, and has reviewed it for its impact on the prior work. DOE determined that the update did not impact the material in the LA and provided a letter to the NRC to that effect and transmitted a copy of the update to the NRC and interested parties. LSN Nos. DEN001606520; DEN001598805. *See also* DOE's response to NEV-SAFETY-157, below.



### **3. NEV-SAFETY-03 - Quality Assurance Implementation**

SAR Subsections 5.0, 5.1, 5.1.2, and similar subsections and DOE's QARD (incorporated by reference in the License Application in Chapter 5), which promise DOE compliance with quality assurance (QA) requirements in the future, ignore the facts that DOE has been and continues to be unable to implement an adequate QA program and that there exists no basis for a reasonable assurance that DOE will do so in the future.

#### **RESPONSE**

Nevada in this contention sets forth a recitation of historic information related to the Yucca Mountain quality assurance (QA) program including instances where DOE's audits, assessments and surveillances identified weaknesses in quality assurance compliance. On the basis of this recitation and, without any analysis, Nevada alleges that there can be no reasonable assurance that DOE will implement an adequate QA program in the future. However, the recitation of past information confirms that DOE is an applicant that is committed to identifying and correcting shortcomings in its QA program. Moreover, Nevada ignores those elements of DOE's QA record that demonstrate continuous improvement in its QA program. Furthermore, the contention contains no information or analysis that calls into question that: (1) the QARD meets the requirements in §§ 63.21(c)(20) and 63.31(a)(3)(iii) to describe the QA program to be applied, including a discussion of how the criteria of § 63.142 will be met; (2) DOE will implement the QA program described in the QARD; and (3) applicable QA requirements have been satisfied for all information and analysis on which the LA is based.

**a. Statement of Issue of Law or Fact to be Controverted**

Nevada provides a litany of historic information, from which it draws to speculate that DOE will not be able to implement the QA program described in the QARD in a manner that supports issuance by NRC of a construction authorization. Nevada's contention, however, does not adequately specify an issue of law or fact to be controverted and therefore, must be dismissed. The contention is so broad that it defeats its admissibility in that it references, without identifying specific sections, the entire QARD (which is 160 pages) and QA related events occurring during the more than 20 years of this project. This scatter-shot approach is inconsistent with the requirements of 10 C.F.R. §2.309(f)(1)(i), as well as the requirements of the June 20, 2008 Case Management Order, to provide a specific statement of the issue of law or fact to be raised or controverted, and thereby should be dismissed.

**b. Brief Explanation of Basis**

Nevada's stated basis for this contention is neither the adequacy of DOE's QA program, nor compliance of the QARD (which describes the requirements of the QA program) with applicable NRC requirements. Instead, Nevada argues that issues identified in connection with DOE's past and present implementation of the QA program demonstrate that DOE will not implement its QA program adequately in the future. Contrary to Nevada's assertion, however, this historic QA record demonstrates that DOE has a robust and functioning QA program through which it has identified areas needing improvement and addressed those areas via its corrective action program. In sum, Nevada does not identify any basis, much less provide an explanation, for the allegation that DOE will not implement its QA program in conformity with subpart G of 10 C.F.R. Part 63, because none exist.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding because Nevada, in much the same manner as it has attempted in NEV-Safety-01 and 02, attempts to redirect this proceeding away from an adjudication of the technical adequacy of the application, into a broad, vague and ultimately impermissible inquiry into the past practices and character of DOE. The Commission's Notice of Hearing, which defines the scope of this proceeding, states, in pertinent part, that "[t]he matters of fact and law to be considered are whether the application satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC's standards in 10 CFR Part 63 for a construction authorization for a high-level waste geologic repository. . . ." Hearing Notice, 73 Fed. Reg. at 63,029 (emphasis added).

The specific QA-related questions that are within the scope of this proceeding are: (1) whether the description of the QA program in the application is adequate; and (2) whether the QA program's compliance with subpart G is sufficient. *See, e.g.*, 10 C.F.R. §§ 63.21(c)(20); 63.31(a)(3)(iii). The adequacy of DOE's QA program in the past is outside the scope of this proceeding. As specifically discussed below, this Nevada tactic, which attempts to divert the NRC from appropriate areas for potential challenge to the LA, is misplaced in this proceeding. In short, if DOE fails to implement its QA program as Nevada speculates, then such noncompliance will be appropriately addressed through the NRC's inspection program, not by an adjudicatory proceeding such as this one.

The appropriate subject of this proceeding with regard to Part 63 and DOE's QA program is whether the Application contains a description of the QA program and whether the QA program complies with subpart G. *See* 10 C.F.R. §§ 63.21(c)(20) and 63.31(a)(3)(iii). NEV-SAFETY-03 does not challenge compliance with these requirements—nor can it—so it attacks

DOE's abilities by claiming that DOE is "unable" to implement a QA program in the future because of its past performances. This challenge, however, is outside the scope of this proceeding, because Part 63 does not require DOE to demonstrate as part of its Application how well it has implemented QA programs in the past.

As previously discussed, the appropriate subject of any hearing on the license application with respect to DOE's QA program is whether "DOE's quality assurance program complies with the requirements of subpart G of this part [i.e., 10 C.F.R. Part 63]." *See* 10 C.F.R. §63.31(a)(3)(iii). Nevada does not appear to contest this issue of law, or the issue of fact that the QARD as currently written satisfies the regulatory requirements. Rather, Nevada seeks to expand the scope of the hearing into an examination of whether DOE's past performance demonstrate that DOE will be unable to implement a QA program consistent with the requirements of subpart G. This contention is outside the scope of this proceeding because it asks the Commission to make a judgment regarding the likelihood of DOE's future compliance with its QA program, the requirements of which are specified in the QARD and NRC's regulations at 10 CFR § 63.142. Future compliance with the legal requirements of its QA program is more appropriate for NRC inspection and enforcement during construction rather than an administrative hearing on construction authorization.<sup>52</sup> Similarly, contentions asserting a general fear of future noncompliance are not admissible. *See Dominion Nuclear Conn.* (Millstone Nuclear Power Station, Units 2 and 3), 54 NRC 349, 366 (2001) ("We cannot allow admission of contentions premised on a general fear that a licensee cannot be trusted to follow regulations of any kind.").

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<sup>52</sup> NRC stated in response to concerns about future QA implementation that "if NRC were to issue a license to DOE, NRC would periodically perform inspections of selected DOE activities at the Yucca Mountain site, at DOE support facilities, and at DOE subcontractor facilities to ensure that DOE's QA program is being effectively implemented." 66 Fed. Reg. 55,732, 55,764 (November 2, 2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and therefore must be dismissed. As noted above, Nevada does not challenge DOE's compliance with applicable NRC regulations. Therefore, by definition, Nevada's spurious challenge that DOE is "unable" to implement the QA program because of its past practices does not raise an issue material to the finding the Commission must make. Failing to assert a material issue of noncompliance with a standard in the regulations, Nevada invents a new standard in its attempt to raise a material issue—whether DOE's past practices make it impossible to have reasonable assurance that DOE will comply with 10 C.F.R. § 63.142 and 10 CFR § 63.143 in the future. *See* Petition at 46. This is not an issue that is material to a finding that the NRC must make in issuance of its construction authorization.

It must also be emphasized that Nevada's recitation of past issues in the QA program does not rise to a material issue, because identified past weaknesses of the QA program are not *per se* material to DOE's ability to construct a repository in the future. In short, while citing a litany of QA-related issues, Nevada never attempts to provide a reasoned basis linking these issues to any impact on the safety determinations that the Commission must make in this proceeding. 10 CFR §63.31. "Allegations of management improprieties or poor 'integrity' . . . must be of more than historical interest: they must relate directly to the proposed licensing action." *Dominion Nuclear Conn.* (Millstone Nuclear Power Station, Units 2 and 3), 54 NRC 349, 366 (2001) (quoting *Ga. Inst. of Tech.* (Georgia Tech Research Reactor), 42 NRC 111, 120 (1995)). License proceedings are not a forum "to litigate historic allegations' or past events with no direct bearing on the challenged licensing action." *See id.* (quoting *Georgia Power Co.* (Vogtle Electric Generating Plant, Units 1 and 2), 38 NRC 25, 36 n.22 (1993)). As such, the

contention fails to raise an issue that is material to a determination that the Commission must make because it never shows the link between any of the QA findings and the determinations the Commission must make.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention contains only unsupported assertions of counsel; and (2) the contention does not reference any expert opinion. This falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention fails on two basic issues applicable to challenges to quality assurance programs: (1) it fails to show a nexus between past lapses and the QA program at issue in the proceeding; and (2) it fails to allege that the lapses are safety significant, relevant to the adequacy of the application, indicative of a pervasive programmatic breakdown and incurable.<sup>53</sup>

**(1) Absence of a Nexus Between Past and Present**

Nevada attempts to create a material issue of fact by reciting a litany of previously identified lapses and criticism of the QA program in the approximately 20 years of the project

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<sup>53</sup> DOE does not dispute point-by-point the alleged QA weaknesses identified by Nevada in the contention because none of those alleged lapses, individually or collectively, raises a material issue of fact and because Nevada does not adequately demonstrate why those recitations are indicative of a QA program that warrants an admissible contention. The recitation of alleged weaknesses, particularly those in Table 2 which are mainly findings from QA audits, assessments and surveillances, actually prove that DOE has a robust QA program that is open and raises issues for resolution, as the regulations demand.

before submittal of the license application (Table 1) and for the period of time since submittal of the license application on June 3, 2008 (Table 2) without demonstrating a nexus between those events and the issues under review by the Commission in this proceeding.<sup>54</sup> The historic criticisms of the QA program listed in Table 1 of the contention are not (individually or collectively) a material issue of fact or law because Nevada has not met its burden to show any relationship between these earlier reviews of the QA program and the QA program and team that are before the Commission with this Application.

Nevada's failure to show this nexus between the historic evaluations of the program described in Table 1 is explainable by the fact that the most recent evaluation of the QA program has found that the program before the Commission is functioning properly. During September 2008, the 2008 Quality Assurance Management Assessment (QAMA) was performed at the Office of Civilian Radioactive Waste Management (OCRWM) for the Yucca Mountain Project. The focus of the assessment was to evaluate the effectiveness of the Office of Quality Assurance's oversight of the OCRWM and its QA program. The Yucca Mountain QA program was measured against nuclear industry excellence standards by a team of senior-level QA professionals from the Nuclear Energy Institute, Southern Company, Pacific Gas and Electric, Florida Power and Light and Constellation Energy. *See* 2008 QAMA (LSN# NEN000000782 at 1). This independent assessment team reviewed the current QA program and "concluded that the OCRWM has a good QA program" and that the "QA program meets requirements...." *Id.* at iii.

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<sup>54</sup> Nevada has extensively used selected quotes from reports and independent assessments as well as issues self-identified by DOE as examples of a broken QA program. Nevada has judiciously avoided including any quotes from these reports that show areas of improvement or provide context to the findings. These problem statements cited by Nevada in fact show a healthy and effective QA program that is finding problems and tracking their resolution. *See* Office of Civilian Radioactive Waste Management Quality Assurance Management Assessment, September 2008 Assessment of the Office of Civilian Radioactive Waste Management Quality Assurance Program, (October 21, 2008) (LSN No. NEN000000782 at 12-13) (2008 QAMA).

To further place the historic criticism of the QA program in context, the 2008 QAMA described the difference in overall QA performance between the program in 2006 during the Nuclear Energy Institute evaluation, which is cited by Nevada, and the current QA program as “like night and day.” *Id.* As such, not only has Nevada failed to raise a material issue of fact by showing a nexus between historic criticisms of the QA program and the current program, but neglects to inform the Commission that the most recent evaluation of the QA program shows that DOE’s QA program is properly functioning.

**(2) Failure to meet the legal standard for challenging QA programs**

Nevada further fails to raise a material issue of fact or law because its litany of alleged shortcomings in the QA program fails to satisfy the legal standard for contentions challenging nuclear QA programs. NRC case law from reactor licensing proceedings provides that a breakdown in QA is only meaningful if the errors have not been cured and that they demonstrate a pervasive breakdown of quality assurance that impacts safety performance in service. *See Ga. Power Co.* (Vogtle Electric Generating Plant, Units 1 and 2), 26 NRC 127, 142 (1987) (“the fact that deficiencies occur during the course of construction of a nuclear power plant does not mean that there has been a pervasive failure of the quality assurance program . . . [and could] constitute[] evidence that the applicants’ program was working as intended.”). Quality assurance lapses are expected in complex projects, and, by themselves, do not raise a material issue of fact. *See, e.g., Union Electric Co.* (Callaway Plant Unit 1), 18 NRC 343, 346 (1983) (“[i]n any project even remotely approaching in magnitude and complexity the erection of a nuclear power plant, there inevitably will be some construction defects tied to quality assurance lapses.”). As such, it is not sufficient for a prospective intervenor to assert that quality assurance lapses have occurred, “[r]ather, the focus perforce is on the implications of the asserted deficiencies in terms of safe

plant operation.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), 33 NRC 299, 325 (1991). Nevada has not made this showing.

Table 2, which purports to describe QA-related deficiencies occurring after the submittal of the LA, however, also does not raise a material issue of law or fact because all it shows is a robust QA program that is identifying issues, developing corrections and tracking performance as required by 10 C.F.R. § 63.142(q). Most of the documents cited in Table 2 (i.e., assessments, audits, surveillances) are tools used in the QA program to ensure quality. For example, stop work orders, among other things, demonstrate that DOE has aggressively monitored its suppliers for the quality of their work and stopped work until problems were fixed. This is what one expects to see in a properly functioning QA program. Identification of conditions adverse to quality is the hallmark of a properly functioning corrective action component of a quality assurance program, not an indication that there is a pervasive breakdown of quality assurance. *Ga. Power Co.* (Vogtle Units 1 and 2), 26 NRC at 142. No quality assurance effort can be expected to be flawless. *Id.* As such, Nevada’s attempt to list QA-related issues does not create a material issue of fact for a hearing, but rather confirms that DOE has a functioning QA program that can identify and track problems.

#### **4. NEV-SAFETY-04 - Content Of Quality Assurance Program**

Legal issue: SAR Subsection 5.1.2, which states that the Quality Assurance Requirements and Description (QARD) addresses design, analysis, fabrication, construction and testing of the repository, fails to comply with applicable quality assurance criteria because the SAR does not address repository operation, permanent closure, and decontamination and dismantling of surface facilities.

#### **RESPONSE**

In this contention, Nevada contends that the Yucca Mountain repository cannot be licensed because the Quality Assurance Requirements and Description (QARD) document, which describes the requirements of the quality assurance (QA) program to be applied to quality-related activities in the project and is incorporated by reference in the SAR, does not address repository operation, permanent closure and decontamination and dismantling of surface facilities.

##### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

##### **b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

##### **c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside of the scope of the proceeding because this proceeding relates to DOE's application for construction authorization for the repository; and this contention

challenges aspects of the quality assurance program that relate to repository operation, closure and decontamination and dismantling of surface facilities, which the NRC already has determined are outside the scope of activities that DOE's QA program must encompass at this time. In response to questions regarding "[w]hich elements of [DOE's] QA program should be in place at the time of license application submittal," the NRC had the following to say:

The DOE quality assurance program and associated quality assurance program controls and implementing procedures regarding activities performed must be in place before activities begin. *These activities include site characterization; acquisition, control, and analysis of samples and data; tests and experiments; scientific studies; facility and equipment design and construction; and performance confirmation.*

Yucca Mountain Review Plan, NUREG-1804, Rev. 2, Final Report 68 Fed. Reg. 45,086, 45,103 (July 31, 2003) (quotations omitted) (emphasis added). It is clear from this statement that the NRC does not anticipate receiving from DOE, at this time, QA program information on repository operation, permanent closure and decontamination and the dismantling of surface facilities. Had the NRC wanted this information at the time of LA submittal, it would have said so and, in fact, likely would not have accepted the Application for docketing.

Petitioner does not cite any legal authority that expands the scope of what the NRC declared the QA program must cover for the purposes of the instant proceeding.<sup>55</sup>

The Notice of Hearing that Petitioner cites as support for this contention only further supports dismissal of the contention. Specifically, section II, paragraph 1 of the Notice of Hearing, as referenced by Petitioner, states that "the matters of fact and law to be considered are

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<sup>55</sup> Notably, the portion of the Yucca Mountain Review Plan, NUREG-1804, that covers the subject of QA does not yet include operation, permanent closure, and decontamination and dismantling of surface facilities. *See* Yucca Mountain Review Plan, NUREG-1804 Rev. 2, § 2.5.1.3 at 2.5-4 (July 2003); 68 Fed. Reg. at 45,103 ("The Yucca Mountain Review Plan will be modified, at the appropriate time, to include facility operation, permanent closure, and decontamination and dismantling of surface facilities.").

whether the application satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC's standards in 10 CFR Part 63 for a *construction authorization* for a high-level waste geologic repository . . . ." 73 Fed. Reg. 63,029 (Oct. 22, 2008) (emphasis added). As such, the contention must be dismissed as exceeding the scope of the proceeding to the extent it seeks a determination regarding the sufficiency of the QARD, DOE's controlling QA document, as applied to activities that DOE is not yet performing or allowed to perform. Any other conclusion would, in effect, allow Petitioner to advocate for stricter requirements than NRC rules require at this stage, which is not allowed. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the NRC must make because it alleges an absence of quality assurance requirements relating to the operation and closure of the repository, when the NRC is being asked to only make findings with respect to the construction of the repository. Petitioner does not cite any legal authority requiring that the SAR or QARD, submitted as part of the LA for construction authorization, include the quality assurance program for activities that relate to operations, closure and decontamination and dismantling of surface facilities of the repository—because there is no such legal authority. Indeed, the applicable regulations explicitly contemplate that DOE would change its QA program following the submittal of the LA. *See generally* 10 C.F.R. § 63.144. SAR section 5.1 and the QARD, which is incorporated by reference and, therefore, also part of the LA, reflect this same concept. *See* SAR § 5.1 at 5.1-2 ("The QARD will be revised at appropriate times to address future activities related to facility operations, permanent closure of the repository, and

decommissioning and dismantlement of the surface facilities.”); Quality Assurance Requirements and Description (QARD), DOE/RW-033P (2008), Rev. 20 at 19 (“Introduction”) (“This QARD will be revised prior to the receipt of a license to receive and possess HLW/SNF to address activities associated with facility operation.”).

Notwithstanding this specific DOE commitment, Petitioner claims a deficiency that does not exist by citing 10 C.F.R. § 63.31(a)(3) as support for the proposition that the NRC cannot authorize construction in the absence of a QA program that covers activities from site characterization through decontamination and dismantling of surface facilities. But Petitioner is wrong as a matter of law. The plain language of the regulation clearly states that DOE’s QA program’s compliance with Subpart G (including 10 C.F.R. § 63.142) is one of several issues for the Commission to “consider” in making its safety determinations. *Nothing* in either 10 C.F.R. § 63.31(a)(3) or 10 C.F.R. § 63.142 requires that DOE’s QA program cover activities beyond those activities for which authorization is sought, i.e., construction authorization. Any other interpretation flies in the face of the NRC’s acceptance criteria and the multi-phased nature of the licensing process described by the NRC in the Statements of Consideration for Part 63:

[P]art 63 provides for a multi-staged licensing process that affords the Commission the flexibility to make decisions in a logical time sequence that accounts for DOE collecting and analyzing additional information over the construction and operational phases of the repository. The multi-staged approach comprises four major decisions by the Commission: (1) construction authorization; (2) license to receive and emplace waste; (3) license amendment for permanent closure; and (4) termination of license. The time required to complete the stages of this process . . . is extensive and will allow for generation of additional information. Clearly, the knowledge available at the time of construction authorization will be less than at the subsequent stages.

Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55,738 (Nov. 2, 2001).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For reasons discussed above, this contention also fails to raise a genuine dispute on a material issue of law or fact because there is no legal requirement that the SAR or QARD submitted as part of the LA identify the elements of the QA program applicable to operations, closure and decontamination and dismantling of surface facilities. The applicable regulations and guidance explicitly contemplate that DOE will amend its QARD to address operations, closure and decontamination and dismantling activities sometime after receipt of construction authorization. Simply put, the NRC is not currently being asked to consider the appropriateness of the QA program for operation, closure and post-closure activities at the repository. Nor should Petitioner be allowed to somehow force that consideration upon the NRC Staff before DOE has requested NRC approval of related activities.

It should also be noted that Petitioner's characterization of SAR 5.1.2 as meaning that "the QARD does not apply the QA program to facility operation, permanent closure, or decontamination and dismantling of surface facilities," Petition at 75, fails as well to establish a dispute on a material issue of law. In short, SAR 5.1.2 *does not* say that the QARD does not apply to facility operation, permanent closure, or decontamination and dismantling of surface facilities. The QARD applies to such activities and, as discussed above, will be amended

pursuant to 10 C.F.R. 63.144 to address those activities at the appropriate time. Until that time, any contentions alleging that DOE does not intend to update the QARD to cover activities up to and including the decontamination and dismantling of surface facilities are speculative and premature. *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-14, 55 NRC 278, 294 (2002) (“An NRC proceeding considers the application presented to the agency for consideration and not potential future amendments that are a matter of speculation at the time of the ongoing proceeding.”).

**5. NEV-SAFETY-05 - Emergency Plan**

SAR Subsection 5.7 (and subsections therein), which states that an emergency plan will be provided to the NRC no later than 6 months prior to the submittal of the updated application for a license to receive and possess spent nuclear fuel and high-level radioactive waste, contains a mere commitment to develop an emergency plan as opposed to the plan itself or even a description of the plan.

**RESPONSE**

This contention argues that the Application does not comply with 10 C.F.R. Part 63 because SAR Section 5.7 does not contain a description of the emergency plan that includes all the information that is currently available.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention fails to raise an issue that is material to the findings that the NRC must make. Nevada argues that the LA does not comply with 10 C.F.R. § 63.31(a)(3), which

“provides that a construction authorization will not be issued unless the Application satisfies the requirements of 10 C.F.R. § 63.21 and the emergency plan complies with the requirements of 10 C.F.R. Part 63, Subpart I.” Petition at 77. But none of the provisions cited by Nevada requires that the Application contain a complete emergency plan or even a description of a complete emergency plan. To the contrary, as Nevada acknowledges, all that is required at this stage is a description of the plan; and that description need only contain all the information that was reasonably available *at the time of docketing*. Petition at 78. See 10 C.F.R. § 63.21(c)(21) (requiring “[a] description of the plan for responding to, and recovering from, radiological emergencies”); 10 C.F.R. § 63.21(a) (requiring that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing”).

Nevertheless, Nevada argues that the section of the Application that describes the emergency plan—SAR section 5.7—does not contain all of the information that is reasonably available *now* and, as support for this assertion, lists seven items which DOE commits to include in the completed emergency plan. *Id.* at 76-77. But Nevada misstates the requirements of 10 C.F.R. Part 63 and, in any event, offers no evidence that the “missing” information actually is available, let alone that it was reasonably available at the time of docketing. Nor does Nevada explain why this information, even if it were available, should have been included in the Application. As a result, Nevada fails to establish how the contention would “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Accordingly, this contention should be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The legal standards that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet

those standards because, as discussed in that Section, it presents only unsupported arguments of counsel and the affidavit of an expert who merely “adopts” paragraph 5 of this contention. This falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Indeed, the contention does not even mention the expert’s affidavits. Nevada’s failure to cite any factual materials in the contention cannot be salvaged by this disconnected affidavit. *See USEC, CLI-06-10, 63 NRC at 472.*

Nevada is obligated to provide a concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials. Yet Nevada cites nothing to demonstrate that any of the seven items that it claims are now available for inclusion in the emergency plan are actually available, let alone that they were available at the time of Application submittal.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention also should be dismissed because it fails to raise a genuine dispute on a material issue of law or fact. As described above, Nevada ultimately does not dispute that 10 C.F.R. Part 63 does not require that the Application contain a complete emergency plan or even that the Application contain the description of a complete plan at this time. Nevada appears to only dispute whether SAR section 5.7 includes all the information that is now available to DOE now. Petition at 78. Nevertheless, Nevada fails to offer a shred of evidence that any of the information believed to be “missing” from SAR section 5.7 is reasonably available now or (more importantly) that it was reasonably available at the time of docketing. Accordingly, the contention is totally unsupported and presents no real dispute.

Indeed, this contention fails to demonstrate that the emergency plan description contained in SAR section 5.7 is deficient in any way whatsoever. SAR section 5.7 contains more than 50

pages of discussion about the plan, including various tables and figures. It also addresses each of the 16 subjects listed in 10 C.F.R. § 72.32(b). *See* 10 C.F.R. Part 63, Subpart I (providing that “[t]he emergency plan must be based on the [16] criteria of § 73.32(b) of this chapter”). These subjects include:

1. Facility Description (SAR subsection 5.7.2)
2. Types of Potential Accidents (SAR subsection 5.7.3)
3. Classification of Potential Accidents (SAR subsection 5.7.3)
4. Detection of Accidents (SAR subsection 5.7.4)
5. Mitigation of Consequences (SAR subsection 5.7.5)
6. Assessment of Releases (SAR subsection 5.7.6)
7. Responsibilities (SAR subsections 5.7.1 and 5.7.7.)
8. Notification and Coordination (SAR subsection 5.7.8)
9. Information to be Communicated (SAR subsection 5.7.9)
10. Training (SAR subsection 5.7.10)
11. Safe Condition (SAR subsection 5.7.11)
12. Exercises (SAR subsection 5.7.12)
13. Hazardous Chemicals (SAR subsection 5.7.13)
14. Comments on the Plan (SAR subsection 5.7.14)
15. Offsite Assistance (SAR subsection 5.7.15)
16. Arrangements Made for Providing Information to the Public (SAR subsection 5.7.16)

DOE’s discussion of these and other subjects demonstrates that the description of the emergency plan in SAR section 5.7 is more than sufficient at this stage. Furthermore, as noted

above, nowhere in the contention does Nevada demonstrate that NRC regulations actually require that any of the seven specific items of information cited in the contention be included in the Application at this time. Even if it did, the fact that DOE makes commitments to include the items when the emergency plan is complete, before the introduction of radionuclides to the repository occurs, does not make the description deficient. Nor does it somehow signal that the information to be included is now available to DOE or was reasonably available at the time of docketing. To the contrary, such commitments are consistent with applicable NRC regulations and expectations.

These commitments are also consistent with the multi-phased nature of the licensing process and the level of detail that the NRC expects to see at this early stage. The NRC addressed this point in the Statements of Consideration for 10 C.F.R. Part 63:

[P]art 63 provides for a multi-staged licensing process that affords the Commission the flexibility to make decisions in a logical time sequence that accounts for DOE collecting and analyzing additional information over the construction and operational phases of the repository. The multi-staged approach comprises four major decisions by the Commission: (1) Construction authorization; (2) license to receive and emplace waste; (3) license amendment for permanent closure; (4) termination of license. The time required to complete the stages of this process . . . is extensive and will allow for generation of additional information. Clearly, the knowledge available at the time of construction authorization will be less than at the subsequent stages.

Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55738 (Nov. 2, 2001). Thus, it is beyond dispute that the Application contains a sufficient description of the emergency plan to be developed by DOE. Moreover, as indicated above, insofar as DOE makes commitments to provide additional information at a later time, Nevada fails to explain how the information sought was reasonably available at the time of docketing and/or that omitting this information at this early stage would

preclude the NRC from making the requisite safety determinations. Accordingly, this contention is inadmissible and must be dismissed.

**6. NEV-SAFETY-06 - Part 21 Compliance**

Legal issue: SAR Subsections 1.5.1 and 5, which state that DOE will identify and evaluate deviations and failures to comply and will report defects and failures to comply associated with activities for and basic components supplied to the Yucca Mountain repository, fails to address the elements of the program to govern such activities or the procedures for implementing such activities, and therefore there is no assurance that such activities are currently in place or functioning.

**RESPONSE**

This contention alleges that the LA does not address the elements of a program to implement the requirements of 10 C.F.R Part 21 (Part 21), or reference any repository procedures to implement such requirements, and, therefore, concludes that DOE must not have a functioning program to ensure compliance with the requirements of Part 21.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(2) and (3), 63.73, 21.1 and 21.2(a)(2). *See* Petition at 80-81. Nevada concludes this general description of various sections of 10 C.F.R. Parts 63 and 21 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 81. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada fails to demonstrate that the issue raised by this contention is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits, however, none of them purports to provide expert opinions to support this contention. In fact, paragraph 1 of this contention labels this as a legal issue. It does not appear, however, that any legal issue is raised by this contention that would distinguish this contention from other contentions that assert that the Application does not contain required information.

The only facts Nevada provides to support this contention are: (1) statements in the Application that DOE "will comply" with Part 21; (2) statements in the Application that DOE "will comply" with 10 C.F.R. § 63.73(b); and (3) statements in an NRC Inspection Procedure and Manual Chapter indicating that DOE would become subject to Part 21 if and when the Application was docketed. Petition at 81, 82.

With respect to the statements in the Application that DOE will comply with Part 21, Nevada asserts that such statements suggest that a Part 21 program is not already in place. Nevada also asserts that the Application does not address the elements of the program to govern such activities. Nevada has apparently overlooked the fact that the program elements are addressed in the Office of Civilian Radioactive Waste Management (OCRWM) Quality Assurance Requirements and Description (QARD) (LSN#: DEN001574022), which is

incorporated by reference in the Application at SAR subsection 5.1 at 5.1-1. The QARD includes requirements for: (1) procurement documents to identify when Part 21 is applicable (QARD at 52); (2) dedication of commercial grade items in accordance with Part 21 (QARD at 72); (3) reviewing nonconformances to determine the need for reporting in accordance with Part 21 (QARD at 92); and (4) reviewing conditions adverse to quality to determine the need for reporting in accordance with Part 21 (QARD at 95).

Contrary to Nevada's suggestions that DOE has no related procedures, these requirements are also covered in DOE procedures, including OCRWM Procedure "AP-15.5Q Identification, Evaluation and Reporting of 10 CFR Part 21/50.55(e) Defects and Noncompliance" (LSN#: DEN001595238), which establishes the responsibilities and process followed by DOE and its prime/principal contractors for identification, evaluation, documentation, review and approval, notifications and reporting of defects and noncompliance as described in 10 C.F.R. Part 21 and 10 C.F.R. § 63.73; and "AP-16.1Q Condition Reporting and Resolution (LSN#: DEN001602973), which establishes the responsibilities and processes to be used to ensure that conditions related to, but not limited to, the environment, safety, health, waste isolation, operations, security, or quality of items and services associated with OCRWM work activities are promptly identified, controlled, evaluated (including review for reportability under Part 21), and corrected. Thus, this assertion does not provide any support for this contention.

With respect to the statement in the Application that DOE will comply with 10 C.F.R. § 63.73(b), Nevada notes that § 63.73(b) covers reporting that is also required by § 21.21, and then asserts that the statement that "methods will be in place" to implement these requirements implies that they are not already in place. Petition at 82. Nevada is wrong in suggesting that a statement about compliance with § 63.73(b) also conveys information about compliance with

Part 21. Although Part 21 and § 63.73(b) have related purposes, and use similar language, they are separate regulatory requirements, and are addressed separately in the Application. See SAR Table 5.2-2 at 5.2.9. They also are addressed separately in the QARD, which addresses the need to review both nonconforming characteristics and Conditions Adverse to Quality to determine the need for reporting in accordance with 10 C.F.R. § 63.73 as well as 10 C.F.R. Part 21 (QARD at 92, 95). Thus, this assertion does not provide any support for this contention.

Finally, Nevada cites the NRC Inspection Manual and an NRC Inspection Procedure to show that NRC expects DOE to have a functioning and effective Part 21 program, since it stated that such a program would be required once the Application was docketed. Petition at 82-3. This, of course, also does not provide any support for Nevada's contention that DOE does not have a program and procedures in place to comply with Part 21. In fact, it appears that NRC on-site representatives had been reviewing DOE's implementation of Part 21 even before the Application was docketed. *See* U.S. Nuclear Regulatory Commission On-Site Licensing Representatives' Quarterly Report Number OR-08-01, On The Yucca Mountain Project, For January 1, 2008 Through March 31, 2008 (LSN#: NRC000029599, ADAMS ML081220555), at Table 1, page 7 (indicating closure of open item OR 02-10 concerning "evaluation and documentation of the design control attributes associated with requirements of . . . 10 CFR Part 21.").

In sum, none of the facts cited by Nevada provides support for the contention that DOE does not have a program for carrying out the requirements of Part 21.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As shown above, Nevada has failed to identify the relevant information in the QARD, and has not cited facts or expert opinion sufficient to show that there is a genuine dispute on any

material issue of law or fact. Moreover, the essence of this contention is Nevada's assertion that, based on its conclusion that the Application did not describe the elements of DOE's Part 21 program, the NRC should assume that "DOE does not have a functioning Part 21 program." *Id.* at 81-82. Such an assumption would be completely unfounded; and Nevada must do more than make an unsupported assertion that DOE does not intend to comply with the commitments it makes in the Application in order for its contention to be admissible. Indeed, Nevada must provide "clear evidence." See *U.S. Department of Energy (High Level Waste Repository: Pre-Application Matters)*, CLI-08-11, *slip op.* at 8 ("Absent 'clear evidence to the contrary,' we presume that public officers will 'properly discharge[] their official duties.'"). Here, Nevada provides *no* evidence.

## 7. NEV-SAFETY-07 - Retrieval Plans And Qa

DOE's description of its plans for retrieval and its QA program are deficient because structures, systems and components necessary for retrieval to be accomplished are not all subject to QA.

### RESPONSE

This contention is impossible to summarize because it is impossible to determine precisely what Nevada is alleging. On the one hand, Nevada appears to allege that not all structures, systems and components (SSCs) necessary for retrieval are classified as important to safety (ITS) or important to waste isolation (ITWI). Nevada then assumes that, as a result, some SSCs are not covered by DOE's quality assurance (QA) program, and argues either that all SSCs should be covered by the QA program or that they should be classified as ITWI. This lack of clarity fails to put DOE on notice of whether the contention is intended to relate to DOE's QA program or to the description of its retrieval plans.

#### a. Statement of Issue of Law or Fact to be Controverted

This contention must be dismissed because it does not "explain, with specificity, particular safety or legal reasons requiring rejection of the contested [application]." *Dominion Nuclear Conn., Inc.* CLI-01-24, 54 NRC at 359-60. Nor does it even come close to "articulat[ing] . . . the specific issues [it] wish[es] to litigate." *Duke Energy Corp.*, CLI-99-11, 49 NRC at 338. Instead, relying exclusively on the glossary of the SAR, Nevada makes a series of vague statements that are impossible to decipher. Initially, Nevada argues that:

The SAR glossary at xlvi defines some [SSCs] . . . that are necessary for retrieval as ITS, but the glossary at xlvi does not clearly define any [SSC] that is necessary for retrieval as ITWI. This means that the QA status of a [SSC] that is necessary for

retrieval depends only on whether it is needed to provide reasonable assurance retrieval will not lead to excessive doses in normal operation and in category 1 and 2 event sequences, ignoring post-closure waste isolation. *DOE should have defined all structures, systems and components which are necessary for retrieval as ITWI.*

Petition at 84 (emphasis added). Nevada then goes on to argue that “important [SSCs] that are necessary for retrieval [are] being *omitted from the QA program.*” *Id.* at 85 (emphasis added).

Taken together, these statements *appear* to raise various questions about: (1) whether SSCs necessary for retrieval have been properly classified as ITS/ITWI or non-ITS/non-ITWI; (2) whether these SSCs are covered by DOE’s QA program; (3) whether these questions in any way implicate DOE’s QA program; and/or (4) whether these questions in any way implicate DOE’s ability to retrieve waste. DOE cannot be expected to speculate as to which of these questions this contention attempts to put into issue in this proceeding.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

10 C.F.R. § 2.309(f)(1)(iv) requires a petitioner to show that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See*

*Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Regardless of whether this contention ultimately relates to the sufficiency of DOE’s QA program or the description of its retrieval plans, Nevada fails to present a material issue. To the extent the contention relates to DOE’s QA program, Nevada implies that certain SSCs were improperly classified, which resulted in certain SSCs falling outside of the QA program. Beyond offering no evidence that any SSCs were, in fact, improperly classified, however, Nevada fails to realize that DOE’s QA program applies to ITS and ITWI SSCs, *as well as* non-ITS and non-ITWI SSCs. *See* Quality Assurance Requirements and Description (QARD), Rev. 20 at 19 (providing that non-ITS/ITWI that are important to worker and public safety and the environment are covered by the QA program using a graded approach). Because Nevada has yet to establish that the SSCs at issue are not covered by DOE’s QA program, it cannot credibly argue that this contention relates to DOE’s QA program in any material way.

Likewise, there is no material issue with respect to DOE’s description of its retrieval plans. Specifically, nothing in this contention even suggests that an SSC’s ITS or ITWI classification, or even whether it is covered by DOE’s QA program, would have any bearing on DOE’s ability to retrieve waste from the repository, as governed by 10 C.F.R. § 63.111(e). Indeed, insofar as Nevada’s real concern is that all SSCs necessary for retrieval be classified as

ITWI, the contention makes no sense whatsoever. The function of an ITWI SSC is to assist with isolating waste, whereas the function of retrieval equipment is to remove waste from isolation. *See* 10 C.F.R. § 63.2 (defining ITWI SSCs as “those engineered and natural barriers whose function is to provide a reasonable expectation that high-level waste can be disposed of without exceeding the requirements of § 63.113(b) and (c)”).

Thus, whether QA-related or related to the subject of retrieval, this contention, fails, twice, to raise an issue that is material to the findings that the NRC must make in this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet these standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above: (1) the contention does not reference any documents, other than the LA; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. This contention falls far short of the requirement to provide conclusions supported by reasoned bases or explanation, and therefore must be dismissed. The contention appears to automatically assume that, among other things, treating particular SSCs as ITS or ITWI will determine whether that SSC is covered by DOE’s QA program, which, in turn, could have an impact on either DOE’s QA program or DOE’s ability to retrieve waste. But Nevada offers no evidence to support this assumption.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

This contention also fails to raise a genuine dispute on a material issue of law or fact because Nevada offers nothing to show that any of the SSCs that are necessary for retrieval have been incorrectly classified. Thus, there is no real question as to whether or not any of the SSCs necessary for retrieval have been properly classified as ITS/ITW or non-ITS/non-ITWI. Nevada offers no evidence on any of these matters. Nor does Nevada establish that any of the SSCs at issue are, in fact, not covered by DOE's QA program. Finally, Nevada even fails to draw a connection among an ITS/ITWI classification, the QA program and DOE's ability to retrieve waste. Accordingly, this contention must be dismissed.

**8. NEV-SAFETY-08 - Alara And The Aging Facility**

The discussion of the Aging Facility in SAR Subsection 1.2.7, and related subsections, is insufficient to establish compliance with NRC requirements that occupational exposure to radiation be “as low as reasonably achievable” (ALARA).

**RESPONSE**

This contention asserts that SAR Subsection 1.2.7 does not establish that the Aging Facility will comply with ALARA requirements because the SAR discussion of ALARA uses simplifying assumptions.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(2) and (3), 63.21(c)(2) and (6), 63.111(a)(1), 20.1101(b), 63.111(c), 63.112(e)(2) and (5) in the contention. *See* Petition at 87-8. Nevada concludes this general description of various sections of 10 C.F.R. Parts 63 and 20 with the mere assertion that “this contention alleges noncompliance with these

regulatory provisions and therefore raises a material issue.” *Id.* at 88. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada has not demonstrated that this contention raises an issue that would prevent the NRC from making any finding required for the NRC to authorize construction of the repository. Moreover, the discussion in e. and f. below shows that this contention does not raise an issue that is material to any of the required findings.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of

counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach an affidavit (by Michael C. Thorne), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply “adopt[s]” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In paragraph 2 of this contention, Nevada asserts that the SAR does not provide specific overpack shielding design, Aging Facility layout and loading plans, and that as a result, there is not a credible demonstration that ALARA requirements have been met because the SAR uses simplifying assumptions. Nevada does not identify any supporting facts or expert opinion for these assertions in paragraph 2 or paragraph 5. As the following list illustrates, the SAR does include such information, but Nevada has not referenced the relevant portions of the SAR or specified the allegedly omitted information.

- Overpack Shielding Design
  - SAR Subsection 1.2.7.6.3 “Shielding Design” (at 1.2.7-12);
  - Figure 1.2.7-6 “Typical Vertical Aging Overpack”(at 1.2.7-28); and
  - Table 1.10-6 “Dimensions of Aging Overpack” (at 1.10-52).
- Aging Facility Layout
  - SAR Subsection 1.2.7.1.2 “Location and Functional Arrangement” (at 1.2.7-12);
  - Figure 1.2.7-2 “Aging Pad Area Locations” (at 1.2.7-23);
  - Figure 1.2.7-3 “Aging Pad 17P Plan” (at 1.2.7-24);
  - Figure 1.2.7-4 “Aging Pad 17 R Plan” (at 1.2.7-25); and

- Figure 1.1-3 “Surface Geologic Repository Operations Area Showing Changes of Restricted Area and Protected Area during Phased Repository Development” (at 1.1-335).
- Loading Plans and ALARA
  - SAR Subsection 1.2.7.2 “Operational Processes” (at 1.2.7-8);
  - SAR Subsection 1.2.7.6.5 “As Low as is Reasonably Achievable Design” (at 1.2.7-12);
  - SAR Section 1.10 “Meeting The As Low As Is Reasonably Achievable Requirements For Normal Operations And Category 1 Event Sequences” (at 1.10-1);
  - SAR Section 5.11 “Operational Radiation Protection Program” (at 5.11-1).

Paragraph 5 of this contention makes three basic assertions, that: (1) a Hazards Analysis Report for the Aging Facility indicates that routine personnel activities will require occupancy exceeding administrative time limits and can result in personnel radiation dose exceeding the Project Design Criteria design goal (Petition at 88-9); (2) dose estimates for the Aging Facility are not credible because shielding of the aging overpacks is not yet designed and worker tasks are not detailed sufficiently to analyze dose consequences of operating the Aging Facility (Petition at 89-90); and (3) the security fence around the Aging Facility allows non-involved workers and visitors to receive exposures up to 2.5 mrem/hr (Petition at 90).

None of these assertions identifies a violation of a regulatory requirement. Moreover, the documents upon which Nevada relies do not provide an adequate foundation for any assertion that the facility design or proposed operations would be inconsistent with any regulation, or prevent the NRC from making the findings necessary to support issuance of construction authorization. Consequently, Nevada has not demonstrated that this contention raises an issue

that is material to the findings that the NRC must make to support issuance of construction authorization.

Nevada's first assertion is based on a DOE report, "Hazards Analysis Report: Aging Facility" (04/2008), LSN# DEN001591110. Petition at 88-9. Nevada asserts that the DOE report "concludes that these operations are not in keeping with ALARA pursuant to 10 C.F.R. Part 20." *Id.* at 89. The DOE report does not conclude that there is any such finding. The conclusion of the DOE report is that "overall the safety of the [Aging Facility], and the associated systems and design processes, is acceptable at this stage of design. Adequate design mitigation for pertinent hazards is incorporated in design requirements, or is in process." *Id.* at 14. The DOE report acknowledges that the ALARA requirements will be met, but indicates that dose reduction measures should be incorporated during completion of design to satisfy DOE's preference for reducing hazards through design rather than through the use of administrative controls. *Id.* at 50. The DOE hazard analysis cited by the petitioner is part of an early, systematic review of the design to ensure that due consideration is given to the hazards associated with the activities at the repository. DOE report at 8-9. Conducting such reviews very early in the design process is consistent with NRC guidance, which describes that "[t]he principal benefits arising from this evaluation process occur during the period of preliminary design since many of the ALARA practices are part of the design process." Regulatory Guide 8.19 "Occupational Radiation Dose Assessment In Light-Water Reactor Power Plants Design Stage Man-Rem Estimates," Rev. 1 at 1. The DOE report identifies concerns that should receive attention during completion of the design. DOE report at 9. A follow up review was scheduled to be done later as the design progressed. *Id.* at 11. A more recent DOE ALARA review of worker doses, based upon best estimate source term and throughput, estimated the dose to an Aging Facility operator

as 200 mrem/yr and to an Aging Facility health physics technician as 300 mrem/yr, which is well below the DOE goal to maintain the doses to workers at the repository to below 500 mrem/yr. LSN# DEN001574948, Table 1.0. In short, the DOE report is part of the process for complying with the ALARA requirements and does not provide support for a contention that the design does not meet those requirements. Consequently, Nevada's first assertion does not demonstrate that this contention raises an issue that is material to the findings that the NRC must make to support issuance of construction authorization.

Nevada's second assertion, concerning the credibility of dose estimates for operating the Aging Facility relies on a very general statement in the SAR explaining that dose estimates in the SAR are conservative, and will likely be reduced as the design advances. *See* SAR Subsection 1.10.2.11.1 at 1.10-20. The general statement does not mention the Aging Facility. *Id.* Contrary to Nevada's assertion that this general statement shows that aging overpack shielding is not yet designed and worker tasks not determined, configuration of an Aging Overpack is depicted in SAR Figure 1.2.7-6 (page 1.2.7-28), Aging Overpack shielding dimensions are given in SAR Table 1.10-6 (page 1.10-52), and worker tasks for operations with horizontal aging modules are depicted in SAR Figure 1.2.7-7 (page 1.2.7-29). Nevada does not cite any regulatory requirement suggesting that such information is not sufficient for construction authorization. Nevertheless, Nevada states, with regard to the Aging Facility," the License Application does not conform to two of the ALARA design principles stated in SAR Subsection 1.10.2 at 1.10-5." Petition at 89. Nevada does not cite any design detail or document that might substantiate such a claim, and it is not borne out by the facts. In fact, the SAR describes specific design features of the Aging Facility that implement the two principles in Subsections 1.2.7.6. 3 and 1.2.7.6.5 (SAR at 1.2.7-12-13). Consequently, Nevada's second assertion also does not provide support for this

contention or demonstrate that it raises an issue that is material to the findings that the NRC must make to support issuance of construction authorization.

Nevada's third and final assertion is that the security fence surrounding the Aging Facility does not fully limit access to visitors and non-involved workers into an area where they could receive up to 2.5 mrem/hr. Nevada does not cite any regulation or guidance that would be violated, or even a reason why any change would be desirable. The location of the Aging Facility areas is distant from the handling facilities and construction workers to reduce worker exposures. SAR Subsection 1.2.7.1.2 ("Location and Functional Arrangement") (page 1.2.7-4). Thus, there will be little occasion for non-involved workers or visitors to be in such areas. It should also be recognized that 2.5 mrem/hr is half of the dose rate of areas that require posting with a caution sign under 10 C.F.R. § 20.1903(c). Consequently, this assertion also does not violate any regulatory requirement, and does not demonstrate that this contention raises an issue that is material to any finding that the NRC must make to support issuance of construction authorization.

Thus, Nevada has failed to provide adequate support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in d. and e. above, the information Nevada has provided to support this contention is not sufficient information to show that a genuine dispute exists with DOE on a material issue of law or fact. Nothing that Nevada states in connection with this contention constitutes a reasoned statement of why the LA is unacceptable in some material respect. Consequently, this contention should be dismissed.

**9. NEV-SAFETY-09 - Increasing Co2 Levels On Future Climate Projections**

SAR Subsections 2.3.1.2.1.2, 5.1.6.5, and similar subsections, which state that the infiltration model used for Yucca Mountain applies current meteorological data for the generation of meteorological conditions for predicted future climates in the Yucca Mountain region over the next 10,000 years, fail to acknowledge that atmospheric CO<sub>2</sub> concentrations are increasing at a rate of 1 to 2 ppmv per year, and as a result, the climate states adopted by DOE for the next 10,000 years cannot be justified.

**RESPONSE**

This contention claims that DOE's infiltration model, as discussed in SAR Subsections 2.3.1.2.1.2 and 5.1.6.5, and similar subsections, does not acknowledge that atmospheric CO<sub>2</sub> concentrations are increasing at a rate of 1 to 2 ppmv per year, and as a result, the climate states adopted by DOE for the first 10,000 years after permanent closure cannot be justified. Petition at 92. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

To the extent that Nevada argues that DOE is required to take into account in its climate analysis potential climate changes caused by ever increasing CO<sub>2</sub> concentrations resulting from human activity, the contention is inadmissible as outside the scope of this proceeding.

Nevada's contention would require DOE to predict how future human activity may, or may not impact the Earth's future climate. This, in turn, would require DOE to predict the future amounts and variations in amounts of CO<sub>2</sub> concentrations due to human activities. This is precisely the type of speculative endeavors that the NRC does not require DOE to undertake. For instance, in promulgating 10 C.F.R. § 63.305(b), the NRC explained that any attempt to foretell the impacts of changes to future human behavior was inappropriate as entirely speculative:

The natural systems of the biosphere are allowed to vary (*e.g.*, climate change) because the geologic record provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes. Because human behavior cannot be similarly predicted, a similar approach cannot be used for the RMEI and the influence the local population has on the biosphere. Thus, it is necessary to emphasize current conditions for the RMEI... The suggestion that NRC consider alternative futures related to human behavior is speculative and leads to problems deciding which alternative futures are credible and which are unrealistic. Such questions have no scientific or technical answer.

66 Fed. Reg. at 55757 (Nov. 2, 2001). Therefore, Nevada's contention would have DOE speculate, in contradiction of the basis for applicable regulations, about future changes in human activity for the first 10,000 year period which are inconsistent with NRC regulations at 10 C.F.R. § 63.305(b) and after that time, which is inconsistent with proposed § 63.342(c)(2). It is well settled that, absent a waiver, "no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding." 10 C.F.R. § 2.335(a). This licensing proceeding is an improper

forum for parties to challenge NRC regulations or proposed rules. *See* 10 C.F.R. § 2.335(a); *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 345 (1999) (extending that prohibition to challenges on the subject of an NRC rulemaking). This includes a contention that advocates stricter requirements than those imposed by the Commission's regulations or that otherwise seeks to litigate a generic determination established by a Commission rulemaking. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001). Accordingly, this contention must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. First, as noted above, the impact of future anthropogenic greenhouse gases on climate is outside the scope of this proceeding and, therefore, by definition the contention does not raise an issue material to the finding the Commission must make.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 93. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a

difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing. Indeed, Nevada fails to address what effect, if any, that including increasing concentrations of CO<sub>2</sub> into the DOE analysis would have, even on infiltration. It does not claim that doing so would result in infiltration estimate beyond that in the license application or that DOE’s estimates are not conservative. Absent any discussion on what effect the contention has on infiltration estimates, Nevada has clearly not met its burden to demonstrate that the resolution of the issue would

prevent the NRC from finding that there is reasonable expectation that the radioactive materials can be received, possessed and disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31.

The method the DOE used in addressing the infiltration model is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (Jonathan Overpeck and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does provide two references for one of its statements in paragraph 5 of the contention, that "insolation and greenhouse gas concentrations are fundamental forcing factors of climate change." However, one of the documents, "Development and Application of a Methodology for taking Climate-Driven Environmental Change into Account in Performance Assessments," is 298 pages long, and the other, "Climate Change 2007," is 21 pages in length. Yet, Nevada does not cite any particular paragraph or page of either of these references as support. Such vague references to documents are not permissible. Rather, a petitioner must

identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Moreover, the mere incorporation of massive documents, such as Nevada has done, is unacceptable. *See Tenn. Valley Auth.* (Browns Ferry Nuclear Plant, Units 1 and 2), LBP-76-10, 3 NRC 209, 216 (1976). Therefore, the reference to these documents is not sufficient to satisfy Section 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada's central claim is that a USGS report entitled "The Climate and Hydrologic History of Southern Nevada During the Late Quaternary," was "a primary basis document" for the license application, and because the report fails to "address the consideration that both insolation and greenhouse gas concentrations are fundamental forcing factors of climate change," DOE's climate analysis "cannot be supported." Petition p. 94. Nevada's contention is incorrect on all of these points. Nevada's assertion that the USGS report is a "primary basis document" for the climate analysis is misleading, and ignores the fact that there are 70 other references cited in SAR section 2.3.1, "Climate and Infiltration." Even limiting this to the SAR subsection specifically referenced in the contention, subsection 2.3.1.2.1.2, the USGS is only one of eleven references. Nevada has no basis for characterizing the USGS report as a "primary basis document."

Further, contrary to Nevada's claim that the USGS report does not consider greenhouse gas concentration to be a climate change forcing function, the USGS report clearly acknowledges that potential. This is readily apparent from the following quote taken from the report's "Central Hypothesis," at page 7:

Climate responds to forcing functions that operate on all time scales from a year or less to millions of years. Short-term forcing

functions involve factors, such as variability of solar output, of ocean/atmosphere heat exchange, such as the El Niño Southern Oscillation (ENSO), of volcanic eruptions, and of human-caused global warming. Long-term (million-year) forcing functions involve factors, such as continental drift, tectonics, and changes in ocean configuration. Change in Earth orbital characteristics occur on a millennial scale. Nonetheless, many factors must contribute to climate change, and the forcing functions likely operate on all time scales.

Even had the USGS report not acknowledged greenhouse gas concentrations as a climate change forcing factor, it would not create a dispute on a material issue because the license application did not cite to this report for its views on climate forcing functions. Rather, the license application cites it solely for its data and analysis of fossil ostracodes and diatoms from Owens Lake, California. As stated by another licensing board, “[T]he Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998). In this case, the USGS report does not support the statements made in this contention. Thus, it is not surprising that the only references to the USGS report in SAR section 2.3.1 are in SAR subsection 2.3.1.2.1.2.4 "Reconstruction of Past Climate Details Using Data about Fossil Ostracodes in Owens Lake and Sizes of Prehistoric Lakes in the Great Basin," 2.3.1.2.2.1.2, "Owens Lake Ostracode and Diatom Record," 2.3.1.2.2.1.3, "Correlation of Owens Lake Paleolimnology and Devils Hole Oxygen Isotope Records," and a subsubsection of 2.3.1.2.3.1.1, entitled "Owens Lake Paleoclimate Record."

The contention urges DOE to analyze the effects of increasing atmospheric CO<sub>2</sub> concentrations for predicted future climates and avers that "atmospheric CO<sub>2</sub> concentrations are increasing at a rate of 1 to 2 ppmv per year." Petition p. 92. Nevada provides no reference to

support these figures. Nevertheless, even if these increases are correct from a historic perspective, Nevada's speculation that atmospheric CO<sub>2</sub> concentrations will increase at a rate of 1 to 2 ppmv per year indefinitely into the future is insufficient to form a basis for the contention and fails to present a genuine dispute of material law or fact. Nevada does not cite to technical or scientific references to substantiate this claim, or provide any reasoned basis whatsoever. As the Commission has held: "an expert opinion that merely states a conclusion (e.g., the application is 'deficient,' 'inadequate,' or 'wrong') without providing a reasoned basis or explanation for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion." *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added) (quoting *Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998)). In fact, Nevada's own document indicates that any attempt to predict changes into the future is "subject to considerable uncertainty":

[T]he future variations in greenhouse-gas concentrations in the atmosphere are subject to considerable uncertainty. One cause of this is that emissions of carbon dioxide from the burning of fossil fuels are difficult to quantify, as they depend on a complex mix of socio-economic and political considerations.

"Development and Application of a Methodology for taking Climate-Driven Environmental Change into Account in Performance Assessments," p. 26. Yet, unlike greenhouse gas emissions, insolation can be predicted quite accurately for millions of years into the future:

The characteristics of the orbit of the Earth enter into consideration because they affect the spatial and temporal pattern of short-wave radiation delivered to the top of the atmosphere. On timescales of up to a few million years into the future, accurate calculations of these variations in insolation have been made using well-justified models of celestial mechanics. Thus, this forcing factor can be

considered as a well-defined input that is not subject to significant uncertainty on the timescales of interest.

*Id.*

The document cited by Nevada further indicates that greenhouse gases such as CO<sub>2</sub> warm the atmosphere. *See* “Development and Application of a Methodology for Taking Climate-Driven Environmental Change into Account in Performance Assessments,” pp. 40-41. Indeed, this document is replete with numerous scenarios and possible future climate variations resulting from increased CO<sub>2</sub> concentrations. For instance, on pp.178-179 it predicts greenhouse gas emissions to result in a climate with much *dryer* conditions:

The combination of higher temperatures throughout the year and somewhat decreased summer precipitation rates would imply a reduction in groundwater resources. Indeed, there might be an extended period of depletion by over-utilisation before a new sustainable water-management regime was established. The reduction in water availability is implied in the data for yearly precipitation and evapotranspiration given in the WP2 simulations. Whereas the current climate provides an annual excess of water that can either run off into the rivers or recharge groundwater resources, in each of the simulations except E (see below) values of precipitation and evapotranspiration are nearly equal. This means, that winter rain is not sufficient to recharge groundwater supplies, because there is always some run-off associated with heavy rain. The consequences of a climate change for agriculture will be time-dependent. The first consequence is likely to be poor harvests, as farming practice may take some time to adjust to the increased frequency of summer drought. After some years, there would be a switch to other species and varieties of grain that are adapted to the warmer and dryer climate, and irrigation practices in family gardens would be intensified.

This helps demonstrate the futility of any type of predictions based on increased production of greenhouse gases by future human activity, and the appropriateness of the NRC’s direction not to attempt to do so. Moreover, dryer conditions, as predicted by Nevada’s own reference will reduce infiltration, making DOE’s model that does not include CO<sub>2</sub> concentrations resulting

from future human activity conservative. Accordingly, there is no genuine dispute as to a material issue.

As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties’ in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the infiltration model properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists.

This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

Finally, the contention's reference to two internal USGS memoranda is entirely immaterial. These memoranda document the internal USGS review of the draft version of the report, together with the substantive responses of the author addressing the comments he received. The documents provide no support for Nevada's assertion that the report "takes ... a limited and inadequate view of factors that will affect future changes in climate." Petition p. 95. To the contrary, the USGS reviewer made it clear that he considered the draft report to be "a very important document representing several dozen man-years of work by top notch scientists in the Yucca Mountain Project (YMP)." LSN DEN001358010 at 82.

**10. NEV-SAFETY-10 - Consideration Of Forcing Functions On Future Climate Projections**

SAR Subsections 5.2.5.3 (and subsections therein) and 5.2.5.4 and similar subsections, ignore basic aspects of climate forcing relevant to the prediction of climate change over the next 10,000 years, and thus conclusions regarding long-term climate projections are inaccurate and incomplete.

**RESPONSE**

In this contention, Nevada alleges that DOE's long-term climate projections are inaccurate and incomplete because "SAR Subsections 5.2.5.3 (and subsections therein) and 5.2.5.4 and similar subsections ignore basic aspects of climate forcing relevant to the prediction of climate change over the next 10,000 years." Petition at 97. In particular, Nevada alleges that DOE should have included the following four "forcing functions": (1) emissions of greenhouse gases resulting from human activities; (2) changes in ice sheets and ocean circulation, again resulting from a human-induced increase in greenhouse gas concentrations; (3) possible decadal-to millennial-scale future climate variability; and (4) possible abrupt climate change. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

This contention does not provide a specific statement of the issue of law or fact to be raised, because the contention fails to specify what "conclusions" regarding DOE's climate change projections are inaccurate and incomplete. In addition, the contention's cites to SAR Subsections 5.2.5.3 and 5.2.5.4 are inaccurate insofar as the SAR does not contain any such subsections. Indeed, SAR Section 5.2 and the subsections it contains pertain to "Records,

Reports, Tests, and Inspections,” and, therefore, have no relevance to DOE’s climate predictions. Clearly, Nevada’s reference to “similar subsections” is likewise irrelevant.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

In essence, Nevada’s core claim is that DOE’s climate analysis is flawed because it fails to take anthropogenic greenhouse gases into account when predicting future climate states. For instance, Nevada alleges at page 99 of the Petition that “human activities are resulting in massive emissions of greenhouse gases ....” The contention goes on and speculates that these greenhouse gas emissions “could result in major changes in ice sheets and ocean circulation ....” *Id.* Nevada’s argument that DOE is required to take into account in its climate analysis potential climate changes caused by increasing greenhouse gases resulting from human activity is inadmissible as outside the scope of this proceeding. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations or that otherwise seeks to litigate a generic determination established by a Commission rulemaking. *See Fla. Power & Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and 4)*, LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001). Section 63.305 contains no requirement that climate forcing functions resulting from human activities be included in DOE’s future climate analysis. An attempt by the petitioner to mandate inclusion of factors that are not required by the Commission’s regulations is, accordingly, inadmissible.

Furthermore, the inclusion of such forcing functions resulting from human activities, for instance emissions of greenhouse gases and the claimed changes in ice sheets, ocean circulation, and other things resulting from these emissions, would require DOE to predict how future human activity may, or may not impact the Earth's future climate. This, in turn, would require DOE to predict the future amounts and variations in amounts of greenhouse gas emissions due to human activities. This is precisely the type of speculative endeavors that the NRC does not require DOE to undertake. For instance, in promulgating 10 C.F.R. § 63.305(b), the NRC explained that any attempt to foretell the impacts of changes to future human behavior was inappropriate as entirely speculative:

The natural systems of the biosphere are allowed to vary (*e.g.*, climate change) because the geologic record provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes. Because human behavior cannot be similarly predicted, a similar approach cannot be used for the RMEI and the influence the local population has on the biosphere. Thus, it is necessary to emphasize current conditions for the RMEI...The suggestion that NRC consider alternative futures related to human behavior is speculative and leads to problems deciding which alternative futures are credible and which are unrealistic. Such questions have no scientific or technical answer.

66 Fed. Reg. at 55757 (Nov. 2, 2001). Nevada's contention would have DOE speculate about future changes in human activity for the first 10,000 year period which is inconsistent with NRC regulations at 10 C.F.R. §§ 63.305(b) and after that time, which is inconsistent with 63.342(c)(2) (proposed). This licensing proceeding is an improper forum for parties to challenge NRC regulations or proposed rules. *See* 10 C.F.R. § 2.335(a) (stating that "no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding"); *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 345 (1999) (extending that

prohibition to challenges on the subject of an NRC rulemaking). Accordingly, this contention must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. First, as noted above, the impact of future anthropogenic greenhouse gases on climate is outside the scope of this proceeding and, therefore, by definition the contention does not raise an issue material to the finding the Commission must make.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing. Indeed, Nevada fails to address what effect, if any, that including the asserted forcing functions into the DOE analysis would have, even on infiltration. It does not claim that doing so would result in infiltration estimate beyond that in the license application or that DOE’s estimates are not conservative. Absent any discussion on what effect the contention has on infiltration estimates, Nevada has clearly not met its burden to demonstrate that the resolution of the issue would prevent the NRC from finding that there is reasonable expectation that the radioactive materials can be received, possessed and disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31.

The method the DOE used in addressing long-term climate projections is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance,

(3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3, *supra*, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Jonathan Overpeck and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5

of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does provide three references purportedly as the basis for their claim that DOE’s climate change assessment “methodology is flawed in that it ignores basic aspects of climate forcing and change relevant to the prediction of climate change over the next 10,000 years.” Petition p. 98. Yet, Nevada does not cite any particular paragraph or page of any of these references as support. Such vague references to documents are not permissible. Rather, a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Indeed, the Commission’s caution that the mere incorporation of massive documents is unacceptable, *see Tenn. Valley Auth.* (Browns Ferry Nuclear Plant, Units 1 and 2), LBP-76-10, 3 NRC 209, 216 (1976), is particularly relevant here. One of the cited documents, “Scientific Assessment of the Effects of Global Change on the United States,” is 271 pages in length, while the other two are 36 and 21 pages long. The fourth and final reference provided in this contention, “Abrupt Climate Change,” is 244 pages in length. Therefore, the contention’s reference to these documents is not sufficient to satisfy Section 2.309(f)(1)(v).

Nevada speculates that “increasing atmospheric greenhouse gas concentrations, unless abated, *could* result in major changes in ice sheets and ocean circulation, that *could*, in turn, create future climates even more distinct from past climates, and those assumed for the future by DOE.” Petition p. 99. Even if this claim was supported by an expert opinion, which it is not, it would fail. It is an indefinite claim that amounts to mere unfocused speculation which does not provide adequate support for a contention. A contention “will be ruled inadmissible if the

petitioner ‘has offered no tangible information, no experts, no substantive affidavits,’ but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Similarly, Nevada’s other claims are speculative on their face and, accordingly also are insufficient support for the contention. This includes the following assertions:

- “[P]ossible decadal- to millennial-scale variability...is known to have been substantial in the past, and *could* thus be so in the future,” Petition p. 99,
- “[A]brupt climate change has occurred in the past, and *could* thus occur in the future.” Petition p. 100.
- “[F]uture climates at Yucca Mountain *could* be different from those assumed by DOE. In particular, those climates *could* be without modern analog.” *Id.*

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed above, DOE has already demonstrated that Nevada’s claims are outside the scope of the proceeding and are also not material. Accordingly, Nevada’s claims of noncompliance also do not raise a genuine dispute of material fact or law. But the contention also contains other arguments which, as DOE demonstrates below, raise no genuine issue on a material issue of fact or law.

DOE modeled climate change consistent with the NRC regulations and regulatory intent. Contrary to Nevada’s claims regarding the first two allegedly omitted functions, DOE appropriately *does* consider climate change and, in predicting that climate change for the first 10,000 year period, considers the impact of past and present human activities. *See* FEP: 1.3.01.00.0A (Climate Change), Features, Events, and Processes for the Total System

Performance Assessment: Analyses, 6-215, 6-218, LSN# DEN001584824 (Mar. 2008). For the first 10,000 years after disposal, DOE modeled climate change using historical climate change records. *See id.* at 6-215. Those records “include effects of modern society over the duration of the historical record.” FEP 1.4.01.00.0A (Human Influences on Climate), Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824 (Mar. 2008).

Furthermore, forcing functions noted by Nevada, could result in a dryer climate, and less potential for infiltration. For instance, one of the documents Nevada cites to in support of NEV-SAFETY-09, found as much with regard to a sudden climate change: “Towards the limit of the Lower-Middle Pleistocene (780 ka BP), a sudden climate change resulted in a dryer period with relative deficits of water and with intermediate episodes of climatic amelioration.”

“Development and Application of a Methodology for Taking Climate-Driven Environmental Change into Account in Performance Assessments,” at 18-19. Similarly, this document indicates that increased greenhouse gas concentration warms the atmosphere. *See id.* at 40-41. Indeed, this document is replete with numerous scenarios and possible future climate variations resulting from increased CO<sub>2</sub> concentrations. For instance, on pages 178-179, it predicts greenhouse gas emissions to result in a climate with much *dryer* conditions:

The combination of higher temperatures throughout the year and somewhat decreased summer precipitation rates would imply a reduction in groundwater resources. Indeed, there might be an extended period of depletion by over-utilisation before a new sustainable water-management regime was established. The reduction in water availability is implied in the data for yearly precipitation and evapotranspiration given in the WP2 simulations. Whereas the current climate provides an annual excess of water that can either run off into the rivers or recharge groundwater resources, in each of the simulations except E (see below) values of precipitation and evapotranspiration are nearly equal. This means, that winter rain is not sufficient to recharge groundwater

supplies, because there is always some run-off associated with heavy rain. The consequences of a climate change for agriculture will be time-dependent. The first consequence is likely to be poor harvests, as farming practice may take some time to adjust to the increased frequency of summer drought. After some years, there would be a switch to other species and varieties of grain that are adapted to the warmer and dryer climate, and irrigation practices in family gardens would be intensified.

This helps demonstrate the futility of any type of predictions based on increased production of greenhouse gases by future human activity, and the appropriateness of the NRC's direction not to attempt to do so. Moreover, dryer conditions, as predicted by Nevada's own reference will reduce infiltration, making DOE's model that does not include CO<sub>2</sub> concentrations resulting from future human activity conservative. Accordingly, there is no genuine dispute as to a material issue.

As discussed in Section V.A.3 above, contentions expressing only generalized "uncertainties" in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the long-term climate projection properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada's claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**11. NEV-SAFETY-11 - Human-Induced Climate Changes On Prediction Of The Next Glacial Period**

SAR Subsection 5.2.5.4 and similar subsections, which state that a cooling trend will be initiated within the first 10,000 years leading to a period of full glacial conditions at about 30,000 years after present, fail to accurately calculate the characteristics of the trend in climate or the timing of the next glacial period because recent studies suggest that, due to human-induced climate changes, it is possible that the Earth will not enter another glacial period for at least 200,000 to 500,000 years, and thus precipitation in excess of that predicted could occur at Yucca Mountain.

**RESPONSE**

Nevada states that “SAR Subsection 5.2.5.4 and similar subsections” fail to accurately predict climate change for the next 10,000 years in light of certain studies that predict that human impact on climate will postpone the next glacial period for at least 200,000 to 500,000 years and result in increased precipitation at Yucca Mountain relative to DOE’s prediction.

**a. Statement of Issue of Law or Fact to be Controverted**

This contention does not provide a specific statement of the issue of law or fact to be raised, because the contention cites to SAR Subsection 5.2.5.4. The SAR does not contain any such subsection. Indeed, SAR Section 5.2 and the subsections it contains pertain to “Records, Reports, Tests, and Inspections,” and, therefore, have no relevance to DOE’s climate predictions. Clearly, Nevada’s reference to “similar subsections” is likewise irrelevant.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention states that DOE should have considered certain predictions regarding the future impact of human activities on climate change. Petition at 105 (“recent studies suggest that, due to human-induced climate changes, the scientific expectation is of a warming trend initiated within the next 10,000 years and resulting in a suppression of glacial conditions for 200,000 years or more. Therefore, SAR Subsection 5.2.5.4 and similar subsections fail to satisfy the requirements of 10 C.F.R. § 63.305(c)”). The following paragraphs demonstrate that such considerations are contrary to NRC regulations and are therefore outside the scope of this proceeding, thereby violating 10 C.F.R. § 2.309(f)(1)(iii).

NRC regulations require that DOE vary factors related to climate based on present knowledge of those factors, but not attempt to predict changes in human activity. Proposed 10 C.F.R. § 63.305 states:

(a) Features, events, and processes that describe the reference biosphere must be consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site. (b) DOE should not project changes in society, the biosphere (other than climate), human biology, or increases or decreases of human knowledge or technology. In all analyses done to demonstrate compliance with this part, DOE must assume that all of those factors remain constant as they are at the time of submission of the license application. (c) DOE must vary factors related to the geology, hydrology, and climate based upon cautious, but reasonable assumptions consistent with present knowledge of factors that could affect the Yucca Mountain disposal system during the period of geologic stability [(i.e., from repository closure to 1,000,000 years after closure)] and consistent with the requirements for performance assessments specified at § 63.342.

70 Fed. Reg. 53,313, 53,319 (Sept. 8, 2005). Proposed 10 C.F.R. § 63.342 prescribes the climate and infiltration model that DOE should employ for analysis of the post-10,000 year period, as discussed further below. *See id.* at 53,319-20.

DOE modeled climate change consistent with these regulations. As shown in included FEP 1.3.01.00.0A, "Climate Change," DOE modeled climate change for the first 10,000 years after disposal using historical climate change records. *See Features, Events, and Processes for the Total System Performance Assessment: Analyses*, LSN# DEN001584824, 6-215 (Mar. 6, 2008). The use of historical climate records is consistent with the NRC's guidance that "[p]rojections of future climate change are based on evaluation of paleoclimate information over the past 500,000 years." *See Yucca Mountain Review Plan*, NUREG-1804, rev. 2, Section 2.2.1.3.5.3: AC 1(7). The climate records used to predict climate change in the LA also "include effects of modern society over the duration of the historical record," that is, they account for human impact on climate. *See Features, Events, and Processes for the Total System Performance Assessment: Analyses*, LSN# DEN001584824, 6-235 (Mar. 6, 2008). Even without inherent inclusion of that impact, the paleoclimate record for the Yucca Mountain region, specifically Owens Lake, includes evidence of strong monsoonal climate incursions for sustained periods of time. *See SAR 2.3.1.2.3.1.2 at 2.3.1-29; SAR Fig. 2.3.1-14; see also Future Climate Analysis*, ANL-NBS-GS-000008 REV 01, Las Vegas, Nevada: Bechtel SAIC Company, LSN# DN2002481558, Sec 6.6.2 at 6-47 – 6-948 (2004). Monsoonal climate incursions result in warmer and wetter climate conditions than present, similar to some modeled global warming scenarios, in the Yucca Mountain region. *See SAR 2.3.1.2.3.1.2 at 2.31-29; SAR Fig. 2.3.1-14. Future Climate Analysis*, ANL-NBS-GS-000008 REV 01, Las Vegas, Nevada: Bechtel SAIC Company, LSN# DN2002481558 Sec 6.6.2 at 6-47 – 6-49 (2004). The infiltration model domain for monsoon climate incorporates approximately 60% greater average annual precipitation than present-day values. *See SAR 2.3.1 at 2.3.1-6*. In addition, the DOE precipitation model used in net infiltration modeling is stochastic and includes the effects of

extreme precipitation events that greatly exceed any observed during the historical record near Yucca Mountain; daily precipitation can reach as high as 983 mm (maximum daily observed in Nevada) See SAR 2.3.1.3.2.1.1 at 2.3.1-37 and -38. *Simulation of Net Infiltration for Present-Day and Potential Future Climates*, MDL-NBS-HS-000023 Rev. 01 (May 2007) LSN# DN2002481680 at Table I-1 at I-5.

Although DOE evaluated human impact on climate when modeling climate change in accordance with NRC regulations at 10 C.F.R. § 63.305(b), as described above, DOE did *not* engage in speculation regarding future impacts of human activities on climate change. See Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824, 6-235 (Mar. 6, 2008). In promulgating 10 C.F.R. § 63.305(b), the NRC explained that any attempt to foretell the impacts of changes to future human behavior was inappropriate as entirely speculative: “The natural systems of the biosphere are allowed to vary (*e.g.*, climate change) because the geologic record provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes. Because human behavior cannot be similarly predicted, a similar approach cannot be used for the RMEI and the influence the local population has on the biosphere. Thus, it is necessary to emphasize current conditions for the RMEI.... The suggestion that NRC consider alternative futures related to human behavior is speculative and leads to problems deciding which alternative futures are credible and which are unrealistic. Such questions have no scientific or technical answer.” 66 Fed. Reg. at 55,757 (Nov. 2, 2001).

At several points throughout the contention, Nevada references the impact of human influence on climate change in the post-10,000 year period. Petition at 102 – 105 (“the Earth will not enter another glacial period for at least 200,000 to 500,000 years” ... “[t]his difference in

the trend in climate characteristics over time has the potential to affect the characteristics of precipitation at Yucca Mountain both within the next 10,000 years and thereafter”). To the extent that this contention challenges DOE’s climate and infiltration modeling for the *post*-10,000 year period, that position constitutes an impermissible challenge to Commission regulations and is therefore outside the scope of this proceeding. *See* 10 C.F.R. § 2.335(a) (“no rule or regulation of the Commission...is subject to attack...in any adjudicatory proceeding subject to this part”). For the period from 10,000 years after permanent closure through the period of geologic stability, proposed 10 C.F.R. § 63.342(c)(2) specifies that DOE’s assessment of the effects of climate change “may be limited to the effects of increased water flow through the repository as a result of climate change, and the resulting transport and release of radionuclides to the accessible environment,” and should be modeled through the use of a “constant value ... based on a log uniform probability distribution for deep percolation rates from 13 to 64 mm/year (0.5 to 2.5 inches/year).” 70 Fed. Reg. at 53,319-20. Consistent with proposed 10 C.F.R. § 63.342(c)(2), DOE limited the climate change analysis for the post-10,000 year period to the effects of increased water flow through the repository. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824, 6-215, 6-216 (Mar. 6, 2008).

Nevada would have DOE speculate about future human impact on climate change for the first 10,000 year period and consider human impact on climate change in the post-10,000 year period, both of which are inconsistent with the requirements of NRC regulations at 10 C.F.R. §§ 63.305(b) and 63.342(c)(2) (proposed). This licensing proceeding is an improper forum for parties to challenge NRC regulations or proposed rules. *See* 10 C.F.R. § 2.335(a); § 2.335(b) (stating that “no rule or regulation of the Commission . . . is subject to attack . . . in any

adjudicatory proceeding”); *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 345 (1999) (extending that prohibition to challenges on the subject of an NRC rulemaking). Accordingly, this contention fails to meet the requirements of 10 C.F.R. § 2.309(f)(1)(iii) and must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. First, as noted above, the impact of future anthropogenic production of greenhouse gases on the timing of the next glacial period is outside the scope of this proceeding and, therefore, by definition the contention does not raise an issue material to the finding the Commission must make.

Similarly, to the extent that Nevada’s contention alleges that DOE must consider how changes to future human activities might affect climate change and, thus, the repository, this contention fails to raise an issue that is material to the findings the NRC must make. DOE considered climate change and human influence on climate change in its LA, but did not speculate about possible future changes in human activities or how those changes could affect climate. *See Features, Events, and Processes for the Total System Performance Assessment: Analyses*, LSN# DEN001584824, 6-235 (Mar. 2008). As described above, DOE has drawn this distinction because NRC regulations governing postclosure performance objectives explicitly prohibit DOE from projecting changes in human knowledge, society, or technology. *See* 10 C.F.R. § 63.305(b). Because NRC regulations direct that DOE should not consider future changes in human activities, such considerations are not material to NRC’s findings.

Moreover, as noted above, proposed 10 C.F.R. § 63.305(c) requires DOE to make “reasonable assumptions consistent with present knowledge” when assessing climate change

through the period of geologic stability. Thus, with regard to § 63.305(c), for the contention to be material to this proceeding, Nevada must allege and provide sufficient support to show that DOE's assumptions were *unreasonable*. Nevada, however, makes no such claim.

Further, to the extent that this contention challenges DOE to consider certain predictions in climate change in the post-10,000 year period, this contention fails to raise an issue that is material to the findings the NRC must make. As discussed above, NRC regulations at proposed 10 C.F.R. § 63.342(c)(2) prescribe the climate and infiltration analyses for the post-10,000 year period. Accordingly, any consideration of alternative climate states for that time period is not material to the NRC's findings in this proceeding.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists a number of regulations in paragraph 4 in this contention. *See* Petition at 102-103. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 103. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing climate change is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

For the aforementioned reasons, this contention fails to raise issues material to the findings NRC must make and therefore, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. To the extent that it relies on expert opinion, this contention fails to meet those standards. Nevada does attach several affidavits (by Jonathan Overpeck and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

In its contention, Nevada cites a handful of supporting documents, which stand for limited propositions, but do not directly refute the climate models presented by DOE in SAR Section 2.3.1. Moreover, Nevada merely opines that the conditions predicted in these supporting documents have “the *potential* to affect the characteristics of precipitation at Yucca Mountain.” Petition at 104 (emphasis added). Licensing boards have found that “[m]ere assertions without appropriate explanation and support do not satisfy the requirements of the contention rule.” *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2, Catawba Nuclear Station, Units 1 & 2), LBP-02-4, 55 NRC 49, 84 (2002). Indeed, Nevada simply does not attempt to engage the specifics of the extensive data and analysis presented in SAR Section 2.3.1 and underlying supporting documents.

In addition, Nevada fails to point to a specific page or section of the document for support in the aforementioned documents. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Consistent with that requirement, the Case Management

Order directs petitioners to ensure that documentary references “be as specific as reasonably possible.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7). Nevada’s contention also fails in this regard.

Accordingly, this contention lacks a sufficient foundation to “warrant further exploration” by the Board and should be dismissed. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 & 2), ALAB-942, 32 NRC 395, 428 (1990) (citation omitted).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated above that this contention is outside of the scope of this proceeding and also not material to any finding the NRC must make. Accordingly, the contention does not raise a genuine dispute on a material issue of law or fact. But the contention also contains other assertions which, as DOE demonstrates below, raise no genuine dispute of a material issue of fact or law.

Nevada fails to raise a genuine dispute with DOE regarding whether a delay in the next full glacial period would lead to greater infiltration than that which is predicted by the present DOE climate forecast. In DOE’s analysis of potential future climate conditions, full glacial climates are characterized by cooler temperatures and wetter conditions, and hence, increased infiltration, than during either the glacial-transition climate or the present climates that precede it. *See, e.g.*, SAR Subsection 2.3.1.2.3.1.1; *see also* SAR Section 2.3.1 at 2.3.1-6; and Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824, 6-215 (Mar. 6, 2008). Therefore, any delay in the onset of the next full glacial period would result in *less* precipitation and *less* infiltration over that intervening time period than that estimated by DOE’s future climate analysis. Accordingly, this contention fails to “state the applicant’s position and the petitioner’s opposing view,” or otherwise provide sufficient

information to show a genuine dispute exists. Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 358.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material, and therefore fails to meet Nevada's burden to show that its contention raises an issue that is material to this proceeding. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. Nevada proposes an alternative climate model, but does not specify the implications of its alleged deficiencies in the LA's climate model, or the resulting dose to the RMEI or release to the accessible environment. Accordingly, this contention suffers from that deficiency. In fact, it appears that Nevada's proposed alternative would most likely lessen the dose to the RMEI, since it would tend to prolong the period before conditions became wetter.

In summary, this contention does not establish a genuine dispute of material issue. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**12. NEV-SAFETY-12 - Projections Of Future Wetter Climate Conditions**

SAR Subsection 2.3.1.2.3.1.2 at 2.3.1-27 through 2.3.1-31, and similar subsections, which define the Analogue Meteorological Stations used for the Yucca Mountain climate forecast for the next 10,000 years, fail to account for the significantly greater summer monsoon rainfall amounts that could occur as a result of continued global warming.

**RESPONSE**

This contention claims that DOE's climate forecast for the next 10,000 years is inaccurate or incomplete because the analog sites used as a proxy for future climate states fail to account for greater monsoon rainfall that could occur as a result of continued global warming. Petition at 107. In essence, Nevada claims that unless DOE takes the effect of future anthropogenic greenhouse gases on monsoon rainfall into account when predicting future climate states over the next 10,000 years, it cannot satisfy applicable regulatory requirements, in particular, 10 C.F.R. § 63.505(c), which requires DOE to vary factors related to climate based on cautious but reasonable assumptions. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada's core claim is that DOE's climate analysis is flawed because it fails to take production of greenhouse gases into account when predicting future climate states. It is clear that what is at issue is the effect of future human-production of greenhouse gases on climate. For instance, in Nevada document "Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change" (IPCC, 2007) (Solomon, S., et al. (eds.), Cambridge University Press, 32 Avenue of the Americas, New York, NY 10013-2473), the reporting Working Group at page 2 states: "[g]lobal atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased markedly as a result of human activities ...." The Group goes on to state at page 3 that: "The understanding of anthropogenic warming and cooling influences on climate has improved since the [Third Assessment Report] ...." Thus, it is clear that Nevada's issue relates not to naturally occurring greenhouse gases, but those that will be produced in the future by humans. Nevada's argument that DOE is required to take into account in its climate analysis the potential for greater monsoon rainfall as a result of a result of global warming in this contention is inadmissible as outside the scope of this proceeding. It is well settled that, absent a waiver, "no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding." 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission's regulations or that otherwise seeks to litigate a generic determination established by a Commission rulemaking. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001). Section 63.305 contains no requirement that speculation over the impact of global warming on monsoon rainfall be included in the DOE's future climate analysis. An

attempt by the petitioner to mandate inclusion of factors that are not required by the Commission's regulations is, accordingly, inadmissible.

Nevada's contention would require DOE to predict how future human activity may, or may not, impact the Earth's future climate. This, in turn, would require DOE to predict the future amounts and variations in amounts of greenhouse gas emissions due to human activities. This is precisely the type of speculative endeavors that the NRC does not require DOE to undertake. For instance, in promulgating 10 C.F.R. § 63.305(b), the NRC explained that any attempt to foretell the impacts of changes to future human behavior was inappropriate as entirely speculative:

The natural systems of the biosphere are allowed to vary (*e.g.*, climate change) because the geologic record provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes. Because human behavior cannot be similarly predicted, a similar approach cannot be used for the RMEI and the influence the local population has on the biosphere. Thus, it is necessary to emphasize current conditions for the RMEI... The suggestion that NRC consider alternative futures related to human behavior is speculative and leads to problems deciding which alternative futures are credible and which are unrealistic. Such questions have no scientific or technical answer.

66 Fed. Reg. at 55757 (Nov. 2, 2001). Therefore, Nevada's contention would have DOE speculate about future changes in human activity for the first 10,000 year period which are inconsistent with NRC regulations at 10 C.F.R. § 63.305(b).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. First, as noted above, the impact of future anthropogenic greenhouse gases on climate is outside the scope of this

proceeding and, therefore, by definition the contention does not raise an issue material to the finding the Commission must make.

Second, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2),

“because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing. Indeed, as discussed in more detail below under section (f), Nevada fails to address what effect, if any, that possible increased summer rainfall amounts would even have on infiltration. It does not claim that doing so would result in infiltration estimates beyond those in the license application or that that DOE’s estimates are not conservative. Absent any discussion on what effect the contention has on infiltration estimates, Nevada has clearly not met its burden to demonstrate that the resolution of the issue would prevent the NRC from finding that there is reasonable expectation that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2).

The method the DOE used in addressing future climate forecast for the next 10,000 years is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Jonathan Overpeck and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in

paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does provide two references in support of its claim that “summer rainfall would likely occur in a manner more intense than present, or as is estimated for the future by DOE.” Petition at 108. However, one of the documents, “Climate Change 2007: The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change,” is 1,009 pages long, and the other, “Weather and Climate Extremes in a Changing Climate, Regions of Focus,” is 180 pages in length. Yet, Nevada does not cite any particular paragraph or page of either of these references as support. Such vague references to lengthy documents are not permissible. Rather, a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Indeed, the Commission’s caution that the mere incorporation of massive documents is unacceptable, *see Tenn. Valley Auth.* (Browns Ferry Nuclear Plant, Units 1 and 2), LBP-76-10, 3 NRC 209, 216 (1976), is particularly relevant here.

Nevada later cites to one chapter of “Climate Change 2007,” in addition to two other sources, in support of its statement that the last interglacial period “appears” to have been “one of the wettest periods in the last 500,000 years. . . [and] [t]hat period was at least as warm as today, and probably at least 2-3°C warmer in the Western U.S...” Petition at 109. However, just that one chapter of “Climate Change 2007” is 66 pages in length. The other two references used in support of that statement are 3 pages long (“Simulating arctic climate warmth and icefield retreat in the Last Interglaciation”) and 16 pages long (“Climate simulation for 125kyr BP with a coupled ocean-atmosphere general circulation model”). The only other two references cited in

this contention (“Climate and Hydrology of the Last Interglaciation (MIS 5) in Owens Basin, California” and “The millennial atmospheric lifetime of anthropogenic CO<sub>2</sub>”) are both 15 pages in length. The contention’s nebulous reference to these documents is not sufficient to satisfy Section 2.309(f)(1)(v).

Nevada’s contention is also replete with speculative and unsupported statements, none of which are appropriate to form a basis for a contention:

- “SAR Subsection ... fail to account for the significantly greater summer monsoon rainfall amounts that *could* occur as a result of continued global warming.” Petition at 107 (emphasis added).
- “Climate modeling indicates that continued global warming *could* lead to greater summer monsoon rainfall ....” *Id.* (emphasis added).
- “During [certain interglacial] periods, the Subtropical Highs would have expanded and/or intensified, resulting in a northward shift of the southwestern monsoon. Summer precipitation *probably* increased dramatically.” *Id.* at 110 (emphasis added).
- “likelihood that hot monsoonal climates *could* also be much more the norm ....” *Id.* (emphasis added).

These indefinite claims amount to mere unfocused speculation which does not provide adequate support for a contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). The statements in this contention fall into this speculative category.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention argues that DOE does not comply with 10 C.F.R. § 63.305(c) because its climate prediction analysis “fails to account for significantly greater monsoon rainfall amounts that could occur as a result of continued global warming” due to human activity. Petition p. 111. Nevada alleges that “simulations of future climate under continued global warming, as well as paleoclimatic evidence from the Yucca Mountain region, support the *possibility* that summer monsoonal rainfall *could be* significantly greater, and more intense, than assumed by DOE.” *Id.* at 110 (emphasis added). This contention fails to raise a genuine dispute of material law or fact.

Nevada’s claim that DOE did not consider any effect of human activity on climate change is misplaced. DOE modeled climate change using historical records. Those records “include effects of modern society over the duration of the historical record.” FEP 1.4.01.00.0A (Human Influences on Climate), Features, Events, and Processes for the Total System Performance Assessment: Analyses, 6-235 DOC.20080307.0003 (Mar. 2008); *see also* FEP: 1.3.01.00.0A (Climate Change), Features, Events, and Processes for the Total System Performance Assessment: Analyses, 6-215, 6-218, LSN# DEN001584824 (Mar. 2008).

Nevada’s discussion on paleoclimatic evidence appears to suggest that DOE ignored such evidence. That is not the case. Rather, a comprehensive assessment of paleoclimate records, along with data obtained from analog sites, and other facts, formed one of the bases for predicting future climates at Yucca Mountain. This is made clear in the introduction to SAR Subsection 2.3.1.2.1.2, “Climate and Climate Change,” p. 2.3.1-10:

An analysis was performed to estimate climatic variables for the next 10,000 years by forecasting the timing and nature of climate change at Yucca Mountain. The future-climate forecast is based on an analysis of paleoclimate data for timing, magnitude, and duration of climate change.

DOE's use of such data is also explained in greater detail in SAR Subsection 2.3.1.2.2.

"Paleoclimatological Data and Data Uncertainty," pp. 2.3.1-19 to 23.

This contention also relies heavily on climate models used in the Intergovernmental Panel on Climate Change (IPCC) report, "Climate Change 2007." Yet the IPCC report states that "[c]onfidence in [the climate models' quantitative] estimates [of future climate change] is higher for some climate variables (e.g., temperature) than for others (e.g., precipitation)." "Climate Change 2007," at 87. Also, the report clarifies at the start of the Technical Summary that it is "a report accepted by Working Group I of the Intergovernmental Panel on Climate Change but not approved in detail." *Id.* at 19. The report continues to explain that this "signifies that the material has not been subject to line-by-line discussion and agreement." *Id.* Moreover, while Nevada uses this document in support of its argument that DOE must account for significantly greater monsoon rainfall, the document indicates that any attempt to predict changes into the future is complicated for monsoons: "[T]he uncertain role of aerosols in general, and carbon aerosols in particular, complicates the nature of future projections of monsoon precipitation..." *Id.* at 751.

Nevada states that "[m]ore than one of the 22 climate models used by the Intergovernmental Panel on Climate Change Fourth Assessment simulated an increase in summertime (monsoonal) rainfall in the Southwest, including the region encompassing Yucca Mountain." Petition at 108. Yet, Nevada specifically cites to only one of the 22 climate models, stating that "the simulated increase was enough to at least double the rainfall amounts estimated by the use of monsoon analogue meteorological stations in SAR Subsection 2.3.1.2.3.1.2 if global greenhouse gas emissions to the atmosphere continue at their recent pace." *Id.* at 108. However, Nevada provides no reference to support that global greenhouse gas emissions to the

atmosphere will continue at their “current pace,” or any pace for that matter. It is also not surprising that Nevada only discussed one of the 22 climate models since the report explains that “modeling studies have come to conflicting conclusions regarding changes in monsoon participation.” “Climate Change 2007,” at 716. In fact, in contradiction to this contention’s argument that DOE failed to properly account for possible future wetter climate conditions, the IPCC report concludes that “[a]nnual precipitation is very likely to increase in Canada and the northeast USA, and likely *to decrease in the southwest USA.*” *Id.* at 887.

Nevada’s reliance on paleoclimatic evidence also fails to raise a genuine dispute of material fact or law. This contention merely claims that “both simulations of future climate under continued global warming, as well as paleoclimatic evidence from the Yucca Mountain region, support *the possibility* that that summer monsoonal rainfall *could be* significantly greater, and more intense, than assumed by DOE.” Petition at 110 (emphasis added). Nevada never alleges that such greater summer monsoon rainfall amounts, should they occur, would have the effect of increasing infiltration beyond that estimated by in the license application. The contention does not allege (let alone provide support for an allegation) that DOE’s estimates for infiltration are not conservative or do not bound the amounts of infiltration that would be estimated if Nevada’s approach were adopted. Because Nevada does not allege, much less demonstrate, that any future increase in monsoon rainfall will result in a failure of DOE to meet Part 63 postclosure performance standards, the contention does not establish a genuine dispute of material fact.

Finally, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such

alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the future climate properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility)*, LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**13. NEV-SAFETY-13 - Future Climate Projections Need To Include Extreme Precipitation Events**

SAR Subsection 2.3.1.2.3.1.2 and similar subsections, which define the climate forecast at Yucca Mountain for the next 10,000 years, fail to accurately account for the more frequent intense rainfall or for the large storm-related rainfall events that could occur as a result of continued global warming.

**RESPONSE**

Nevada states that DOE's predictions of rainfall over the next 10,000 years are inaccurate, in light of possible global warming resulting from anthropogenic carbon dioxide emissions, and therefore DOE did not satisfy certain regulatory requirements including those at 10 C.F.R. § 63.305(c).

**a. Statement of Issue of Law or Fact to be Controverted**

This contention does not provide a sufficiently specific statement of the issue, because it fails to provide context for or explain what it means by "more frequent intense rainfall" or "large storm-related rainfall events." Petition at 113. The Commission requires that a contention "explain, with specificity, particular safety or legal reasons requiring rejection of the contested [application]." *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 359-60 (2001). This contention, however, does not define the terms that form the crux of its argument. Rather, it provides vague allegations such as "greater rainfall intensity is possible," "greater rainfall amounts are possible," and "DOE's conclusions regarding extreme events (*e.g.*, wet) are based on analog sites and their expanded standard deviations which are flawed." Petition at 115-116. Only once does Nevada provide an actual value to give context to its position: "Rainfall events lasting up to a week (*e.g.*, when a tropical storm collides

with a frontal storm) and exceeding 50 cm are possible.” Petition at 115. However this solitary reference does not constitute a specific statement of this issue, especially in light of its presentation as a mere theoretical possibility.

The contention also fails because the issue in dispute apparently shifts from subject to subject throughout the contention. In Paragraph 1, its statement of the contention, Nevada states that “SAR Subsection 2.3.1.2.3.1.2 and similar subsections, which define the climate forecast at Yucca Mountain for the next 10,000 years, fail to accurately account for the more frequent intense rainfall or for the large storm-related rainfall events that could occur as a result of continued global warming.” Petition at 113. That statement of the issue is repeated again in Nevada’s Paragraph 6. *See* Petition at 117. However, in Paragraph 5, Nevada introduces a new and different area of dispute, that “DOE’s conclusions regarding extreme events (e.g., wet) are based on analog sites and their expanded standard deviations which are flawed for two reasons.” Petition at 116. The contention proceeds to summarize the two reasons, provides no support for its allegations, and does not raise the issue again. *See* Petition at 116-17. This amounts to another (albeit surreptitiously added) dispute, which violates the Board’s Case Management Order requiring petitioners to provide “narrow, single-issue contentions.” *U.S. Dep’t of Energy, LBP-08-10, 67 NRC \_\_ (slip op. at 6).*

As written, the contention fails to give DOE sufficient notice of the issues of law or fact that Nevada seeks to dispute. Moreover, the contention does not comply with the Board’s Case Management Order that contentions be “narrow, single-issue contentions” that are “sufficiently specific as to define the relevant issues” and do not require the Parties or Board to exhaust extensive resources to clarify the issue. *U.S. Dep’t of Energy, LBP-08-10, 67 NRC \_\_ (slip op.*

at 6). Based on the information Nevada has provided, this contention lacks the specificity required by 10 C.F.R. § 63.309(f)(1)(v) and, therefore, must be rejected.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention states that DOE should have considered that, “[b]ecause anthropogenic carbon-dioxide emissions could remain in the atmosphere for thousands, tens of thousands, and even hundreds of thousands of years, greater rainfall intensity is possible at Yucca Mountain during and beyond the next 10,000 years.” Petition at 115. The following paragraphs demonstrate that considerations in the LA of (1) changes in future human activities, and (2) climate changes in the post-10,000 year period, are contrary to NRC regulations and therefore outside the scope of this proceeding, in violation of 10 C.F.R. § 2.309(f)(1)(iii).

Proposed 10 C.F.R. § 63.305 requires that DOE vary factors related to climate based on present knowledge of those factors, but not attempt to predict changes in human activity:

(a) Features, events, and processes that describe the reference biosphere must be consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site. (b) DOE should not project changes in society, the biosphere (other than climate), human biology, or increases or decreases of human knowledge or technology. In all analyses done to demonstrate compliance with this part, DOE must assume that all of those factors remain constant as they are at the time of submission of the license application. (c) DOE must vary factors related to the geology, hydrology, and climate based upon cautious, but reasonable assumptions consistent with present knowledge of factors that could affect the Yucca Mountain disposal system during the period of geologic stability and consistent with the requirements for performance assessments specified at § 63.342.

70 Fed. Reg. 53,313, 53,319 (Sept. 8, 2005). Proposed 10 C.F.R. § 63.342 prescribes the climate and infiltration model that DOE should employ for analysis of the post-10,000 year period, as discussed further below.

DOE modeled climate change consistent with the NRC regulations and regulatory intent. As shown in included FEP1.3.01.00.0A, "Climate change," DOE modeled climate change for the first 10,000 years after disposal using historical climate change records. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-215 (Mar. 6, 2008). The use of historical climate records is consistent with the NRC's guidance that "[p]rojections of future climate change are based on evaluation of paleoclimate information over the past 500,000 years." *See* Yucca Mountain Review Plan, NUREG-1804, rev. 2, Section 2.2.1.3.5.3: AC 1(7). The climate records used to predict climate change in the LA "include effects of modern society over the duration of the historical record," that is, they account for human impact on climate. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-235 (Mar. 6, 2008).

Even without inherent inclusion of that impact, the paleoclimate record for the Yucca Mountain region, specifically Owens Lake, includes evidence of strong monsoonal climate incursions for sustained periods of time. *See* SAR 2.3.1.2.3.1.2 at 2.3.1-29; SAR Fig. 2.3.1-14; *Future Climate Analysis*, ANL-NBS-GS-000008 REV 01, Las Vegas, Nevada: Bechtel SAIC Company, LSN# DN2002481558, Sec 6.6.2 at 6-47 – 6-49 (2004). Monsoonal climate incursions result in warmer and wetter climate conditions than present, similar to some modeled global warming scenarios, in the Yucca Mountain region. *See* SAR 2.3.1.2.3.1.2 at 2.3.1-29; SAR Fig. 2.3.1-14; *Future Climate Analysis*, ANL-NBS-GS-000008 REV 01, LSN# DN2002481558 Sec 6.6.2 at 6-47 – 6-49 (2004). The infiltration model domain for monsoon

climate incorporates approximately 60% greater average annual precipitation than present-day values. *See* SAR 2.3.1 at 2.3.1-6. In addition, the DOE precipitation model used in net infiltration modeling is stochastic and includes the effects of extreme precipitation events that greatly exceed any observed during the historical record near Yucca Mountain; daily precipitation can reach as high as 983 mm (maximum daily observed in Nevada), which is much greater than the value of 50 cm stated by Nevada. *Compare* SAR 2.3.1.3.2.1.1 at 2.3.1-37 and 38, *Simulation of Net Infiltration for Present-day and Potential Future Climates*, MDL-NBS-HS-000023 Rev. 01 (May 2007) LSN# DN2002481680 at Table I-1 at I-5, *with* Petition at 115.

Moreover, the extensive climate and infiltration analyses in SAR Section 2.3.1 and supporting documents serve to demonstrate that DOE made *reasonable assumptions* regarding climate change, consistent with proposed 10 C.F.R. § 63.305(c). Nevada thus has an affirmative burden to show that DOE's assumptions were *unreasonable*. However, Nevada makes no attempt to establish – beyond its mere assertion that additional studies should be considered – that the LA's climate model is unreasonable.

Although DOE evaluated human impact on climate when modeling climate change, in accordance with NRC regulations at 10 C.F.R. § 63.305(b), as described above, DOE did *not* engage in speculation regarding future impacts of human activities on climate change. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-235 (Mar. 6, 2008). DOE did not, for example, attempt to predict how long or at what rate human activities could continue to produce carbon-dioxide emissions. In promulgating 10 C.F.R. § 63.305(b), the NRC explained that any attempt to foretell the impacts of changes to future human behavior was inappropriate as entirely speculative: “The natural systems of the biosphere are allowed to vary (*e.g.*, climate change) because the geologic record

provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes. Because human behavior cannot be similarly predicted, a similar approach cannot be used for the RMEI and the influence the local population has on the biosphere. Thus, it is necessary to emphasize current conditions for the RMEI . . . . The suggestion that NRC consider alternative futures related to human behavior is speculative and leads to problems deciding which alternative futures are credible and which are unrealistic. Such questions have no scientific or technical answer.” 66 Fed. Reg. at 55757 (Nov. 2, 2001).

At several points throughout the contention, Nevada references the impact of human influence on climate change in the post-10,000 year period. *See* Petition at 113-17 (“continued global warming could lead to more frequent intense rainfall events and more large moisture-laden remnant tropical storms at Yucca Mountain over the next 10,000 *or more years*”) (emphasis added); *Id.* at 117 (“greater rainfall intensity is possible at Yucca Mountain during *and beyond* the next 10,000 years”) (emphasis added). To the extent that this contention challenges DOE’s climate and infiltration modeling for the *post*-10,000 year period, that position constitutes an impermissible challenge to Commission regulations and is therefore outside the scope of this proceeding. *See* 10 C.F.R. § 2.335(a) (“no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding subject to this part”). For the period from 10,000 years after permanent closure through the period of geologic stability, proposed 10 C.F.R. § 63.342 specifies that DOE’s assessment of the effects of climate change “may be limited to the effects of increased water flow through the repository as a result of climate change, and the resulting transport and release of radionuclides to the accessible environment,” and should be modeled through the use of a “constant value . . . based on a log uniform probability distribution for deep percolation rates from 13 to 64 mm/year (0.5 to 2.5 inches/year).” 70 Fed Reg. at 53,319-20.

Consistent with proposed 10 C.F.R. § 63.342(c)(2), DOE limited the climate change analysis for the post-10,000 year period to the effects of increased water flow through the repository. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-215, 6-216 (Mar. 6, 2008).

Nevada would have DOE speculate about future human impact on climate change for the first 10,000 year period and beyond, which is inconsistent with NRC regulations at 10 C.F.R. §§ 63.305(b) and 63.342(c)(2) (proposed). This licensing proceeding is an improper forum for parties to challenge NRC regulations or proposed rules. *See* 10 C.F.R. § 2.335(a) (stating that “no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding”); *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 345 (1999) (extending that prohibition to challenges on the subject of an NRC rulemaking). Accordingly, this contention fails to meet the requirements of 10 C.F.R. § 2.309(f)(1)(iii) and must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

To the extent that Nevada’s contention alleges that DOE must consider how changes to future human activities might affect climate change and, thus, the repository, this contention fails to raise an issue that is material to the findings the NRC must make. DOE considered climate change and human influence on climate change in its LA, but did not speculate about possible future changes in human activities or how those changes could affect climate. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824, 6-235 (Mar. 6, 2008). As described above, DOE has drawn this distinction because NRC regulations governing postclosure performance objectives explicitly prohibit DOE from projecting changes in human knowledge, society, or technology. *See* 10 C.F.R. §

63.305(b). Because NRC regulations direct that DOE should not consider future changes in human activities, such considerations are not material to the NRC's findings.

In addition, to the extent that this contention challenges DOE to consider certain predictions in climate change in the post-10,000 year period, this contention fails to raise an issue that is material to the findings the NRC must make. As discussed above, NRC regulations at proposed 10 C.F.R. § 63.342(c)(2) prescribe the climate and infiltration analyses for the post-10,000 year period. *See* 70 Fed. Reg. at 53,319-20. Accordingly, any consideration of alternative climate states for that time period is not material to the NRC's findings in this proceeding.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists a number of regulations in paragraph 4 in this contention. *See* Petition at 102-103. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 103. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing climate change is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada merely alleges that SAR Subsection 2.3.1.2.3.1.2 “fails to accurately account for the more frequent intense rainfall, or for the large storm-related rainfall events that *could* occur as a result of continued global warming.” Petition at 117 (emphasis added). The contention does

not identify how the LA analyzed rainfall events or infiltration, explain how the alleged (albeit vague) “more frequent intense rainfall” could affect the safety of the repository, or how the NRC’s ability to make a required finding could be affected.

For the aforementioned reasons, this contention fails to raise issues material to the findings the NRC must make and therefore, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Even if we assume that this contention is cognizable in this proceeding, it should still be dismissed because Nevada fails to provide adequate support for its assertions that DOE’s postclosure performance assessment fails to comply with applicable regulatory requirements, or that DOE’s assumptions regarding climate are *unreasonable*, in violation of 10 C.F.R. § 63.305(c).

Throughout its contention, Nevada makes conclusory statements, references an entire paper or study generally, and fails to provide any explanation for its assertions. Moreover, Nevada’s supporting documents stand for limited propositions and do not directly refute the climate models presented by DOE in SAR Section 2.3.1.3. Indeed, Nevada simply does not attempt to engage the specifics of the extensive data and analysis presented in SAR Section 2.3.1 and underlying supporting documents.

For example, one reference is provided for the statement that “[t]here is also paleoclimate evidence for multiple wetter – and more flood prone – periods in the Southwestern U.S. than previously assumed for the last 7000 years.” Petition at 116. This suffers from several flaws. First, Nevada fails to explain how this statement is inconsistent with DOE’s climate model or provide specific references to contrary findings in the LA. Second, Nevada’s statement mischaracterizes the study. The study discusses the 5000-year paleoflood record, rather than the

7000 years that Nevada states, and it makes no comparison to previous understandings of the flood pattern in the Southwestern U.S. Ely, L.L., Enzel, Y., Baker, V.R., and Cayan, D.R. (1993), “A 5000-Year Record of Extreme Floods and Climate Change in the Southwestern United States,” *SCIENCE*, Vol. 262, No. 5132. Rather, the findings of this study, as summarized in the report itself, are that “[a] 5000-year regional paleoflood chronology ... reveals that the largest floods in the region cluster into distinct time intervals that coincide with periods of cool, moist climate and frequent El Nino events.” *Id.* at 410.

In other examples, Nevada fails to provide *any* support for its conclusory statements. Nevada concludes in one paragraph that “[b]ecause anthropogenic carbon-dioxide emissions could remain in the atmosphere for thousands, tens of thousands, and even hundreds of thousands of years, greater rainfall intensity is possible at Yucca Mountain during and beyond the next 10,000 years,” but provides no support for that conclusion. In fact, entire passages from Nevada’s contention that are laden with speculative conclusions lack any expert support whatsoever:

Also as a result of continued global warming and circulation changes, it is possible that large storm-related rainfall events will be able to reach the Yucca Mountain region with greater frequency than observed in the period of instrumental observation. Rainfall events lasting up to a week (e.g., when a tropical storm collides with a frontal storm) and exceeding 50 cm are possible. Such events could occur several times per year. Already, some areas of the southwest United States experience several intense storms in a year, and climate change has the potential to induce changes in atmospheric circulation that would favor the induction of more such storms, increase the power of individual storms, and increase the likelihood of such storms reaching the area of Yucca Mountain.

Petition at 115-16.

Licensing boards have found that “[m]ere assertions without appropriate explanation and support do not satisfy the requirements of the contention rule.” *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2, Catawba Nuclear Station, Units 1 & 2), LBP-02-4, 55 NRC 49, 84 (2002). Accordingly, the Board should not accept such hypothetical, unsupported assertions.

In addition, although this contention references six supporting documents, Nevada fails to point to a specific page or section of the documents for support. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Consistent with that requirement, the Case Management Order directs petitioners to ensure that documentary references “be as specific as reasonably possible.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7). Nevada’s failure in this regard is especially egregious considering that one of its supporting documents, “Climate Change 2007,” is 989 pages, another, “Scientific Assessment of the Effects of Global Change on the United States,” is 271 pages, and a third, “Weather and Climate Extremes,” is 180 pages. Petition at 114-15.

Moreover, to the extent that it relies on expert opinion, this contention fails to meet those standards. Nevada does attach several affidavits (by Jonathan Overpeck and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

For the aforementioned reasons, this contention falls short of the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted, as discussed in Section V.A.3 above. Accordingly, this contention lacks a sufficient foundation to “warrant further exploration” by the Board, *see Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 & 2), ALAB-942, 32 NRC 395, 428 (1990) (citation omitted), and should be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention does not show that the LA climate and infiltration models are unreasonable and, therefore, fails to establish a genuine dispute. Proposed 10 C.F.R. § 63.305(c) requires in part that DOE “vary factors related to the geology, hydrology, and climate based upon cautious, but reasonable assumptions consistent with present knowledge of factors that could affect the Yucca Mountain disposal system.” 70 Fed. Reg. at 53,319. As established in SAR Section 2.3.1 and supporting documents, DOE made *reasonable assumptions* regarding climate change, consistent with proposed 10 C.F.R. § 63.305(c). Moreover, DOE’s reasonable assumptions adhere to NRC guidance that “[p]rojections of future climate change are based on evaluation of paleoclimate information over the past 500,000 years.” *See* Yucca Mountain Review Plan, NUREG-1804, rev. 2, Section 2.2.1.3.5.3: AC 1(7); Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-235 (Mar. 6, 2008). Nevada thus has an affirmative burden to show that DOE’s assumptions were *unreasonable*. Because this contention does not establish the unreasonableness of DOE’s assumptions, it does not establish a genuine dispute of material issue and must be dismissed.

Moreover, this contention fails to raise a genuine dispute with DOE regarding the question of whether the future climate at Yucca Mountain should be modeled as wetter than

present day climate. Nevada alleges that “greater rainfall amounts are possible at Yucca Mountain during and beyond the next 10,000 years,” and that “consideration should be given to such century-to-millennia length wet events occurring again in the future.” Petition at 116. At no point in the contention does Nevada acknowledge that DOE’s climate analysis in SAR Section 2.3.1 assumes that the present day climate will be followed by a much warmer and wetter monsoon climate for approximately 600-2000 years from present (with approximately 60% greater average annual precipitation), a cooler and even wetter glacial-transition climate for approximately 2000-10,000 years from present, and increased infiltration rates at the repository (resulting from cooler and wetter conditions) for the post-10,000 year period. *See* SAR Section 2.3.1 at 2.3.1-6; *see also* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-215 (Mar. 6, 2008). As described above, the climate record for the Yucca Mountain region, which DOE used to model future climate changes, includes evidence of strong monsoonal warmer and wetter climate incursions for sustained periods of time. *See* SAR 2.3.1.2.3.1.2 at 2.3.1-29; SAR Fig. 2.3.1-14; *Future Climate Analysis*, ANL-NBS-GS-000008 REV 01, Las Vegas, Nevada: Bechtel SAIC Company, LSN# DN2002481558, Sec 6.6.2 at 6-47 – 6-49 (2004).

The contention does not demonstrate that the alleged “greater rainfall amounts” will produce *more* precipitation for the next 10,000 years than that projected in DOE’s climate analysis. Thus, this contention fails to “state the applicant’s position and the petitioner’s opposing view,” or otherwise provide sufficient information to show a genuine dispute exists. *See* Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 358.

In addition, this contention does not present a genuine dispute of material issue because it postulates a series of theoretical possibilities and does not demonstrate the effect of the hypothetical result. The contention challenges DOE to consider multiple events that “may” occur, but does not demonstrate – and does not even assert - that inclusion of these events would affect the outcome of this proceeding. *See* Petition at 115 - 117 (“greater rainfall intensity *is possible*” ... “[tropical storms and hurricanes] *may* be able to rain out more water in the future” ... “*it is possible* that large storm-related rainfall events will be able to reach the Yucca Mountain region with greater frequency than observed” ... “DOE has failed to consider how the infiltration responds to large events ... that *could* be more common in the future” ... “none of these types of flooding scenarios *may* be true for the analog sites” ... “the same *may* be true for Owens Lake”) (emphasis added). A petitioner must allege not only that more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006). Nevada’s hypothetical assertions, however, do not directly controvert a position taken by the applicant in the application and therefore cannot form the basis for this contention. *See Texas Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

This contention also fails to define or quantify the “greater rainfall intensity” or “extreme events (e.g., wet)” that it alleges “could” occur. Petition at 115-116. Nor does it point to specific portions of the LA that fail to consider such events, or explain the ramifications of the alleged omissions. A contention that alleges some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla.*

*Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). This contention therefore fails to explain how inclusion of these unspecified events could significantly affect the results of the postclosure analysis, or otherwise make a difference in the outcome of the licensing proceeding.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material, and therefore fails to meet Nevada's burden to show that its contention raises an issue that is material to this proceeding. Petition at 117-18. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that deficiency. Nevada proposes certain vague considerations for the LA's climate model, but does not specify the implications of its alleged deficiencies in the LA's existing model.

In summary, this contention does not establish a genuine dispute of material issue. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**14. NEV-SAFETY-14 - Precipitation Model**

The precipitation component of the net infiltration model, which is described in SAR Subsection 2.3.1.3.2 and similar subsections, is fundamentally flawed because it relies upon modeling that fails to represent physical and empirical aspects of the precipitation process, and because no attempt has been made to investigate important aspects of its performance.

**RESPONSE**

This contention claims that DOE’s net infiltration model, described in SAR Subsection 2.3.1.3.2, “and similar subsections,” is “fundamentally flawed,” Petition at 119, because the precipitation component of the model does not adequately incorporate important physical phenomena, uses inappropriate assumptions that are not consistent with certain data, provides results that are not consistent with empirical observations, and does not attempt to evaluate important aspects of the model’s performance, such as extremes.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges non-compliance with these regulatory provisions and therefore raises a material issue.” Petition at 120. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic

setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the precipitation model is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Indeed, nowhere in the contention does Nevada allege that the omissions and errors it claims exists in the DOE precipitation model will result in underestimating net infiltration to the unsaturated zone. In fact, extremes are just as likely to result in greater runoff, with reduced infiltration. As stated in SAR Subsection 2.3.1.3.2.1.1 at 2.3.1-43, “very extreme rainfall events are likely to result in significant overland flow and runoff, and will not greatly affect net infiltration.” Similarly, as noted on page 2.3.1-70 of the SAR, “[f]or example, annual precipitation may be very high because of an especially high amount of precipitation occurring on a single day. In such a case, runoff would tend to be higher and net infiltration lower than if several days during the year experienced large amounts of precipitation, but the annual total was less.”

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Howard S. Wheeler and Richard E. Chandler), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5

of this contention, the affidavits simply “adopt” the otherwise unsupported assertions. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. Moreover, the contention does not reference any documentation other than DOE’s own description of its infiltration model.

Furthermore, Nevada makes indefinite claims that amount to mere unfocused speculation and, therefore, does not provide adequate support for the contention. In particular, in paragraph 5, Petitioner asserts:

[The] failure to represent seasonality adequately at half of the sites considered and erroneous representation of the rainfall-elevation relationship which is relied upon to generate spatial rainfall for input into the net infiltration model. . . are [both] important physical phenomena that *may* have a substantial impact on net infiltration estimates, whence their omission *may* significantly change estimates of radiological exposure.

Petition at 122. (emphasis added). As the Commission has held, a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 203 (2003) (quoting *Gen. Pub. Utils. Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). Accordingly, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected on that basis.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention argues that the precipitation model is flawed because it relies on an erroneous representation of the rainfall-elevation relationship to generate spatial rainfall for input into the net infiltration model. This is not correct. SAR Subsection 2.3.1.3.2.1.1 at 2.3.1-38

provides that “[t]he climate behavior at each site is strongly correlated with elevation, and each of the four probabilistic parameters for each site was adjusted for elevation using a linear lapse rate correction.” SAR Subsection 2.3.1.3.4.1 at 2.3.1-76 further states, “[t]he analysis found that after normalizing (for elevation) the precipitation from the 10 present-day Yucca Mountain meteorological stations, the stimulated and measured data were very closely matched.”

Even if Nevada’s allegations were accepted as true (which they are not), like with its seasonality argument, Nevada simply alleges that DOE’s infiltration results are incorrect – it does not allege that the results are not consistent with the reasonable expectation standards that are discussed in Section V.A.3, above. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

With regard to Nevada’s position that the precipitation model’s assumptions could result in logical impossibilities such as probabilities outside the range (0,1), Petition at 122, DOE addressed and accounted for this by placing constraints on the magnitude of the first-order term. As stated in “Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV01”, LSN# DN2002482668, Section F3.2 at F-32:

However, the magnitude of a first-order term is subject to constraints. The magnitude of a first-order term must be less than the magnitude of the zero-order term because neither a Markov probability nor an average precipitation can be less than zero. Also, the first-order term may not cause a Markov probability to exceed 1.0. Therefore, an approximate uncertainty distribution for

the magnitude of a first-order term for the upper-bound Monsoon climate is a uniform distribution from one standard deviation below the lower value to one standard deviation above the upper value, subject to constraints.

Therefore, this argument raises no genuine dispute.

Furthermore, this argument alleges an error without specifying the ramifications or results of the alleged deficiencies. Indeed, the contention makes no attempt to show that, if true, the alleged error would prevent the NRC from making any material finding, or that the proposed repository would not meet any regulatory requirements. Instead, Nevada merely states in paragraph 5 that “the model assumptions are such that it has the potential to produce physically impossible parameter combinations (for example, probabilities outside the range [0,1]).” Petition at 122. Because Nevada has not demonstrated that model assumptions used are not conservative, or that another set of assumptions will result in increased infiltration, it has not established a genuine issue of material fact.

This contention also argues that the precipitation model is flawed because no attempt was made to evaluate important aspects of performance such as extremes. However, it is readily apparent that DOE in fact took extremes into consideration. SAR Subsection 2.3.1.3.2.1.1, at 2.3.1-37, provides:

In order to capture the full range of infiltration uncertainty, the performance assessment must assure that low probability extreme precipitation years have been considered. Therefore, rather than use the meteorological records as direct input, MASSIF characterized each record in terms of periodic functions that summarized the records of precipitation, temperature, and wind speed at each meteorological station. This approach of developing synthetic datasets of precipitation, air temperature, and wind speed enabled the simulation of average infiltration over periods of time that span hundreds and thousands of years.

(citation omitted).

Nevada asserts that “the precipitation input for net infiltration is modeled on a daily time step, but even at this time-scale no evaluation is made of critically important effects such as persistence and extremes. The only features considered...are the reproduction of the seasonal cycle and the distribution of mean annual precipitation (MAP)...” Petition at 121. This allegation mischaracterizes DOE’s model. As discussed in more detail in DOE's response to NEV-SAFETY-34, DOE did not use an average duration for rainfall but instead varied the duration and amount of the rainfall, plus accounted for uncertainties in the duration and amounts. Furthermore, in contrast to the contention’s assertion that extreme events are not evaluated, Petition at 121, DOE’s model does include extreme precipitation events, characterized by daily precipitation amounts as high as 983 mm. (MDL-NBS-HS-000023 REV 01 AD001, Table I-1, LSN# DEN001575070). As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 39.

As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties” in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the precipitation model properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of

material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**15. NEV-SAFETY-15 - Alternative Precipitation Models And Weather Variables**

The precipitation and weather components of the net infiltration model described in SAR Subsection 2.3.1.3.2 are not sufficient because alternative conceptual models exist that are consistent with the available data and with current scientific understanding, and by neglecting these, DOE has substantially underestimated the uncertainty inherent in the results of the performance assessment.

**RESPONSE**

This contention claims that the precipitation and weather components of the net infiltration model described in SAR Subsection 2.3.1.3.2 do not comply with 10 C.F.R. § 63.114(c) because DOE “neglect[ed]” alternative conceptual models, thereby “substantially underestimat[ing] the uncertainty inherent in the results of the performance assessment.” Petition at 125. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

To the extent that Nevada argues that DOE is somehow required to *use* alternate conceptual models in its performance assessment, the contention is inadmissible as outside the scope of this proceeding. It is well settled that, absent a waiver, “no rule or regulation of the

Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations or that otherwise seeks to litigate a generic determination established by a Commission rulemaking. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001). Section 63.114(c) requires DOE to “[c]onsider” and “evaluate” alternative conceptual models. Indeed, this is echoed in the NRC Standard Review Plan for the Yucca Mountain Repository at p. 2.2-62, which notes that DOE is to “investigat[e]...[a]lternative modeling approaches.” As explained in section (f) below, DOE has assessed various alternative conceptual models related to infiltration, thereby satisfying the requirements of 10 C.F.R. § 63.114(c). The regulations do not require DOE to consider any particular conceptual model. To the extent Nevada is contending that additional requirements should be imposed on DOE beyond the applicable NRC regulations, its contention constitutes an impermissible challenge to 10 C.F.R. § 63.114(c).

Additionally, as discussed in the applicable Legal Standards section above, contentions expressing only generalized “uncertainties” in DOE models or analyses represent an improper challenge to Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from that deficiency. Nevada merely alleges that “DOE has substantially underestimated the uncertainty inherent in the results of the performance assessment.” Petition at 128. Nevada does not define what is meant by “substantially underestimated,” nor provide any data to demonstrate that the precipitation and weather components used in DOE’s net infiltration model are not conservative. This is an improper challenge to Part 63, which recognizes that such uncertainties exist and cannot be eliminated. Furthermore, Nevada has the

burden to raise an admissible contention and attempting to shift this burden to DOE is an improper challenge to 10 C.F.R. §2.309.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. First, as noted above, generalized “uncertainties” in DOE models or analyses are outside the scope of this proceeding and, therefore, by definition the contention does not raise an issue material to the finding the Commission must make.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the precipitation and weather components of the net infiltration model is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Howard S. Wheeler, Richard E. Chandler and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 and/or 6 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 and/or 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada asserts that the precipitation model used by DOE is based on Woolhiser, D.A. and Pegram, G.G.S., “Maximum Likelihood Estimation of Fourier Coefficients to Describe Seasonal Variations of Parameters in Stochastic Daily Precipitation Models,” and then cites to one reference, “The Weather Generation Game: A Review of Stochastic Weather Models,” to support its allegation that “[t]his type of model is known to perform poorly with respect to a number of hydrologically important features.” Petition at 126-27. This reference document is 30 pages long; yet, Nevada does not cite any particular paragraph or page as support. Such vague references to documents are not permissible. Rather, a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989)*. To the extent that Nevada is attempting to demonstrate that DOE’s model performs poorly based on this reference, it must fail for lack of specificity. Nevada does not identify what particular “hydrologically important features” the DOE model supposedly fails to model well, or whether those features exist or are relevant to the Yucca Mountain repository. Therefore, the reference to this document is not sufficient to satisfy Section 2.309(f)(1)(v). With the exception of the one reference document discussed, the contention does not reference any other documentation other than DOE’s own description of its infiltration model.

Furthermore, Petitioner makes indefinite claims that amount to mere unfocused speculation and, therefore, does not provide adequate support for the contention. In particular, in paragraph 5 Petitioner asserts:

Since net infiltration is a nonlinear function of weather inputs, any failure to account for variability in the inputs would *potentially* affect the estimates of average infiltration and hence, ultimately radiological exposure. It is therefore necessary to consider alternative conceptual models that allow for variability in the

inputs, and to evaluate the effects that the use of such models would have on the performance of the repository.

Petition at 128. (emphasis added). As the Commission has held, a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits,’ but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 203 (2003) (quoting *Gen. Pub. Utils. Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000) (GPU)). Accordingly, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected on that basis.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. First, as noted above, generalized “uncertainties” regarding the precipitation and weather components of DOE’s net infiltration model are outside the scope of this proceeding. Therefore, by definition the contention does not raise an issue material to the finding the Commission must make.

Second, DOE did assess various alternative conceptual models related to infiltration, thereby satisfying 10 C.F.R. § 63.144(c). For example:

- DOE performed an alternative set of simulations assuming wetter initial water content conditions for soil moisture content. SAR, p. 2.3.1-69.
- DOE performed an alternative model study using variations in soil saturated hydraulic conductivities. SAR at 2.3.1-70 to 71.
- DOE compared its model of precipitation with other models of precipitation. SAR at 2.3.1-75 to 77.

Therefore, the SAR satisfies 10 C.F.R. § 63.114(c). DOE also performed separate sensitivity evaluations of uncertainties. *See* SAR Section 2.3.1.3.3.2.2. Thus, this contention does not establish a genuine issue of material fact.

Furthermore, as discussed above, this contention only consists of bare assertions and speculation, which fail to provide a genuine dispute of material fact. Nevada first asserts in this contention that “[t]he precipitation component of the net infiltration model is deficient in several important respects.... Advanced precipitation models are available that could overcome these deficiencies and avoid use of these [simplifying] assumptions.” Petition p. 126. Yet, Nevada does not specifically mention one model. Nevada later asserts that “[a]dvanced models have been developed over the last 30 years that perform much better with respect to features such as extremes and inter-annual variability, have more flexibility to represent complicated seasonal patterns and also avoid problems such as the potential to produce negative probabilities.” *Id.* at 127. Once again, Nevada fails to specify an advanced model, any expert support, or what constitutes “much better” performance.

Nevada also provides no support for its claim that DOE’s precipitation model is deficient. As mentioned above, the reference Nevada provides to support this assertion, “The Weather Generation Game,” at page 329 states that it “reviews the historical development of statistical weather models.” While Nevada uses this reference in support of its allegation that DOE’s precipitation model is deficient, the document simply notes that the use of the mixed exponential distribution discussed in “Maximum Likelihood Estimation of Fourier Coefficients to Describe Seasonal Variations of Parameters in Stochastic Daily Precipitation Models” “has been reported to provide substantially better overall fits to daily precipitation data than the gamma distribution” and “reports better representation of the frequencies of the very largest precipitation amounts.”

“The Weather Generation Game,” p. 337. There is no assertion, much less any demonstration, of the effect of such “improved” representation, should it actually exist, of these specific terms on the ultimate probability-distributed results of infiltration calculations. Thus it is impossible to tell from this speculative kind of claim whether there is a genuine dispute over an issue of material fact to be litigated; and Nevada cannot shift its burden of going forward to DOE. Nevada’s allegation that “the use of annual relationships masks the variability that can be expected for daily precipitation,” Petition at 127, mischaracterizes DOE’s model. As discussed in more detail in our response to NEV-SAFETY-34, DOE did not use an average duration for rainfall but instead varied the duration and amount of the rainfall, plus accounted for uncertainties in the duration and amounts. As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 39.

In regards to DOE’s remark in LSN# DN2002482668 at 6-25 that while “a more complicated model might allow precipitation to occur in parts of the domain while other parts of the domain remain dry[,] [s]uch sophistication was deemed unnecessary for the current development,” Nevada alleges that “[i]t is necessary to quantify the effect in order to justify the claim that ‘such sophistication was deemed unnecessary for the current development.’” Petition at 127. However, no such quantification by DOE is necessary. DOE has made a simplifying assumption that conservatively assumes that when precipitation occurs, it “is assumed to occur at the same time in all parts of the domain.” LSN# DN2002482668, Table 5-1. In other words, given a precipitation event, a more “complicated” or “sophisticated” model might actually result in less precipitation across the model domain, as there would be “dry spots” where no

precipitation has occurred. Therefore, DOE's simplifying approach results in more precipitation available across the entire model domain for infiltration and is therefore conservative.

Nevada fails to acknowledge that the purpose of the precipitation model is not to represent “complicated seasonal patterns” of precipitation, but rather to bound the range and uncertainty of “steady-state” net infiltration rates for three potential future climate states: Present-Day, Monsoon, and Glacial Transition, which span hundreds to thousands of years each. As stated in SAR § 2.4.2.3.2.1.1, “the three climate states used in the TSPA model for the first 10,000 years after permanent repository closure are: (1) present-day climate for the first 600 years after waste emplacement; (2) monsoon climate for the 600 to 2,000 years after waste emplacement; and (3) glacial-transition climate for the period 2,000years after waste emplacement to 10,000 years after closure (SNL 2008a, Section 6.3.1.2).” At the time-scales of interest for these three climate states, for which MASSIF is intended to provide steady-state net infiltration rates, inter-annual or seasonal variability in precipitation is not a significant contributing factor.

Nevada does not allege that DOE’s infiltration results are not consistent with the reasonable expectation standard discussed in section V.A.3.C. If Nevada believes that quantification would show that DOE’s infiltration results are not consistent with that standard because of this effect, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear

Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

This contention next makes the vague argument that “[e]lsewhere in the weather-related components of the net infiltration model” there are deficiencies because (1) “there are several places...where a quantity of interest is treated as a deterministic function of some other quantities, but where data show considerable scatter about the fitted relationships” and (2) “simplifying assumptions are made for several other weather variables.” Petition at 128. Again, as with the other arguments in this contention, Nevada provides no tangible information, no experts, and no substantive affidavits to support these claims. Nevada, citing to DOE’s own description of its infiltration model, just makes bare assertions and speculations.

As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties’ in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the precipitation and weather components of the net infiltration model at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See*

*Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**16. NEV-SAFETY-16 - Qualification Of Climate And Infiltration Models**

SAR Subsection 2.3.1, which describes the analysis and modeling underpinning the climate and infiltration components of the TSPA, fails to provide details of data qualification procedures used in this work and fails to identify any formal peer reviews used in its preparation.

**RESPONSE**

This contention alleges that SAR Subsection 2.3.1 fails to provide details of data qualification procedures used in climate and infiltration components of the TSPA and fails to identify any formal peer reviews used in its preparation.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations without identifying specific violated provisions. Petition at 130. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-

compliance with these regulatory provisions and therefore raises a material issue within the scope the licensing proceeding.” Petition at 131. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada asserts that DOE must include a description of the quality assurance program to be applied to the structures, systems and components important to safety. Petition at 130. However, as discussed below, DOE did do exactly what Nevada seeks. As such, Nevada fails to demonstrate that its issue is material to any finding the NRC must make to authorize construction of the repository.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not

reference any documents, other than the Application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits of Howard S. Wheeler and Richard E. Chandler, which purportedly provide expert opinions to support this contention. Rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. As such, the contention should be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

In addition to the reasons described in Section d above, this contention fails to raise a genuine dispute on a material issue of law or fact for the following reasons: (1) there is no legal requirement for peer review of the specified model components of the TSPA; (2) there is no legal requirement that section 2.3.1 of the SAR contain the description of the quality assurance program that Nevada seeks; and (3) Nevada does not allege any impacts to safety resulting from the absence of peer review nor that peer review would change the TSPA.

**(1) No Legal Requirement for Peer Review**

DOE is required to include in the SAR "a description of the quality assurance program to be applied to all structures, systems, and components important to safety, to design and characterization of barriers important to waste isolation, and to related activities," which includes "acquisition, control, and analysis of samples and data." 10 C.F.R. § 63.142(a). The regulations at 10 C.F.R. § 63.142 go on to set forth the 18 criteria that are required to be addressed by DOE's quality assurance program. *See* 10 C.F.R. §§ 63.142(b)-(s). Nowhere in 10 C.F.R. § 63.142 is there a requirement to use peer review.

Nevada asserts in paragraph 5 of the contention that peer review is required by NUREG-1804, section 2.2.1.3.5.3. NUREG-1804, however, is a guidance document issued to the NRC staff to assist it in reviewing the Application. As a guidance document, NUREG-1804 is not binding upon DOE's preparation of the Application and does not carry the binding effect of regulations. *See, e.g., Int'l Uranium (USA) Corp.*, CLI-00-1, 51 NRC 9, 19 (2000) (upholding the rejection of a contention alleging a lack of compliance with a guidance document because "NRC NUREGs and Regulatory Guides . . . are routine agency policy pronouncements that do not carry the binding effect of regulations"). "It is well established . . . that NUREGs and Regulatory Guides, by their very nature, serve merely as guidance and cannot prescribe requirements." *Curators of University of Missouri* (Byproduct License No. 24-00513-32; Special Nuclear Materials License No. SNM-247), CLI-95-1, 41 NRC 71, 98 (1995). "[C]ompliance with [them] is not legally required and thus not litigable." *Entergy Nuclear Vermont Yankee* (Vermont Yankee Nuclear Power Station), LBP-04-28, 60 NRC 548, 559 (2004). As such, Nevada fails to raise a genuine issue of law or fact because, regardless of whether peer review was applied to the climate and infiltration components of the TSPA, there is no legal requirement for DOE to follow NUREG-1804.

## **(2) The Application Provides a Description of the QA Program**

DOE is required to include in the SAR "a description of the quality assurance program to be applied to all structures, systems, and components important to safety, to design and characterization of barriers important to waste isolation, and to related activities," which includes "acquisition, control and analysis of samples and data." 10 C.F.R. § 63.142(a). The regulations at 10 C.F.R. § 63.142 go on to set forth the 18 criteria that are required to be addressed by DOE's

quality assurance program. *See* 10 C.F.R. §§ 63.142(b)(s). Nowhere in 10 C.F.R. § 63.142 is there a requirement to use peer review.

The absence of a description of data qualification procedures from SAR subsection 2.3.1 is not material because the QARD, which is incorporated by reference into the SAR, and DOE's commitment to NUREG-1298, provide the quality assurance program for acquisition, control and analysis of samples and data. *See* Quality Assurance Requirements and Description rev. 20, (2008) (QARD), Supplement III.2.7.A.1 at 133 (commitment to "NUREG-1298 (1988) Qualification of Existing Data for High-Level Nuclear Waste Repositories"). "Qualified data" is "data collected under an approved QA program that meets the requirements of 10 C.F.R. 63.142 (or previously implemented 10 CFR 60 QA program) (i.e., qualified from origin) or unqualified data that have undergone a qualification process. (NUREG-1298, 2/88)." QARD at 155. Qualification of data is that formal process intended to provide a desired level of confidence that data is suitable for its intended purpose. *Id.*

Section 5.1 of the SAR incorporates the QARD by reference. The QARD provides that the QA program shall apply to, among other things, "acquisition, control, and analysis of samples and data." QARD, § 2.2.2.D, at 30. The QARD describes the manner by which this quality assurance program applies to the acquisition, control and analysis of samples and data by describing how DOE implements the 18 criteria of 10 C.F.R. § 63.142, plus relevant supplements regarding sample control (QARD, Supplement II), scientific investigations (QARD, Supplement III) and control of the electronic management of information (QARD, Supplement V). Since Nevada does not allege that the QARD fails to meet the quality assurance requirements of 10 C.F.R. 63 subpart G, the contention fails to raise a material issue of fact

because the QARD describes the data qualification procedure and Nevada has not alleged any deficiencies in the QARD with respect to data qualification.

For that data collected before the QARD and DOE's implementation of a quality assurance program under 10 C.F.R. 63, DOE has adopted NUREG-1298. *See also* SAR at 2.3.1. NUREG-1298 "provides guidance on a set of alternative conditions which may be used to qualify data not initially collected under a 10 CFR 60, Subpart G QA program." Qualification of Existing Data for High-Level Nuclear Waste Repositories, NUREG-1298 at 1 (February 1988). Nevada does not challenge compliance with NUREG-1298.

As such, Nevada fails to raise a genuine dispute on a material issue of fact because the QARD provides the description of the 10 C.F.R. Part 63 subpart G quality assurance program that serves to qualify the acquisition, control and analysis of samples and data, supplemented by NUREG-1298 for the qualification of data that was not collected under DOE's QARD.

**(3) No Showing of Harm From Absence of QA Description and Peer Review.**

Finally, Nevada fails to raise a genuine dispute on a material issue of fact because it fails to describe the ramifications of the absence of a description of the data qualification procedures and peer review from SAR subsection 2.3.1 with respect to the climate and infiltration components of the TSPA. Nevada has failed to articulate any harm or different results that could flow from an absence of a description of the data qualification procedures or peer review, and therefore, there is no material issue.

**17. NEV-SAFETY-17 - Calibration And Simulation Of Precipitation Model**

The procedures used to calibrate and simulate the precipitation component of the precipitation model, as referenced in SAR Subsection 2.3.1.3.2, are non-standard, not generally accepted and, in the case of the simulation procedure as described, incorrect.

**RESPONSE**

This contention claims that the precipitation model referenced in SAR Subsection 2.3.1.3.2 does not comply with 10 C.F.R. § 63.21(c)(9) and (c)(15) because the procedures used to calibrate and simulate it “are non-standard, not generally accepted and, in the case of the simulation procedure as described, incorrect.” Petition p. 133. In particular, Nevada alleges that: (1) the net infiltration model is calibrated using a nonstandard least squares procedure that is not generally accepted; (2) the simulation methodology as described adopts the procedure of using the same random number to generate both rainfall occurrence and amounts of rainfall; and (3) the procedure used for sampling from a lognormal distribution is not generally accepted. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada argues that DOE should have used “more widely accepted superior procedures” to calibrate the precipitation component of the net infiltration model, instead of the one actually

used. Petition at 134. Similarly, Nevada asserts that DOE should have used “[m]odern methods” to generate “pseudo-random numbers from lognormal distributions.” *Id.* at 135. Because DOE’s modeling did not use these other (unspecified) procedures and methods, Nevada claims that DOE violated 10 C.F.R. § 63.21(c)(9) and (c)(15). *Id.* at 133. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001). No regulation DOE must meet imposes the requirement that it consider any particular procedure or methodology to calibrate and simulate a precipitation or infiltration model. Accordingly, Nevada’s contention should be dismissed as outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing. Indeed, Nevada fails to address what effect, if any, that using a different particular procedure or methodology to calibrate and simulate a precipitation or infiltration model would have, even on infiltration. It does not claim that doing so would result in infiltration estimate beyond that in the license application or that that DOE’s estimates are not conservative. Absent any discussion on what effect the contention has on infiltration estimates, Nevada has clearly not met its burden to demonstrate that the resolution of the issue would prevent the NRC from finding that there is reasonable expectation that the radioactive materials

can be received, possessed and disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31.

The method the DOE used in addressing the precipitation model is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (Howard S. Wheeler and Richard E. Chandler), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

With the exception of one reference document, the contention does not reference any other documentation other than DOE's own description of its infiltration model. With regard to the one document Nevada cites, "Statistical Models," Nevada does not identify where in this document can be found the support for which it is cited. Vague references to documents are not permissible. Rather, a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989)*. Therefore, the reference to this document is not sufficient to satisfy Section 2.309(f)(1)(v). Indeed, even had Nevada referenced the document with sufficient specificity, it is cited merely to support the proposition that "[m]odern methods for simulating from lognormal distributions rely on the relationship between the lognormal and normal distributions, and the

availability of efficient and exact methods for sampling from the latter.” Petition at 135.

However, whether or not the methods DOE chose to use in its model “rely on the relationship between the lognormal and normal distributions, and the availability of efficient and exact methods for sampling from the latter” is not at all material to this proceeding, and, therefore, this statement provides no support the contention.

Finally, many of the statements Nevada asserts provide the factual support for its contention provide no objective information, and rely on vague, subjective terms. Such inadequate conclusory statements include:

- “This procedure is flawed because more widely accepted superior procedures are available and in common use.” Petition at 134.
- “[T]he method utilized by DOE for generating pseudo-random numbers from lognormal distributions ... is not generally accepted.” *Id.* at 135.
- DOE’s simulation methodology is “*slow and could be relatively inaccurate.*” *Id.* (emphasis added).

This is precisely the type of “expert opinion” that the Commission has repeatedly rejected as inadequate “because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion.” *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added) (quoting *Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998)). Because the contention provides no reasoned basis or explanation for such conclusions, the contention is not properly supported and should be rejected pursuant to 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated above that Nevada's claim that DOE's procedures used to calibrate and simulate its precipitation model "are non-standard, not generally accepted and, in the case of the simulation procedure as described, incorrect," Petition at 133, are not material. Accordingly, they do not raise a genuine dispute on a material issue of law or fact. But the contention also contains other assertions which, as DOE demonstrates below, raise no genuine issue on a material issue of fact or law.

Nevada's argument that DOE's calibration procedure is "flawed" merely "because more widely accepted superior procedures are available and in common use," Petition at 134, does not present a genuine dispute of a material fact. The mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). Because the contention neither alleges, nor provides a basis for concluding that DOE's results are not inconsistent with the reasonable expectation standard, it does not establish a genuine issue of material fact. Furthermore, the contention never explains the basis for its statement that DOE uses a method "that is not generally accepted," Petition at pages 133, 135-136, nor does it ever explain how DOE's approach violates the principle regulatory provisions that it cites, 10 C.F.R. § 63.21(c)(9) and (c)(15).

Nevada's claim that DOE's implementation of the infiltration model is "incorrect since it uses the same pseudo-random number to determine both the occurrence and amount of rainfall" is simply wrong. A contention is inadmissible if "the Petitioner's assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the

application[.]” *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 & 3), LBP-04-15, 60 NRC 81, 95 (2004). Although the algorithm described on Page F-36 of “Simulation of Net Infiltration for Present-Day and Potential Future Climates, MDL-NBS-HS-000023 REV01” (05/24/2007), LSN# DN2002482668, uses the same symbol R to indicate the use of two pseudo-random numbers in Equations F-50 and F-51, in the implementation of the model these two equations use uncorrelated, independent random numbers, as is made clear by repetition of the phrase “select a random number.”

Finally, as discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties” in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the precipitation model properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

**18. NEV-SAFETY-18 - Use Of Climate Data From The Analog Sites**

SAR Subsection 2.3.1.2.3 and similar subsections, which describe the use of analog sites to represent future climate states, make inappropriate use of information from the analog sites.

**RESPONSE**

This contention claims that “SAR Subsection 2.3.1.2.3 and similar subsections,” make inappropriate use of information from analog sites used as proxies for future climate states. Nevada alleges that “there are substantial differences between sites that are supposed to represent the same climate,” Petition at 138, and concludes that “the chosen sites cannot possibly all represent the same climate regime, and the results obtained by pooling results from different sites are not shown to correspond to any physically plausible climate state.” *Id.* at 139. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada argues that, rather than “using a fixed parameter set drawn from the pooled [analog sites’] results,” DOE should have used “*the correct way* to represent ... [variance] in a 1,000-year climate simulation,” which is “by allowing the parameters to vary within the simulation so as to reflect the actual process that is expected to occur.” Petition at 139 (emphasis

added). Because DOE's modeling did not use this allegedly "correct way," Nevada claims that DOE violated 10 C.F.R. § 63.21(c)(15). *Id.* It is well settled that, absent a waiver, "no rule or regulation of the Commission ... [is] subject to attack ... in any adjudicatory proceeding." 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission's regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001). That is the case here. No NRC regulation, including those cited by Nevada, mandate that the DOE performance assessment allow the parameters to vary within the simulation in order to represent variance in a 1,000-year climate simulation. Accordingly, Nevada's contention should be dismissed as outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific

citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing. Indeed, because the climate analysis provides input to DOE’s infiltration model, it is notable that Nevada has not asserted that the DOE’s analysis underestimates infiltration and will continue to do so unless the issues identified in the contention are adopted. Instead, Nevada merely asserts that the manner in which DOE’s uses information from the analog sites is “inappropriate” because “the chosen sites have quite different climatologies ....” Petition at 137. Nevada has not established how the contention resolution would make a difference in the outcome of the proceeding. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed. Similarly, Nevada also does not allege, even qualitatively, that use of Nevada’s so-called “correct way to

represent this [variance] in a 1,000-year climate simulation,” Petition at page 139, would result in an increase in infiltration. Indeed, while Nevada claims that “the data from the analog sites have therefore been used inappropriately,” Petition at 139, it does not allege that DOE’s infiltration results are inconsistent with the reasonable expectation standard.

As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

The method the DOE used in addressing climate analysis is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are

immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Jonathan Overpeck, Howard S. Wheeler, and Richard E. Chandler), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Moreover, the contention does not reference any documentation other than DOE’s own description of its infiltration model. Accordingly, the contention is devoid of support for its claim that:

[T]he correct way to represent this in a 1,000-year climate simulation is not by using fixed parameter set drawn from the pooled results, but rather by allowing the parameters to vary within the simulation so as to reflect the actual process that is expected to occur. The data from the analog sites have therefore been used inappropriately, and therefore the requirement in 10 C.F.R. § 63.21(c)15 – that ‘[a]nalyses and models will be used to assess performance of the geologic repository must be supported by using an appropriate combination of such methods as . . . natural analog studies’ – has not been met.

Nevada also provides no explanation for its conclusory assertion that its proposed method is “the correct way,” or any reference or further explanation for its claim that “the parameter values derived do not comply with the requirement of 10 C.F.R. § 63.114(b), in that the technical basis for the parameter ranges used to describe future climatic conditions is flawed.” *Id.*

Yet, even if these claims were construed to have been submitted by an expert, they constitute the type of “expert opinion” that the Commission has repeatedly rejected as inadequate “because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion” of the alleged basis for the contention. *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998)). Because the contention provides no reasoned basis or explanation for such conclusions, the contention is not properly supported and should be rejected pursuant to 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s claim articulated in this contention is not material. DOE has also demonstrated that Nevada has failed to proffer adequate factual support or expert opinion. Accordingly, Nevada’s claim of noncompliance with this regulation also does

not raise a genuine dispute of material fact or law. The contention's arguments also raise no genuine dispute of material fact or law for the reasons set forth below.

First, Nevada has failed to perform a meaningful analysis of the SAR. For example, Nevada's claim that DOE's use of analog sites to represent future climate states "is inappropriate" because the sites have "quite different climatologies" is simply wrong. The selection of more than one climate station (called "pooling" in this contention) is entirely *appropriate* to fully characterize climate conditions at a single analog location. For instance, weather station data from Nogales, Arizona, and Hobbs, New Mexico, were combined to represent the monsoon climate state because using only one would not appropriately represent the range of potential monsoon conditions that could impact the Yucca Mountain site. *See* "Simulation of Net Infiltration for Present-Day and Potential Future Climates," MDL-NBS-HS-000023 REV 01 (May 2007), LSN# DN2002481680, at 7-11 ("Even if their average annual precipitation is similar, the two upper-bound sites have different behavior over the year: Hobbs features a longer but less intense monsoonal period, while Nogales presents a shorter (2 months) but more intense monsoonal period."). That is because monsoon characteristics vary depending on whether the air mass originates in the northern Gulf of California (wet Arizona monsoons) or in the southern Gulf of California or tropical eastern Pacific Ocean (New Mexico monsoons). Mitchell, D.L., Ivanova, D., Rabin, R., Brown, T.J., and Redmond, K., 2002, "Gulf of California sea surface temperatures and the North American Monsoon: Mechanistic Implications from Observations," *Journal of Climate*, 15(17): 2261–2281, 2261 (2002). Including data from both stations incorporates all sources of monsoonal storm tracks which better represents potential future monsoonal storm events at Yucca Mountain.

Likewise, stations in Rosalia, St. John, and Spokane, Washington are close to each other, but do not have identical meteorological records. “Future Climate Analysis,” ANL-NBS-GS-000008 Rev. 001” (9/3/2004), LSN# DN2001637047 at 6-52 to -53. These stations were selected to collectively represent the upper bound transition climate state to minimize the influence of local meteorological phenomena on the input to the infiltration model. *Id.* The selected analog climate stations and the simulated climate in the infiltration model are intended to represent a range of future climate variability for each climate state.

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. As just shown, Nevada’s contention ignores relevant analyses performed in support of the Application. In short, this contention is inadmissible because “the Petitioner’s assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[.]” *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 & 3), LBP-04-15, 60 NRC 81, 95 (2004).

Second, Nevada erroneously asserts in this contention that “DOE makes an attempt to justify the pooling for the monsoon climate – ‘The climate during this period would vary from episodes of intense summer rain to present-day-like climates with relatively more winter and less summer precipitation.’” Petition at 139 (quoting SAR at 2.3.1-41). A closer reading of the SAR in context demonstrates that the quoted statement is not a justification; it is a description of past monsoon climate based on paleoecological data from Owens Lake, hydrology, current microfossil species distribution, and precipitation and temperature data, among other

paleoenvironmental information and, therefore, does not create a genuine dispute. LSN# DN2001637047, at Section 6.5.

Furthermore, as discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties” in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the climate analysis properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

**19. NEV-SAFETY-19 - Future Infiltration Projections Need To Include Reduced Vegetation Cover**

SAR Subsection 2.3.1.3.2.1.5 and related subsections, which state the nature of vegetation cover predicted for the future at Yucca Mountain, fail to account accurately for the possible impact of reduced vegetation cover that could result in increased rates of infiltration.

**RESPONSE**

Nevada states that SAR Subsection 2.3.1.3.2.1.5 “and related subsections,” do not consider how human impacts on climate change could affect vegetation cover, resulting in increased rates of infiltration, and therefore, DOE did not satisfy applicable regulatory requirements, including 10 C.F.R. § 63.305(c).

**a. Statement of Issue of Law or Fact to be Controverted**

Because Nevada is, in essence, challenging existing regulatory requirements, the contention has no basis in existing law.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

The essence of Nevada’s claim, like the claims it makes in a number of other contentions, is that DOE has not taken into account the effect of climate change resulting from future anthropogenic production of greenhouse gases. In this contention, Nevada alleges that such human-induced future climate change may reduce the amount of vegetative cover on the surface of the Yucca Mountain repository. Petition at 142. Nevada’s argument that DOE is required to take potential climate changes caused by increasing greenhouse gases resulting from human

activity into account and any effect that this climate change may have, is inadmissible as outside the scope of this proceeding. NRC's regulations do not impose this requirement onto DOE. Therefore, Nevada's attempt to do so makes this contention inadmissible. Absent a waiver, "no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding." 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission's regulations or that otherwise seeks to litigate a generic determination established by a Commission rulemaking. *See Fla. Power & Light Co. (Turkey Point Nuclear Generating Plant, Units 3 and 4)*, LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001).

Furthermore, attempting to determine the impact of reduced vegetative cover on infiltration, would necessarily require DOE to determine the effect of future human activity on the Earth's climate. This, in turn, would require DOE to predict the future amounts and variations in amounts of greenhouse gas emissions due to human activities. In short, DOE would have to somehow foretell human behavior for thousands of years into the future. This is precisely the type of speculative endeavor that the NRC does not require DOE to undertake. The NRC made this clear when promulgating 10 C.F.R. § 63.305(b), explaining that:

The natural systems of the biosphere are allowed to vary (*e.g.*, climate change) because the geologic record provides evidence of past climate over a long time frame, which provides a strong basis for predicting future changes. Because human behavior cannot be similarly predicted, a similar approach cannot be used for the RMEI and the influence the local population has on the biosphere. Thus, it is necessary to emphasize current conditions for the RMEI . . . . The suggestion that NRC consider alternative futures related to human behavior is speculative and leads to problems deciding which alternative futures are credible and which are unrealistic. Such questions have no scientific or technical answer.

66 Fed. Reg. 55,732, 55,757 (Nov. 2, 2001).

Nevada also appears to challenge DOE's climate and infiltration modeling for the *post-*10,000 year period. *See* Petition at 143. That position also constitutes an impermissible challenge to Commission regulations and is, therefore, outside the scope of this proceeding. *See* 10 C.F.R. §§ 2.335(a) and (b). NRC's proposed 10 C.F.R. § 63.342 (c)(2) makes it clear that DOE need not predict the possible effects of climate change for the period from 10,000 years after permanent closure through the period of geologic stability, and DOE accordingly did not do so. *See* 70 Fed. Reg. at 53,319. DOE must, instead, adhere to the prescribed analysis for climate and infiltration in the post-10,000 year period, set forth at proposed 10 C.F.R. § 63.342(c)(2). *See id.* Because this contention would impose different requirements than those mandated by NRC's regulation, it fails to meet the requirements of 10 C.F.R. § 2.309(f)(1)(iii) and must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. As noted above, the effect of possible reduced vegetation cover resulting from climate changes caused by future anthropogenic production of greenhouse gases is outside the scope of this proceeding and, therefore, the contention does not raise an issue material to the finding the Commission must make.

Additionally, to identify an issue as material, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is reasonable expectation that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31. Nevada makes no such showing, making only the nebulous assertion that "reduced vegetation cover ... *could* result in increased rates of

infiltration.” Petition at 142. Nevada does not claim that it would result in infiltration estimates beyond those in the license application, or that DOE’s estimates are not cautious or reasonable.

Moreover, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

Furthermore, 10 C.F.R. § 63.305(c) requires DOE to make “reasonable assumptions consistent with present knowledge” when assessing climate change. Thus, for the contention to be material to this proceeding, Nevada must also allege and provide sufficient support to show that DOE’s assumptions were *unreasonable*. Nevada, however, makes no such claim or showing. Indeed, Paragraph 6 of the contention essentially admits that Nevada does not know whether it poses a material issue. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 146. Absent any discussion on what effect the contention has on infiltration estimates, Nevada has clearly not met its burden to demonstrate that the resolution of the issue would prevent the NRC from finding that there is reasonable expectation that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2).

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists a number of regulations in paragraph 4 in this

contention. *See* Petition at 102-103. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 103. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

For the aforementioned reasons, this contention fails to raise issues material to the findings the NRC must make and therefore, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for many statements and assertions, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the

contention does not reference any expert opinion. Nevada does attach several affidavits (by Jonathan Overpeck and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada provides no documentary support whatsoever for a number of conclusory statements, including those contained in the following paragraph from page 144 of the Petition:

[Human induced climate change] will likely result in temperatures at Yucca Mountain that are much hotter than assumed by DOE, as well as precipitation regimes that are both drier on average during the winter, with episodic, likely more intense, rainfall at irregular intervals, particularly in the summer or during increasingly infrequent wet winters. The hotter (5 to 10 or more degrees F warmer than present) and drier climate will make it more difficult, at least during extended dry periods, for vegetation to grow. Reduced vegetation growth will reduce the capture of soil moisture by above- and below-ground vegetation. This means that during dry periods in the future, less frequent but more intense rainfall should be able to infiltrate more freely than current, or DOE-predicted, vegetation cover allows. Thus, by assuming a particular vegetation cover at Yucca Mountain, DOE has underestimated the potential for infiltration.

Licensing boards have found that “[m]ere assertions without appropriate explanation and support do not satisfy the requirements of the contention rule.” *See Duke Energy Corp.*

(McGuire Nuclear Station, Units 1 & 2, Catawba Nuclear Station, Units 1 & 2), LBP-02-4, 55 NRC 49, 84 (2002). Accordingly, the Board should not accept any of Nevada’s unsupported assertions.

Finally, the documentary materials Nevada does cite are immaterial to the contention’s central issue: whether the DOE’s model appropriately accounts for variations in vegetation

cover when estimating infiltration. Moreover, the two documents Nevada cites in support of the proposition that “[f]uture climate changes will likely result in substantial periods of time during which the vegetation cover is reduced below that predicted by DOE,” Petition at 144, are both hundreds of pages in length, yet Nevada fails to provide specific pages or sections on which support for the proposition can be found. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Consistent with that requirement, the Case Management Order directs petitioners to ensure that documentary references “be as specific as reasonably possible.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7). Nevada’s contention fails in this regard.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated above that Nevada’s claim is outside of the scope of this proceeding and also not material to any finding the NRC must make. The contention also contains other assertions which, as DOE demonstrates below, raise no genuine dispute on a material issue of fact or law.

First, contrary to Nevada's claim that DOE has underestimated possible infiltration, Petition at 145, DOE’s infiltration model takes into account climatic impact of evapotranspiration rates: “[e]vapotranspiration rates are controlled by a combination of soil and vegetation properties, and vegetation properties are highly dependent on climate.” SAR Subsection 2.3.1.3.1.4 at 2.3.1-36. DOE described parameters and data uncertainty relevant to its infiltration model -- including evapotranspiration -- in SAR Section 2.3.1.3.2 and 2.3.1.3.3. Because the contention does not show that the DOE models and related parameters are not reasonable, it fails to establish a genuine dispute. *See* 10 C.F.R. § 63.305(c).

Second, this contention fails to quantify the “reduced vegetation cover,” “increased rates of infiltration,” or “possible impact” that it alleges could occur. Petition at 145. A petitioner must allege not only that more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339 (2006). This contention therefore fails to explain how inclusion of these unspecified events could significantly affect the results of the postclosure analysis, or otherwise make a difference in the outcome of the licensing proceeding.

Third, the study on which Nevada bases its assertion that infiltration will increase if vegetation is reduced, “Ecological controls on water-cycle response to climate variability in deserts,” Petition at 143, compared vegetated and non-vegetated areas (that is, areas in which vegetation occurred naturally, but was continually removed) under similar climate conditions, that is, similar amounts of precipitation. However, this only addresses the amount of moisture that the vegetation is capable of removing by evapotranspiration. Yet, the other primary determinant of net infiltration is precipitation, which DOE’s infiltration model also takes into account. *See* SAR Section 2.3.1.3.1.4 at 2.3.1-36. In other words, a decrease in vegetation results from a decrease in annual precipitation, not an increase in temperature. The precipitation decrease would likewise decrease mean net infiltration over the site. *See* SAR Section 2.3.1.3.3.2.2 at 2.3.1-74.

Finally, as discussed in the applicable Legal Standards section and section (d) above, this contention alleges potential errors, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies. Here, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Accordingly,

Nevada has failed to raise a genuine dispute of material fact or law and therefore, this contention is inadmissible. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises genuine dispute on a material issue of fact or law in this proceeding. Paragraph 6 essentially shifts Nevada's burden to DOE and, therefore this contention should be rejected.

**20. NEV-SAFETY-20 - Net Infiltration Alternative Conceptual Model**

SAR Subsection 2.3.1.3.3.1 and similar subsections, which state that the MASSIF model estimates net infiltration at the Yucca Mountain site based on daily water balance calculation of the near-surface soils, fails to apply alternative conceptual models to evaluate the performance of the geologic repository.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Additionally, this contention asserts that DOE did not “apply” any alternate modeling approaches for net infiltration. Nevada goes on to identify a number of alternate infiltration model codes DOE “could have used,” such as HYDRUS-1D, HELP, MIKE-SHE, and KINEROS. Because DOE allegedly did not use these alternative codes to calculate net infiltration, Nevada asserts that DOE failed to satisfy 10 C.F.R. § 63.114(c).

Section 63.114(c) does not require DOE to apply alternate codes such as HYDRUS, HELP, and KINEROS. Rather, the NRC requires DOE to “[c]onsider” alternative conceptual models of “features and processes” and “evaluate the effects that alternative conceptual models have on the performance of the geologic repository.” This is echoed in the NRC Standard Review Plan for the Yucca Mountain Repository at 2.2-62, which notes that DOE is to “investigat[e]” “[a]lternative modeling approaches.” Contrary to this contention, 10 C.F.R. § 63.114(c) does not require that alternative “codes” be used - - it requires that alternative “conceptual models” of features and processes be used. Code and conceptual model are two separate concepts. It is entirely possible and not unreasonable to use the same code to provide different conceptual models of features and processes by varying input and other various parameters.

To the extent that Nevada is contending that additional requirements should be imposed on DOE beyond the applicable NRC regulations, its contention constitutes an impermissible challenge to the 10 C.F.R. § 63.114(c). *See Fla. Power & Light Co.*, LBP-01-6, 53 NRC at 159, *aff’d on other grounds*, CLI-01-17, 54 NRC 3 (contentions that advocate stricter requirements than agency rules impose constitute an impermissible challenge to the regulations).

Although it would have been permissible for DOE to use alternative codes to satisfy 10 C.F.R. § 63.114(c), that regulation does not require DOE to do so. Instead, DOE assessed various alternative conceptual models related to net infiltration using the MASSIF code. For example:

- DOE performed an alternative set of simulations assuming wetter initial water content conditions for soil moisture content. SAR, at 2.3.1-69.

- DOE performed an alternative model study using variations in soil saturated hydraulic conductivities. SAR, at 2.3.1-70-71.
- DOE compared its model of precipitation with other models of precipitation. SAR, pp. 2.3.1-75 to 77.

Therefore, the SAR satisfies 10 C.F.R. § 63.114(c).

Moreover, DOE did consider and evaluate two of the alternate infiltration codes noted in the contention - HYDRUS-1D and HELP. See Simulation of Net Infiltration for Present-Day and Potential Future Climates, Section 6.2.4 “Alternative Models Considered,” (LSN DEN001575070). These two alternate codes were representative of two modeling groups based on how they consider subsurface water movement, either with Richards’ equation or with a water balance approach that uses field capacity. DOE's assessed the capabilities and limitations of these two representative codes. DOE eventually concluded that neither of these two alternate models is suitable to estimate net infiltration at Yucca Mountain.<sup>56</sup>

Additionally, DOE utilized the HYDRUS-1D code to build confidence in the MASSIF code. For example, as discussed in SAR Section 2.3.1.3.4.1, DOE used the HYDRUS-1D code to assess the ability of the MASSIF model to simulate daily actual evapotranspiration and changes in daily soil water storage. MASSIF simulation output was first compared to long-term detailed water balance data collected at lysimeter facilities at the Nevada Test Site and at the Reynolds Creek Experimental Watershed. DOE then applied the HYDRUS-1D to the same water balance data and compared the results from the alternative (HYDRUS-1D) with MASSIF.

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<sup>56</sup> Additionally, DOE examined various conceptual models used to represent the component processes of the water balance equation. See LSN DEN001575070, Section 6.2.2 "Modeling Processes Controlling Net Infiltration." Section 6.2.2 provides additional description of possible alternative representations for each of the component terms. Rational for selection of the component terms implemented in MASSIF is provided in the Section 6.2.3, “Criteria for Selection of Net Infiltration Model Components.”

Notably, these comparisons show that MASSIF simulations compare well to the results of HYDRUS-1D. SAR at 2.3.1-78. DOE also used the HYDRUS-1D code to validate MASSIF, showing that MASSIF produces annual net infiltration estimates that are very close to the estimates obtained by HYDRUS-1D. SAR Section 2.3.1.3.4.2.3.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Although this contention asserts that DOE should have applied alternative codes to essentially reproduce the results of the selected model (MASSIF), the contention does not allege that doing so would have produced results that are significantly different than the results of the MASSIF code for net infiltration. Therefore, the contention does not establish a genuine issue of material fact. As stated by the licensing board in *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station Units 1 and 2), LBP-03-17, 58 NRC 221, 240 (2003):

The Board views this proposed contention or subpart as an attempt to challenge the use by Duke of various models used in its calculation of accident consequences. But the Intervenors have made no showing either that the models used by Duke are defective or incorrect for the purpose used or that those models were used incorrectly by Duke. Nor have the Intervenors demonstrated that the models they are recommending are superior in any way to those employed by Duke. The Intervenors merely point out that, by using their models in the manner they are recommending, a different result would be achieved. That is an insufficient basis to formulate a valid contention.

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such

alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this failure. Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have on net infiltration or doses. In fact, the contention makes no mention of dose whatsoever. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As noted above, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**21. NEV-SAFETY-21 - Infiltration Model And Changes In Soil And Rock Properties**

SAR Subsections 2.3.1.3.2.1.2, 2.3.1.3.2.1.3, 2.3.1.3.2.1.4 and similar subsections, which state that the MASSIF infiltration model was developed with bedrock hydraulic conductivity, soil depth and soil properties assumed to be constant for the next 10,000 years, fails to account for biogeochemical and geomorphological processes, including erosion and also fails to account for uncertainties and variabilities in parameter values.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing

by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) as discussed in Section V.A.3 above: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Howard S. Wheeler, Stephan K. Matthäi, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. As discussed in Section V.A.3 above, that approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does provide a reference for one of its statements in paragraph 5 of the contention, citing that document for the proposition that "there are potentially significant changes to soil depth and rock properties that are expected to occur due to geomorphological processes." Petition at 154. The contention does not cite any particular paragraph or page of that referenced document as support, and therefore the reference to that document is not sufficient to satisfy Section 2.309(f)(1)(v). As the Commission has stated, vague references to documents do not suffice—the petitioner must identify specific portions of the documents on which it relies. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 & 2), CLI-89-03, 29 NRC 234, 240-41 (1989).

Furthermore, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998). In this case, the document referenced by Nevada does not support the statements made in the contention. Rather, the document lends support to DOE’s determination that erosion is not consequential, stating: “It may be seen that there is little apparent change [in Yucca Mountain] within the first 1 my [million years] ....” LSN# NEV000005187, p.7. Obviously, this reference has no relevance to this contention, which pertains to processes that could affect Yucca Mountain over the next 10,000 years.

Additionally, in order to predict significant erosion within 500,000 to 5,000,000 years, the document relied upon by Nevada is forced to use “conservative estimates for all involved parameters.” *Id.* at 1. As such, the reference is not material to compliance with 10 C.F.R. § 63.305(c), which requires DOE to vary factors related to geology based upon “cautious, but reasonable assumptions.” Furthermore, the reference is not material to compliance with 10 C.F.R. § 63.101(a)(2), which only requires that there be a “reasonable expectation” that the postclosure performance objectives will be met. *See* Section V.A.3c of this Answer.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes DOE for assuming constant soil and bedrock properties over the first 10,000 years after repository closure, rather than varying soil properties due to changes in

vegetation and erosion. For several reasons, this contention does not establish a genuine dispute of material fact.

First, while the contention alleges that there will be changes in soil and bedrock during these 10,000 years which “would widen the range of estimates of infiltration,” the contention never alleges that such changes would have the effect of increasing net infiltration beyond that estimated by in the license application. Since the contention does not allege (let alone provide support for an allegation) that DOE’s estimates for net infiltration are not conservative or do not bound the amounts of net infiltration that would be estimated if Nevada’s approach were adopted, the contention does not establish a genuine dispute of material fact. *See* Section V.A.3 of this Answer.

Second, as discussed above, Nevada’s cited reference does not address erosion within the first 10,000 years, which is the subject of this contention. Therefore, that reference does not establish a genuine issue of material fact.

Third, the contention does not properly characterize the license application. Nevada asserts that “no consideration is given to changes in soil depth, soil properties, or bedrock conductivity over 10,000 years.” Petition at 153. For its base case, DOE did assume that soil depth and properties are constant for the next 10,000 years. SAR, at 2.3.1-45. However, contrary to Nevada’s allegation, DOE also postulated changes in soil depth and in the hydraulic conductivity of the most common bedrock units, as part of its uncertainty analysis. SAR at 2.3.1-73. That analysis determined that assumptions related to the depth of class 4 soils have a significant contribution to the uncertainty in net infiltration. SAR at 2.3.1-74. Accordingly, DOE took a conservative approach to specifying soil depth of the soil class 4 to ensure that the depth is not overestimated (an overestimate of soil depth could result in an underestimate of net

infiltration). SAR, at 2.3.1-47. Thus, this contention has mischaracterized the analyses performed by DOE. As a previous licensing board has ruled, if a petitioner alleges that the application does not address a particular issue, but the allegedly missing information is indeed in the license application, then the contention does not raise a genuine issue. *See Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada’s contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this point.

In summary, for all of the reasons set forth above, this contention does not establish a genuine issue of material fact. Therefore, it should be rejected.

**22. NEV-SAFETY-22 - Net Infiltration Model Water Balance**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections, which address the hydrological processes represented in the net infiltration model, are inadequate because they fail to address lateral subsurface flow and allow for the generation of surface runoff only when the soil layers are saturated.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention asserts that DOE's infiltration model has not addressed lateral flow or given appropriate consideration to runoff. For the reasons discussed below, this does not establish a genuine issue of material fact.

The contention acknowledges that DOE's model considers runoff, but then essentially asserts that DOE's model only considers runoff when soil layers are saturated, thereby excluding runoff under other conditions. The contention mischaracterizes DOE's model. As clearly stated in SAR Section 2.3.1.3.3.1, "Runoff can occur if the net precipitation exceeds the ability of the thin surface soil layer to store and transmit water to underlying soil layer," as well as when soil layers are saturated. SAR, pp. 2.3.1-56. Additionally, DOE has validated its model of runoff against actual data from streamflow gauges. That validation shows that DOE's model correctly predicts the timing and magnitude of the runoff. SAR, pp. 2.3.1-79 and 80. Therefore, Nevada's assertions that DOE has not considered runoff under certain conditions fail to raise a genuine dispute of material factor or law, as required by 10 C.F.R. § 2.309(f)(1)(vi).

With respect to the assertion regarding the alleged failure to address lateral subsurface flow, the contention relies upon statements in the "Independent Review of Simulation of Net Infiltration for Present-Day and Potential Future Climates" prepared by the Oak Ridge Institute for Science and Education (ORISE). LSN# DEN001595302 (ORISE Report). However, Nevada quotes selectively from the ORISE Report, omitting the fact that the Report is uncertain as to whether subsurface lateral flow would have any net effect on mean net infiltration (which is calculated over the model domain). For example, the ORISE Report states:

Subsurface lateral flow may be important or maybe not. . . . For example, subsurface lateral flow can reduce vertical percolation of water and increase evapotranspiration, thus reducing net

infiltration. Or, lateral flow may increase net infiltration by diversion of water to washes or other likely flow paths to the deep subsurface, such as head slopes, where water is converging, in first order drainage basins. As a result, it is important to consider the impact on net infiltration of subsurface lateral flow that possibly occurs at specific locations experiencing extreme fluxes, rather than assuming the flux is distributed uniformly across a grid cell, hillslope, or catchment.

ORISE Report (LSN# DEN001595302 at 6) As illustrated by the above quotation, the authors of the ORISE Report conceded not knowing whether consideration of lateral subsurface flow would have any effect (much less a material effect) on the results of DOE's model. In fact, such consideration could result in a decrease in net infiltration.

Statements somewhat similar to those in the ORISE Report appear in the report of the expert elicitation panel cited in this contention, "Unsaturated Zone Flow and Transport Modeling Expert Evaluation (UZFTTE) Project" (CRWMS M&O, 1997) (LSN# NRC000010491 at 3-8). The expert panel stated that consideration of lateral flow would lead to calculation of less infiltration along ridge tops and more infiltration within washes. However, the panel did not reach any conclusions on whether there would be an increase in the mean net infiltration.

A petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). The ultimate conclusion of Nevada's assertion is that "[t]he inclusion of these missing hydrological processes would widen the range of estimates of infiltration, including those associated with episodic events." Petition at 158. In other words, uncertainty may, to some unquantified degree, be greater than DOE estimates. However, neither this contention nor the ORISE Report provide a basis for concluding that consideration of lateral subsurface flow will lead to any increase in mean net

infiltration results. Accordingly, the contention has not established a genuine issue of material fact and should be rejected.

When viewed in context, it is apparent that the ORISE Report and the expert panel report were concerned about the impact of lateral flow on spatial distribution of net infiltration. *See, e.g.*, LSN# DEN001595302, pg. 10 (an analysis of lateral flow “is necessary to quantify spatial distribution of net infiltration”); LSN# NRC000010491, pg. 3-8. Consistent with the statements in the ORISE Report and the expert elicitation panel, DOE did evaluate the effects of a variation in the location of net infiltration due runoff. SAR at 2.3.1-71 and 2.3.1-80-81. That evaluation demonstrated that spatial variability in net infiltration does not significantly affect the mean net infiltration (as calculated over the model domain), and that in any event the nonwelded Paintbrush unit located over the repository emplacement area will dampen and homogenize downward moving pulses of transient net infiltration events. SAR at 2.3.1-71 and 2.3.1-80-81. Nevada has not contested this conclusion, and therefore has not established a genuine dispute of material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada’s contention is not material. This

assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this point.

In summary, this contention does not establish a genuine dispute of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**23. NEV-SAFETY-23 - Evaluation Of Alternative Net Infiltration Models**

SAR Subsections 2.3.1.3.2, 2.3.1.3.3, and 2.3.1.3.4 and similar subsections, incorrectly compare the MASSIF net infiltration model with an alternative model using other data sets.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a

difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does

not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach

several affidavits (by Adrian P. Butler and Michael C. Thorne) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, even if the statements in this contention were embodied in an affidavit, the statements would not constitute sufficient supporting information. For example, the contention is replete with conclusory statements, such as allegations that “flaws in these comparisons exists,” “there is a fundamental problem in that the comparisons between observed and simulated responses are poor,” “large and important differences occur,” and there are “major discrepancies in the dynamics of the response.” Use of such vague terms does not provide the requisite specificity or demonstrate any noncompliance with regulatory requirements. As discussed in more detail in Section V.A.3 above, “an expert opinion that merely states a conclusion (*e.g.*, the application is ‘deficient,’ ‘inadequate,’ or ‘wrong’) without providing a reasoned basis or explanation for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion.” *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998)).

Nevada does provide a reference for one of its statements in paragraph 5 of the contention, stating that the ORISE Report (LSN# DEN001595302, pg. D-11) identifies “some” of the alleged “flaws” in the comparison of the MASSIF to the HYDRUS-1D, as set forth in the five bullets in paragraph 5 of the contention. However, of the five alleged “flaws,” the ORISE

Report discusses only the first two bullets. Indeed, the contention mischaracterizes the ORISE Report in regard to the bullets that are discussed in the ORISE Report. With respect to the first bullet (model calibration was used to fit the data to the model), the ORISE Report does not state that this is a “flaw.” Instead, it states that blind soil tests would have been optimal, but indicates that the calibration of DOE’s MASSIF model did enable it to reproduce the observed runoff and infiltration following modification of the input properties. Rather than supporting the assertion in the second bullet (treatment of boundary conditions was different in the model to those of the data), the ORISE Report states “The soil depth, which should have been modeled as very deep, was not, due to the fact that the bottom boundary condition of a lysimeter is very different from a natural soil profile.” Accordingly, the ORISE Report provides no basis for the otherwise unsupported assertion that the identified bullets are “flaws” that constitute or demonstrate a failure to satisfy 10 C.F.R. § 63.114(g) or any other regulatory requirements.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention alleges that DOE’s corroboration of DOE’s MASSIF infiltration model with the HYDRUS-1D model using lysimeter data was “flawed.” For several reasons, this contention does not establish a genuine issue of material fact.

First, the contention provides five bullets, and alleges that these bullets identify “flaws” in the comparison between MASSIF and HYDRUS-1D using data from lysimeter facilities. However, this is not the case. No regulatory shortfalls were identified or demonstrated in the bullets – but rather only vague allegations. As discussed above, the first two bullets are not “flaws,” according to the ORISE Report cited by Nevada. The third bullet (no overland flow in the lysimeter facilities), fourth bullet (no data for wetting phases at one of the lysimeter facilities), and the fifth bullet (the lysimeter facilities did not evaluate net infiltration) do not

represent or demonstrate a failure to meet the requirements of 10 C.F.R. § 63.114(g) or other applicable regulations, and do not identify any “flaws” in the comparison between MASSIF and HYDRUS-1D or defects in the comparison between MASSIF and the lysimeter data. Thus, none of the bullets indicates any regulatory shortfall with MASSIF. At most, the bullets may indicate some of the physical constraints of the lysimeter facilities. Because the five bullets do not identify any discrepancies in the outputs of MASSIF and HYDRUS-1D and do not identify any problems with the ability of the calibrated MASSIF model to predict evapotranspiration or water storage at the lysimeter facilities, the bullets do not establish a genuine issue of material fact.

Second, the purpose of the model comparison was not to evaluate the ability of MASSIF to simulate net infiltration but instead to evaluate evapotranspiration and soil water storage. SAR, at 2.3.1-77. Thus, it cannot reasonably be claimed that this comparison was “flawed” because it did not compare net infiltration. For the same reason, the alleged “flaws” also provide no basis for the assertion that the MASSIF model's estimation of net infiltration is not credible.

Finally, the contention asserts that the comparisons between the observed and simulated responses are “poor,” citing to 1) a statement on page 7-19 of LSN# DEN001575070 regarding a 40 mm difference between MASSIF and one of the lysimeter facilities during 3 months of a 5 year period, and 2) Figures 7.1.2.1-3 and 7.1.2.2-2 in LSN# DEN001575070. However, Nevada has not properly characterized these data and figures. In fact, the figures show a close comparison between MASSIF results, HYDRUS-1D results, and the lysimeter data.

Nevada’s incorrect reading of LSN# DEN001575070 does not provide an adequate basis for a litigable contention. *See Ga. Inst. of Tech.* (Georgia Tech Research Reactor, Atlanta, Ga.), LBP-95-6, 41 NRC 281, 300 (1995). As has been previously held, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion

supplies the basis for a contention.” *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998). Instead, a licensing board will examine documents to confirm that they support the proposed contentions. *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 48 (1989), *vacated in part on other grounds and remanded*, CLI-90-4, 31 NRC 333 (1990). In this case, examination of the cited documents does not support the allegations in this contention, and therefore Nevada’s allegations regarding those documents do not establish a genuine issue of material fact.

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. The contention does not assert that the alleged discrepancies result in an underestimation of net infiltration by MASSIF, and Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have on doses. In fact, the contention makes no mention of dose whatsoever. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001).

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**24. NEV-SAFETY-24 - Precipitation Data In Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections, are flawed because there are no reliable data at Yucca Mountain to quantify snowfall, and the network of precipitation gauges is inadequate to characterize the rainfall spatial distribution for modeling of infiltration.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. §

2.309(f)(1)(v) as discussed in Section V.A.3 above: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Howard S. Wheeler and Richard E. Chandler), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. As discussed in Section V.A.3 above, that approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does provide two references which date from the first half of the 1990s. Petition at 165. However, both of these documents simply report the results of precipitation monitoring performed during that period and do not present any criticism of DOE's more recent approach to modeling precipitation set forth in SAR Sections 2.3.1.3.2 and 2.3.1.3.3.

In summary, this contention does not sufficiently identify facts or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention essentially consists of two assertions: 1) DOE should have collected more data to capture the spatial and temporal distribution of precipitation, including snowfall, at Yucca Mountain, and 2) the precipitation values used in DOE's infiltration model have not been validated with a reasonable level of confidence. Neither of these assertions establishes a genuine issue of material fact.

First, it is undisputed that DOE has, in fact, collected actual precipitation data at numerous locations on and in the vicinity of the Yucca Mountain site. As discussed on page 2.3.1-9 of the SAR and Section 6.3.3.2 of the Yucca Mountain Site Description (LSN DN2002481434), site-specific data for Yucca Mountain have been collected from a meteorological network, parts of which began operating as early as 1985. The monitoring sites were established to provide representative data regarding meteorological conditions on topographically diverse settings at and around Yucca Mountain, including a location on the ridgetop of Yucca Mountain.

Second, it is also undisputed that future climate predictions have uncertainty, which makes it difficult to forecast future climates based on past climate. This is especially true of extreme precipitation years, which may not be captured by meteorological records directly. *See, e.g., SAR, at 2.3.1-31 to 32, and -37.* In order to address this uncertainty, DOE selected upper and lower bounds for the important climatic condition for each future climate state. SAR, pp. 2.31-6, -31, and -37. Nevada's contention does not allege, or otherwise provide any basis for contending, that DOE's bounds are incorrect.

The contention especially attacks what is claimed to be a lack of data on snow. As discussed SAR Section 2.3.1.3.3.2.2, DOE conducted an extended sensitivity study that included snow melt among its parameters (*see SAR Table 2.3.1-25*). As a result of this study, DOE was able to show that the uncertainty related to the parameters in SAR Table 2.3.1-25 (which includes snow melt) were not important to estimating net infiltration (none of the parameters explains more than 3% of the variance). *See SAR, at 2.3.1-75.* This contention does not contest that conclusion, and therefore does not establish a genuine dispute of material fact related to the lack of significance of snow.

Third, the present climate is predicted to last only for another 600 years, to be followed by a warmer and wetter monsoon climate for the subsequent 1400 years, to be followed by a wetter and cooler glacial transition climate for the remainder of the 10,000 years. SAR, at 2.3.1-6. This contention does not dispute that current precipitation data for Yucca Mountain are not appropriate for direct use in forecasting the precipitation for either the monsoon climate or glacial transition climate. DOE modeled these future climates using meteorological data from analogue sites, rather than from Yucca Mountain. Thus, the contention has no relevance whatsoever to DOE's future climate modeling. *See* SAR Section 2.3.1.2.3.1.2.

Finally, contrary to what the assertions in the contention might imply, DOE took steps to build confidence in its infiltration model and has validated the results of its model for the three future climates by comparing those results to the results of other models and comparable environments. This comprehensive effort is described in SAR Section 2.3.1.3.4, which covers 15 pages and cites to underlying analyses. The contention does not provide any information to contest DOE's effort let alone engage the specifics of the extensive effort.

In summary, Nevada's contention that there are no reliable data to quantify snowfall at Yucca Mountain, and that the network of precipitation gauges is inadequate to characterize the spatial distribution of rainfall, does not establish a genuine issue of material fact. DOE has demonstrated that snow melt is not important to estimating net infiltration, and therefore Nevada's assertions related to snow are not material. Furthermore, DOE has used actual meteorological data from Yucca Mountain and appropriate analogue sites. However, DOE has also acknowledged the inherent uncertainty in forecasting future climates based upon existing meteorological data, and has accounted for that uncertainty by selecting bounding values for precipitation. By using bounding values, DOE does not need additional data on snowfall or the

spatial distribution of rainfall. Nevada has not established any genuine dispute of material fact with respect to those bounding values. Therefore, this contention does not establish a genuine issue of material fact. Accordingly, it should be rejected.

**25. NEV-SAFETY-25 - Site-Specific Data In Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections contain site-specific data at Yucca Mountain that are too limited to allow for validation of the net infiltration model, and those data that are available demonstrate that performance of the model is unacceptably poor for infiltration modeling.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention asserts that the site-specific data are too limited to allow for validation of DOE's MASSIF infiltration model, and that the data that are available demonstrate that the performance of the model is unacceptably poor. In other words, Nevada appears to contend that the validity of DOE's MASSIF infiltration model must be assessed against site-specific data. For the reasons discussed below, this contention does not establish a genuine issue of material fact.

First, contrary to the contention, 10 C.F.R. § 63.114 does not require DOE to use only site-specific data to validate a model. Rather, 10 C.F.R. § 63.114(g) states that DOE must:

Provide the technical basis for models used in the performance assessment such as comparisons made with outputs of detailed process-level models *and/or* empirical observations (e.g., laboratory testing, field investigations, and natural analogs). (Emphasis added).

Indeed, there is nothing in § 63.114(g) that would prohibit DOE from using a wide range of information to validate a model - - in fact, such an approach is explicitly allowed. Section 63.114(g) permits DOE to validate a model without the use of any site-specific data.

As is permitted by Section 63.114(g), DOE used a variety of information to validate the MASSIF infiltration model. In addition to site-specific information, DOE compared MASSIF against other models, net infiltration estimates for other locations in the western United States (including Nevada), and the results of the HYDRUS-1D model. *See* SAR Section 2.3.1.3.4.2. To the extent that Nevada is contending that DOE must use only site-specific data to validate MASSIF, its contention constitutes an impermissible challenge to 10 C.F.R. § 63.114(g). *See Fla.. Power & Light Co.*, LBP-01-6, 53 NRC at 159, *aff'd on other grounds*, CLI-01-17, 54 NRC

3 (contentions that advocate stricter requirements than agency rules impose constitute an impermissible challenge to the regulations).

Second, the contention asserts that there is uncertainty in the site-specific data, and uncertainty in the results of the MASSIF model, especially with respect to the spatial distribution of net infiltration. The existence of uncertainty is not sufficient grounds, in and of itself, for rejecting the MASSIF model or the output of the model. As provided in 10 C.F.R. § 63.102(h):

Although there is an extensive geologic record ranging from thousands to millions of years, this record is subject to interpretation and includes many uncertainties. . . . The performance assessment provides an evaluation of the repository performance based on credible models and parameters including the consideration of uncertainty in the behavior of the repository system.

Thus, uncertainty is anticipated and permissible, provided that the TSPA accounts for the uncertainty. This contention does not allege that MASSIF has not properly accounted for the uncertainty. Therefore, to the extent that Nevada is contending that the MASSIF model is unacceptable because there is some uncertainty in the manner in which it models particular conditions, the contention constitutes an impermissible challenge to 10 C.F.R. § 63.102(h).

Third, the specifics of Nevada's allegations regarding the ability of MASSIF to model runoff in the Upper Split Walsh and other washes do not establish a genuine issue of material fact regarding the adequacy of MASSIF. Indeed, as shown in what follows, Nevada repeatedly misconstrues or mischaracterizes the information it cites as support for its contention. For instance, Nevada's Petition at 169 and 170 cites to a 2000 report of an NRC contractor regarding modeling of the Upper Split Wash. However, even a cursory reading shows that this report does not pertain to MASSIF. As the first two sentences makes clear:

The purpose of this report is to provide an independent analysis of run-off and shallow infiltration estimates used by the U.S. Department of Energy (DOE) in their performance assessment of a proposed repository at Yucca Mountain (YM), NV. The DOE uses a run-off and shallow infiltration model developed by the U.S. Geological Survey (USGS).

(LSN# NRC000027373 at iii.). The MASSIF model replaced the USGS infiltration model which is the subject of the cited report.

Similarly, Nevada's Petition at 170-71 contends that monitoring data are inadequate to characterize precipitation and temperature and therefore that validation using streamflow is indeterminate, citing to a DOE report (LSN# DEN001575070) for support. However, that report does not state what Nevada asserts that it states. Instead, the DOE report states that a "comprehensive knowledge" of precipitation and temperature does not exist and, despite the uncertainty in weather data, the MASSIF model is able to produce fairly good calculations of daily runoff in the Upper Split Wash. LSN# DEN001575070, pg. 7-35.

Again, citing to DOE's report in LSN# DEN001575070, Nevada's Petition at 170-71 asserts that the runoff data for Upper Split Wash are "incredibly limited" and do not include any events equivalent to the 100-year return event. However, Nevada misconstrues the purpose of the data. Contrary to Nevada's suggestion, DOE was not attempting (and was not required) to provide comprehensive runoff data for 100 years for Upper Split Walsh. Instead, DOE was providing several years of runoff data in order to compare that data against simulations by MASSIF. DOE determined that MASSIF correctly predicted the timing and magnitude of the runoff. SAR, at 2.3.1-80; LSN# DEN001575070, pg. 7-48. Nevada has not disputed that conclusion.

Citing to Figure 7.1.3-15 of DOE's report in LSN# DEN001575070, Nevada's Petition at 171 asserts that MASSIF's simulated streamflows appear to be an order of magnitude greater than those observed, and that for the largest observed runoff no flow is simulated. However, Nevada has taken that figure out of context. While that figure does show some discrepancies, all of the other figures (Figures 7.1.3-5, 7.1.3-6, 7.1.3-9, 7.1.3-11, 7.1.3-12, 7.1.3-14) show generally good agreement, thereby supporting the conclusions in SAR, at 2.3.1-80 and LSN# DEN001575070, pg. 7-48, that MASSIF correctly predicted the timing and magnitude of the runoff. Accordingly, none of the references Nevada cites establishes a genuine issue of material fact regarding the adequacy of MASSIF.

Based upon DOE's Report LSN# DEN001575070 and the ORISE Report (LSN# DEN001595302), Nevada's Petition at 171-72 states that assumptions related to soil conductivity affect the calculation of streamflow and the spatial distribution of net infiltration (*i.e.*, the amount of net infiltration at specific locations, as distinct from the mean net infiltration). However, the SAR at 2.3.1.-71 and 2.3.1-80 and 81 explicitly acknowledges that the spatial distribution of net infiltration is sensitive to assumptions related to soil conductivity. Therefore, this assertion by Nevada does not establish any dispute on a genuine issue of material fact.

Furthermore, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. The primary challenge posed in this contention is that "there may be considerably more uncertainty as to where net infiltration is occurring than is represented by 40 realizations used to characterize infiltration uncertainty analysis." Petition at 172. Yet, Nevada has not asserted that DOE has not accounted

for or assessed uncertainty as required by regulation. Rather, Nevada asserts that the bound of uncertainty may be wider than DOE has estimated. This is not sufficient to show a genuine dispute of material fact.

Nevada also has made no attempt to determine or estimate what effect, if any, acceptance of their contention, including increased levels of uncertainty, and spatial variability of net infiltration, would have on mean net infiltration or doses. In fact, the contention makes no mention of dose whatsoever. In contrast, DOE did evaluate the importance of spatial variability. That evaluation shows that spatial variability in net infiltration does not significantly affect the mean net infiltration and that, in any event, the nonwelded Paintbrush unit above the repository emplacement area will dampen and homogenize downward moving pulses of transient net infiltration events. SAR, pp. 2.3.1-71 and 2.3.1-80-81. Nevada has not contested this conclusion, and therefore, has not established a genuine issue of fact regarding the materiality of spatial variability of net infiltration. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Thus, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. Because Nevada has not met its burden of establishing genuine issue of material fact, the contention should be rejected.

**26. NEV-SAFETY-26 - Soil Properties Data In Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections fail to properly characterize model net infiltration because data to characterize soil depth and hydraulic properties are limited and thus have no credibility for use in infiltration modeling.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Based upon statements from the DOE's infiltration model document (LSN# DEN001575070) and the ORISE Report (LSN# DEN001595302), this contention states that data used to characterize soil depth and hydraulic properties are limited and that these parameters are important to spatial distribution of net infiltration. Based upon this statement, the contention asserts that the net infiltration modeling has no credibility. For several reasons, this contention does not establish a genuine issue of material fact.

As an initial matter, there is no dispute that the data on soil depth and hydraulic properties are limited, or that those parameters are important (especially the soil depth for class 4 soil). In fact, the contention quotes DOE's own report for this proposition. Furthermore, the license application repeats those statements. *See, e.g.*, SAR at 2.3.1-46, -72. The contention also criticizes the pedotransfer of hydraulic conductivity data from Hanford to Yucca Mountain, stating that the soils at Hanford are different from those at Yucca Mountain. However, once again, the license application also states that the pedotransfer function introduces uncertainty. *Id.* Thus, there is no dispute regarding the underlying facts. Any dispute, therefore, is limited to the implications of those facts.

However, Nevada provides no basis whatsoever to support its conclusion that limited soil data means that the infiltration modeling has no credibility. Indeed, this baseless conclusion is contradicted outright in the license application. Not surprisingly, the contention ignores entirely those portions of the license application. As discussed below, the SAR examines the uncertainty that arises from the limited data, and importantly, demonstrates that these limitations have been conservatively accounted for in DOE's infiltration model. Nevada has not contested DOE's assessment and conclusions in the SAR as listed below:

- “The use of the Hanford soil property database is likely to be conservative because the field capacity of the Hanford soils is less than the field capacity reported for Nye County soils, which are likely to be more representative of site-specific soils than Hanford soils (BSC 2006a, Section 6.4.6, Figures 6-20 and 6-21).” SAR at 2.3.1-46.
- “[A] uniform distribution for soil depths between 0.1 m and 0.5 m was selected to represent uncertainty in the upscaled quantity used to represent an effective uniform value of soil depth class 4. This range does not represent the spatial variability of soil depth class 4 (which would have a range of 0 to 3 m). This approach ensures that soil depth is not overestimated (and, therefore, net infiltration is not underestimated because the selected range is large for an upscaled uniform value, and has a bias towards shallower soil depths) (SNL 2008a, Section 6.5.2.4.1[a]).” SAR at 2.3.1-47
- Uncertainty analyses found that soil conductivity does have an effect on spatial distribution of net infiltration. That evaluation also shows that spatial variability in net infiltration does not significantly affect the mean net infiltration. In any event, as discussed in SAR Section 2.3.2.2.1.2, the presence of the nonwelded Paintbrush unit above the repository emplacement area will effectively dampen and homogenize downward moving pulses of transient net infiltration events. SAR at 2.3.1-71, 2.3.1-80-81, and 2.3.1-91.
- Because DOE’s MASSIF model conservatively treats parameter uncertainty such as soil depth, “most of the comparable net infiltration (or recharge) models generally predict less infiltration than MASSIF (Section 2.3.1.3.4.2.2).” SAR at 2.3.1-91.

DOE has agreed that there is uncertainty on soil depth and conductivity, and that this in turn leads to uncertainty on spatial distribution of net infiltration. Thus, there is no dispute

regarding the underlying facts. However, DOE has also demonstrated that it has treated the former uncertainties in a conservative manner, and that the latter uncertainty is not important to performance of the repository. Because this contention does not dispute or even address those conclusions, it does not establish a genuine issue of material fact. As other licensing boards have previously held, a contention that does not directly controvert a position taken by the applicant in the application is subject to dismissal. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 18, 29, 39-40, 42; *Tex. Util. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992). Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

Finally, as discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this failure. Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have on net infiltration, let alone doses to the RMEI. In fact, the contention makes no mention of dose whatsoever. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). It is Nevada's burden to show that its contention raises an issue that is material to this proceeding, and it has not satisfied its burden with respect to this contention.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**27. NEV-SAFETY-27 - Rock Properties Data In Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections fail to provide adequate data to characterize the spatial distribution of rock properties at the soil-rock interface making it impossible to undertake infiltration modeling that is adequate for assessment purposes.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a

difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does

not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's

supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Adrian P. Butler, Howard S. Wheater) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention makes three assertions related to DOE's modeling of rock properties: "(a) major faults, which are potentially important preferential flow paths, are not represented; (b) uncertainties in the mapping of the rock units are not quantified or analyzed, and (c) data are inadequate to characterize the bulk rock hydraulic properties." As discussed below, none of these assertions establishes a genuine issue of material fact.

Nevada's contention that DOE has not accounted for faults does not properly characterize the license application and the supporting documents. Table 2.3.1-1 of the SAR, at 2.3.1-102, explicitly states that the infiltration model includes heterogeneities in rock properties, including faults. Similarly, LSN# DEN001575070, pg. 6-92 states that the infiltration model includes bedrock types with differing hydrogeologic properties and conductivities. Furthermore, although the contention cites to page 6-93 of LSN# DEN001575070 as support, that page does not state that faults were not considered. Instead, it simply states that each cell was generalized based upon the properties of the center point of the cell, and that such generalization is acceptable given that the model contains over 250,000 cells. Thus, the application does not state what the contention purports, and therefore Nevada's contention regarding this aspect does not establish a

genuine issue of material fact. As stated by another licensing board, a petitioner's imprecise reading of a document cannot be the basis for a litigable contention. *Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995).

DOE also accounted for the affects of faults in the assessment of bedrock permeabilities. DOE recognized that fracture density generally increases near faults. Therefore, the fracture volume fraction potentially increases near faults. Because fracture data from underground mapping have been collected near faults, an increase in fracture density resulting from faults is included with the fracture-volume-fraction calculation for bedrock permeabilities. See [LSN# DN2002289082](#), page 6-63.

Nevada also contends that uncertainties in the mapping of the rock units have not been quantified or analyzed, because the model did not cover areas on the northern, eastern, and southern edges of the model area, but instead assigned those areas as a single rock type, unit 405. The contention provides no citation for its characterization of DOE's model. DOE assumes that Nevada is referring to page 6-93 of [LSN# DEN001575070](#), which states that the north, east, and south edges of the model are alluvium (infiltration hydrologic units (IHU) 490 and 491), and that the conductivity value of these units is assigned the value for bedrock unit 405. As described in [LSN# DN2002289082](#), page 6-22, IHU 490 represents alluvium/colluvium, while IHU 491 represents basin-fill sediments, undivided and caldera moat-filling sediments, which overlie bedrock. Extrapolation from the area covered by the geologic framework model suggests that most of this alluvium is predominantly underlain by the Tiva Canyon Tuff (IHUs 403 and 405) with IHU 405 more likely in the shallower alluvial areas. It was therefore recommended that the saturated hydraulic conductivity value for IHU 405 be used as the bedrock saturated hydraulic conductivity value for areas mapped as IHUs 490 and 491. [LSN#: DN2002289082](#), page 6-24

and Table 6-3a. In addition, as shown on page 6-95 of LSN# DEN001575070, units 490 and 491 collectively represent 3% of the total cells in the region (plus are on the edge of the modeled area). Given this information, Nevada has not provided a sufficient reason to believe that the conductivity values for units 490 and 491 are important to net infiltration.

Furthermore, as is discussed in more detail in response to NEV-SAFETY-28, DOE has performed sensitivity analyses with respect to the conductivity of bedrock units and these demonstrated that the uncertainty associated with bedrock conductivity is not important. Nevada has not contested this conclusion. Therefore, Nevada's assertions are not sufficient to establish a genuine issue of material fact.

Nevada also contends that the data are inadequate to characterize the bulk rock hydraulic properties, citing to page 6-97 of LSN# DEN001575070 for the proposition that few data are available to quantify the proportion of fractures that are unfilled or their hydraulic aperture. However, Nevada has lifted this statement out of context and exaggerates its importance. The complete statement on pages 6-97 and 6-98 of this report states:

Few data are available to quantify either the proportion of fractures that are unfilled or the hydraulic aperture to characterize them. Reasonable values may be inferred from the sources identified in Data Simulation of Net Infiltration for Present-Day and Potential Future Climates Analysis for Infiltration Modeling: Bedrock Saturated Hydraulic Conductivity Calculation (BSC 2006 [DIRS 176355], Section including the Alcove 1 infiltration test (DTN: MO0605SPAFABRP.004 [DIRS 180539]), and analysis of fracture air-permeability data and fracture frequency data described in Data Analysis for Infiltration Modeling: Bedrock Saturated Hydraulic Conductivity Calculation (BSC 2006 [DIRS 176355]). Figure 6.5.2.6-2 shows a comparison of bedrock saturated hydraulic conductivities calculated using 100- $\mu\text{m}$  and 200- $\mu\text{m}$  aperture fractures for 10%, 50%, and 100% of fractures, and saturated hydraulic conductivities for completely filled fractures, and completely open fractures (data from air permeability measurements). Error bars are included for the plots of completely filled versus completely open fractures. In addition, the inferred

saturated hydraulic conductivity from the Alcove I test (DTN: MO0605SPAFABRP.004 [DIRS 180539]) is included in this figure. Note that the Alcove I data point is approximately halfway between the filled fracture, and the 200- $\mu\text{m}$  aperture fracture saturated hydraulic conductivities. Based on these values, the upper bound of bulk bedrock has been calculated based on the consideration of an additional 200- $\mu\text{m}$  hydraulic aperture with all fractures.

Thus, DOE accounted for the uncertainty associated with unfilled fractures by assigning a bounding value. Nevada has not contested that bounding value, or provided any reason to believe that it is inappropriate. Therefore, Nevada has not established a genuine issue of material fact.

Finally, Nevada has made no attempt to determine or estimate what effect, if any, acceptance of its contention would have on net infiltration or doses. In fact, the contention makes no mention of dose whatsoever. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Thus, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. It has not done so with respect to this contention.

For all of these reasons, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**28. NEV-SAFETY-28 - Net Infiltration Model Rock Properties Uncertainty Analysis**

The uncertainty analysis in SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections is invalid because it uses an arbitrary criterion to exclude from consideration 70 percent of the area of interest.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the

contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Richard E. Chandler, Howard S. Wheeler, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention criticizes DOE's uncertainty analysis of its infiltration model, stating that it encompassed the hydraulic conductivity of rock units 405 and 406, but not other rock units that individually accounted for less than 15 percent of the modeled area but collectively accounted for 70 percent of the modeled area. For the reasons discussed below, this contention does not establish a genuine dispute of material fact.

First, the contention mischaracterizes DOE's application. The contention refers to the initial detailed analysis of parameter uncertainty performed by DOE, which screened certain parameters that applied to less than 15% of the area of interest. However, in addition to that analysis, DOE also performed an extended parameter sensitivity study during model development (*see* LSN DEN001575070, Section 7.1.4). The purpose of the extended parameter sensitivity study was specifically to confirm that screening processes and criteria had not inadvertently excluded parameters that could significantly influence mean net infiltration (*see* SAR Section 2.3.1.3.3.2, "Consideration of Uncertainty in the Infiltration Model"). This

extended parameter sensitivity study included every rock type that represents 3% or more of the total cells in the infiltration model (and which, in the aggregate, represent over 90% of the modeled cells). LSN# DEN 001575070, pp. 6-95 and 7-69. Specifically, LSN# DEN 001575070, page 7-67 states that rock units 401-408, 412, 414, and 418 were evaluated in the extended sensitivity study, LSN# DEN 001575070, page 6-95 shows that these rock units comprise more than 90% of the cells that were modeled in the infiltration model (*i.e.*, the UZ grid cells). In short, contrary to the contention, DOE did not arbitrarily exclude rock types from consideration in the uncertainty analysis. In fact, DOE conducted extended parameter sensitivity studies on rock units, comprising more than 90% of the cells within the infiltration model as an integrated part of DOE's confidence building activities related to parameter uncertainty analysis conducted during model development.

Second, the extended sensitivity study varied 42 parameters and confirmed the results of the initial parameter screening. In particular, the study showed that two input parameters (Soil depth of Soil Depth Class 4 and Holding Capacity of Soil Group 5/7/9, both of which are unrelated to rock units), account for approximately 80% of the variance. The study also demonstrated that each of the screened parameters explains less than 3% of the variance and therefore is not important for estimating mean net infiltration. *See* SAR, at 2.3.1-75; LSN# DEN 001575070, pg. 7-69. Therefore, the extended parameter sensitivity study has demonstrated that the other rock units are not important to net infiltration, and Nevada has not contested that study. As a result, the contention does not establish a genuine issue related to a material fact.

Finally, the contention is also deficient because the issue addressed is solely whether DOE has fully accounted for the uncertainty in hydraulic conductivity of certain types of rock. Petition at 183. This does not satisfy Nevada's burden to show that its proposed contention

meets the requirements in 10 C.F.R. § 2.309(f). Nevada has not attempted to determine what effect, if any, an increase in uncertainty would have on net infiltration, let alone the ultimate dose to the RMEI. Indeed, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada’s contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. See Section V.A.3 of the Answer for a more detailed discussion of this point.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**29. NEV-SAFETY-29 - Spatial Variability Of Soils And Vegetation In Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections use an invalid analysis because they improperly aggregate data on soils and vegetation and therefore fail to account properly for spatial variability resulting in inappropriate modeling of the amount and spatial distribution of infiltrating water.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." Petition at 187. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the

findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada's position is that DOE's infiltration model aggregates data on soils and vegetation and does not properly account for their spatial variability, and that these assumptions affect average net infiltration and its spatial distribution. For several reasons, this contention does not establish a genuine issue of material fact.

First, there is no dispute that DOE has combined 40 map units into four soil group units.<sup>57</sup> In fact, the contention quotes DOE's own report for this proposition. Furthermore, the license application repeats those statements. *See, e.g.*, SAR, pp. 2.3.1-45 and 46. Similarly, there is no dispute that DOE used a single maximum rooting depth for each climate state,<sup>58</sup> and used a single mean plant height. *See, e.g.*, SAR at 2.3.1-50 to -51; LSN# DEN001575070 at 6-112, 6-115 to -116. Thus, there is no dispute regarding the underlying facts. The dispute relates to the implications of those facts.

With respect to Nevada's assertions related to soil, the contention is little more than a repeat of NEVADA-SAFETY-26 regarding variations in soil depth and conductivity. In fact, this contention actually repeats the same quotation from LSN# DEN001575070, page 6-18 and refers to the same page V of the ORISE Report that is provided in NEVADA-SAFETY-26 regarding soil depth and conductivity. Petition 187-88. For the reasons discussed in our response to NEVADA-SAFETY-26, Nevada's assertions related to variations in soil depth and conductivity do not establish a genuine issue of material fact. In particular, this contention does

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<sup>57</sup> Nevada's Petition at 187-88 also asserts that for each simulation uniform soil depth is assumed for each soil unit. This assertion does not accurately characterize the LA. As discussed on page 2.3.1-46 of the SAR, five different soil depth classes were used. Thus a soil unit (which refers to the type of soil) can have different soil depth classes, depending upon location.

<sup>58</sup> Although DOE used a maximum root depth, the actual root depth was specified to be the depth of the soil, when the soil depth was less than the root depth. *See* SAR at 2.3.1-51.

not contest that DOE's MASSIF infiltration model conservatively treats parameter uncertainty such as soil depth, that spatial variability in net infiltration does not significantly affect the mean net infiltration, and that the nonwelded Paintbrush unit above the repository emplacement area will dampen and homogenize downward moving pulses of transient net infiltration events. SAR, at 2.3.1-71, 2.3.1-80 to -81, and 2.3.1-91. As a result, there is no dispute that DOE's infiltration model conservatively accounts for the variability in soil depth and conductivity.

Similarly, DOE has also accounted for variations in root depth and vegetation height. SAR at 2.3.1-50 to 51 and LSN# DEN001575070, pages 6-112, 6-115 to 116. As discussed in SAR Section 2.3.1.3.3.2, DOE performed sensitivity analyses using a range of root depths and plant heights. Based upon those sensitivity analyses, DOE determined that such parameters account for only a small percent of the variance and are not important in estimating mean net infiltration. SAR at 2.3.1-73 to 75. This contention does not contest those conclusions or otherwise provide any information that is inconsistent with those conclusions. As other licensing boards have previously held, a contention that does not directly controvert a position taken by the applicant in the application is subject to dismissal. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 18, 29, 39-40, 42; *Tex. Util. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. As noted above, this contention suffers from this failure. In fact, the contention does not even allege that net infiltration would be increased if greater consideration were given

to variations in soil depth and conductivity, plant root depth, or plant height. Instead, it only alleges that such consideration “would be expected to widen the range of estimates of infiltration.” Petition at 188. Since the contention does not dispute that DOE’s estimate of mean net infiltration is conservative, it does not establish a genuine issue of material fact.

Further, Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have on doses. In fact, the contention makes no mention of dose whatsoever. The petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada’s contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**30. NEV-SAFETY-30 - Temporal Variability In Precipitation In Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections use an invalid analysis because the net infiltration modeling fails to represent correctly the temporal variability of precipitation, and hence the magnitude and spatial distribution of net infiltration is incorrect.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the

most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Richard E. Chandler, Howard S. Wheeler, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does cite a report prepared by an NRC contractor in 2000 for one of its statements in paragraph 5 of the contention: "smoothing of rainfall intensities ... may lead to errors ...." However, even a cursory reading of this report demonstrates it is inapplicable to the contention. Indeed, the first page of text of the report states:

The purpose of this report is to provide an independent analysis of run-off and shallow infiltration estimates used by the U.S. Department of Energy (DOE) in their performance assessment of a proposed repository at Yucca Mountain (YM), NV. The DOE uses a run-off and shallow infiltration model developed by the U.S. Geological Survey (USGS).

LSN# NRC000027373 at iii. DOE used the MASSIF infiltration model, not the USGS infiltration model to estimate net infiltration in the license application. In addition, Nevada uses this reference merely to support the assertion that smoothing of rainfall intensities may lead to errors. Yet, the subject of the contention is the time steps used in DOE's infiltration model, and that topic is not addressed in the cited page of this reference, which examines the impact of the duration of rainfall on the USGS model (id. at 1-4), again, which was not even used in the license application.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention asserts that the use of daily time steps in DOE's infiltration model leads to incorrect results because it smoothes the temporal variability of the precipitation. For several reasons, this contention does not establish a genuine dispute of material fact.

First, Nevada's assertion that DOE's infiltration model uses only daily time steps is incorrect and mischaracterizes the license application. In fact, in addition to using sub-daily estimates of precipitation as the contention concedes, the DOE infiltration model uses time steps less than 24 hours to account for the duration of the precipitation. This is discussed on page 6-29 of LSN# DEN001575070 (which is one of the pages cited in the contention):

On days with precipitation events with durations less than 24 hours, the water redistribution calculation is conducted twice. First, the calculation is conducted for the duration equal to the precipitation event duration. It is during this calculation that water is added to the top of the cell. In the second calculation, if there is water in excess of field capacity in the bottom layer, it has the opportunity to enter the bedrock during the remainder of the day at a rate limited by the rock hydraulic conductivity. During this calculation, the duration is the difference between a full day and the precipitation event duration.

The contention appears to recognize that allowance is made for sub-daily rainfall, but then states then states that the model uses "an average storm duration [that] smoothes the extreme temporal variability," and further alleges that this temporal smoothing is not addressed in the model parameterization. Petition at 191 and 192. This allegation also mischaracterizes DOE's model. As discussed in more detail in our response to NEVADA-SAFETY-34, DOE did not use an average duration for rainfall but instead varied the duration and amount of the rainfall, plus accounted for uncertainties in the duration and amounts. As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of

material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op. at 39) (Sept. 12, 2008).

Second, the contention simply alleges that DOE's net infiltration results are incorrect - - it does not allege that the results are not conservative. Importantly, even if Nevada's allegations were accepted as true (which they are not), Nevada has not contended that use of shorter time steps would increase the amount of net infiltration to an unacceptable level and what that level may be. In fact, use of shorter time steps is just as likely to result in greater runoff, with reduced net infiltration. As stated in the SAR at 2.3.1-43, "very extreme rainfall events are likely to result in significant overland flow and runoff, and will not greatly affect net infiltration." Similarly, as noted on page 2.3.1-70 of the SAR: "For example, annual precipitation may be very high because of an especially high amount of precipitation occurring on a single day. In such a case, runoff would tend to be higher and net infiltration lower than if several days during the year experienced large amounts of precipitation, but the annual total was less...." Because Nevada has not demonstrated that shorter time steps will increase net infiltration rather than merely increasing runoff, it has not established a genuine issue of material fact. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada’s contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**31. NEV-SAFETY-31 - Calibration Of Net Infiltration Model**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections reveal that the MASSIF net infiltration model is invalid because it requires calibration yet has not been and cannot be properly calibrated for present-day conditions.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and

(3) the contention does not reference any expert opinion. Nevada's Petition attaches several affidavits (by Adrian P. Butler and Howard S. Wheeler) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, even if the statements in this contention were embodied in an affidavit, the statements would not constitute sufficient supporting information. For example, three of the bullets on page 196 of Nevada's petition provide no reference for their characterization of the MASSIF model. Furthermore, the contention is replete with conclusory statements, such as allegations that "the model is based upon crude approximations," there is "no proper attention to parameter up-scaling," "the implications of the use of simplified soil physics for recharge estimation have not been properly addressed," and "appropriate analysis of aggregation effects has not been carried out." As discussed in more detail in Section V.A.3 above, "an expert opinion that merely states a conclusion (*e.g.*, the application is 'deficient,' 'inadequate,' or 'wrong') without providing a reasoned basis or explanation for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion." *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added) (quoting *Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998)).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention refers to statements in DOE's supporting report on the MASSIF infiltration model (LSN# DEN001575070) and the ORISE Report (LSN# DEN001595302) that describe various simplifications in MASSIF, and then asserts that such simplifications are invalid because they have not been calibrated against site-specific data. For several reasons, this does not establish a genuine issue of material fact.

The NRC has recognized the appropriateness for models used to estimate post-closure performance of the Yucca Mountain Repository to utilize simplified assumptions, and therefore, that in and of itself, is not a basis for criticizing the model. As stated in NUREG-1804, "Yucca Mountain Review Plan," pg. 2.2-2:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use conservative assumptions to simplify its approaches and data collection needs.

The Commission recognized this decades ago in the context of simplified dose calculations:

Mathematical models describing the various sequences of natural phenomena which relate releases of radioactive material to radiation dose vary in detail and complexity. This was frequently observed in the hearing. Through circumstances peculiar to his case, one applicant may be able to present to the Regulatory Staff adequate support for his proposal through the use of simple models and conservative parameter values, while another applicant cannot prove his case so easily. There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements. The use of the simpler procedure may, however, introduce a wider range of uncertainty in estimated doses than a more complicated analysis. Hence the proper choice of parameter values for a simple calculation might be more conservative than values appropriate for a more precise calculation.

*Rulemaking Hearing - - Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as Practicable" for radioactive material in Light-Water-Cooled Nuclear Power Reactor Effluents, CLI-75-5, 1 NRC 277, 339 (1975).*

Thus, simplified calculational methods are appropriate provided that they are conservative. As discussed below, the SAR provides ample discussion on the conservative nature of DOE's simplifying assumptions which the contention ignores. Accordingly, there is no legal or factual basis for Nevada's contention that MASSIF is inappropriate because it uses simplified methods.

The simplified assumptions regarding soil depth, soil water holding capacity, and bedrock conductivity, and the assumptions that there are no mechanisms to remove water from bedrock such as plant roots, used by the MASSIF infiltration model provide for a conservative assessment of net infiltration. *See* SAR at 2.3.1-91. This contention does not allege, or provide any basis for alleging, that these assumptions are not conservative. Therefore, Nevada has not provided an adequate basis for contesting these simplifying assumptions in MASSIF. *See also Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_

(Sept. 12, 2008), slip op. at 18, 29, 39-40, 42; *Tex. Util. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992) (a contention that does not directly controvert a position taken by the applicant in the application is subject to dismissal.)

Furthermore, Nevada's contention that MASSIF must be, but has not been, calibrated against site-specific data is factually baseless. Sensitivity studies were conducted to validate the hydrologic processes of run-on and run-off in the MASSIF model by comparison of measured streamflow data with MASSIF predictions of runoff (streamflow) at discharge cells at the base of streamflow watersheds. *See* Section 7.1.3 of LSN# DEN001575070. Furthermore, comparison of net infiltration uncertainty results with net infiltration estimates from other sites in the region provides confidence that the range of net infiltration predicted by the model is reasonable and likely conservative. Additionally, calibration techniques were applied to several of the model input parameters to MASSIF. For example, as discussed in Section 6.5.3.7 of LSN# DEN001575070, the relationship between the Normalized Difference Vegetation Indices (NDVI) measured at the site was calibrated to the transpiration coefficients calculated from site-specific vegetation data. In another example, site-specific precipitation data was used to calibrate a precipitation lapse rate that is used to distribute precipitation across the modeling domain (Appendix F of LSN# DEN001575070). Thus, Nevada has not accurately characterized DOE's actions to calibrate MASSIF.

Additionally, there is no regulatory requirement that a model be calibrated using site-specific data, and Nevada has not contended otherwise. Furthermore, site-specific data, such as runoff has been used to validate elements of MASSIF. *See* SAR, pp. 2.3.1-79 to 81. And, as described more generally in SAR Section 2.3.1.3.4.1, DOE conducted various other activities

while developing the MASSIF model that were designed and intended to build confidence in the model.

Notably, in addition to the calibration and confidence building activities performed during model development, DOE also performed post-model development validation. These activities included comparisons of the model results with data from comparable environments. *See* SAR Section 2.3.1.3.4.2. This validation provides additional assurance that the model is producing conservative results.

Finally, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This is precisely what Nevada has done in this contention. Although it is alleged that the MASSIF results “have no validity,” Nevada neither alleges nor provides any basis with which to assess whether the results over-, or under-estimate net infiltration. Petition at 196. Indeed, Nevada does not allege that additional calibration of MASSIF with site-specific data would result in any change in the calculated values of net infiltration, let alone an increase in net infiltration. Similarly, Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have on doses. In fact, the contention makes no mention of dose whatsoever. As result, Nevada has not established that its allegations would have any material effect on the results of DOE’s calculations.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**32. NEV-SAFETY-32 - Use Of Initial Conditions In Net Infiltration Model**

SAR Subsection 2.3.1.3.3 and similar subsections fail to properly estimate net infiltration because they use an incorrect procedure, in which initial conditions are reset each year, and as a result, the model underestimates the effects of wet years and underestimates net infiltration.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. As discussed below, this contention suffers from this infirmity.

The MASSIF infiltration model used by DOE reset the initial conditions each modeled year to dry soil moisture conditions. Quoting from the ORISE Report, LSN# DEN001595302, pg. D-14, Nevada asserts that this approach “is neither physically appropriate nor conservative” for exceptional years.<sup>59</sup> Petition at 199. The contention then states that this approach “is incorrect, because it is likely to underestimate net infiltration following a wet year.” *Id.* Even if these statements were to be accepted as true, they do not establish a genuine issue of material fact.

DOE conducted simulations to investigate the effect, if any, of the MASSIF model's resetting of initial conditions annually on October 1, which corresponds to the start of the water year implemented in MASSIF. Use of a water year more naturally captures the cycle of winter precipitation and annual plant growth that is generally senescent in the Yucca Mountain environment during late summer. To evaluate the significance of the assumption regarding initial soil moisture content for each simulated water year used in MASSIF, DOE ran simulations using a higher initial soil moisture content which would account for the possibility that the soil has more residual moisture content at the start of the MASSIF model simulation due to precipitation occurring at the very end of the prior year. DOE's analysis demonstrated that the

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<sup>59</sup> Nevada does not quote the full passage from this page of the ORISE Report, which states that “For most years, this assumption is likely valid.”

effects of the higher initial soil moisture content on net infiltration uncertainty are minor, not only for the present day climate, but also for the future, wetter, glacial-transition and monsoon climates. SAR at 2.3.1-69, and Figs. 2.3.1-17, 2.3.1-18, and 2.3.1-19.

Nevada cites the ORISE Report for the proposition that sequentially wet climate years “may not have been realistically simulated” by the approaches of MASSIF (LSN# DEN001595302, pg. D-15). Importantly, however, the ORISE Report does not conclude that these approaches underestimated net infiltration. Indeed, the Report opined merely that DOE's study may not “best represent the impact of sequential climate years ....” *Id.* at D-14. Thus, neither the ORISE Report nor the contention provides any basis for concluding that the alternative runs performed by DOE materially underestimate the net infiltration.

Without any support for its contention, Nevada is essentially requesting that the Licensing Board infer that this issue has a material impact on net infiltration. But, as a licensing board stated in another proceeding:

However, it is the petitioner who is obligated to provide the analyses and expert opinion showing why its bases support its contention. It has not done so and the Board may not make factual inferences on petitioner's behalf.

*Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 305 (1995).

Furthermore, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada's contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to

show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this point.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**33. NEV-SAFETY-33 - Approach To Estimating Percolation**

SAR Subsection 2.3.1.3.3 and similar subsections use a model to estimate infiltration to depth that is invalid.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a

difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does

not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application

and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Adrian P. Butler, Michael C. Thorne, and Howard S. Wheeler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada does rely on a document, other than the license application and DOE's description of its infiltration model, as support for one assertion, namely that an infiltration model based on field capacity "has been severely criticized." Petition at 203. The entirety of Nevada's support for this statement is three sentences from a 171-page report which represent a separate view of a single member of an expert elicitation panel. Moreover, the statements fail to provide any objective information. Rather, they are conclusory in the extreme. This is precisely the type of "expert opinion" that the Commission has repeatedly rejected as inadequate: "an expert opinion that merely states a conclusion (e.g., the application is 'deficient,' 'inadequate,' or 'wrong') without providing a reasoned basis or explanation for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion." *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998)).

The remaining statements in paragraph 5 of the contention suffer from the same defect. For example, Nevada criticizes the MASSIF model used by DOE, stating that the use of

“duration” in calculating percolation “is incorrect,” “has no physical basis,” “is arbitrary,” and has “no justification.” However, the contention provides no reasoned basis or explanation for such conclusions. Therefore, the contention is not properly supported and should be rejected pursuant to 10 C.F.R. § 2.309(f)(1)(v).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes the use of the field capacity concept and “duration” in DOE’s MASSIF infiltration model. For several reasons, this contention does not establish a genuine dispute of material fact.

Nevada’s criticism that the field capacity concept and duration are not physically based and are “arbitrary” is not consistent with the explicit definition of those terms in the same DOE document Nevada cites as support. As stated in LSN# DEN001575070, pg. 6-9, “Field capacity for a given soil layer is the amount of water that the soil can hold without significant gravity draining occurring.” Additionally, as provided on page 6-27 of LSN# DEN001575070, “duration” refers to the duration of precipitation.

In this regard, page 5-2 of LSN# DEN001575070 notes that the concept of field capacity “is a simplification of the actual processes that control flow.” However, the mere fact that a model does not provide an exact representation of the actual conditions is not a sufficient basis for rejecting the model. As the Commission has noted in the context of simplified dose calculations:

Mathematical models describing the various sequences of natural phenomena which relate releases of radioactive material to radiation dose vary in detail and complexity. This was frequently observed in the hearing. Through circumstances peculiar to his case, one applicant may be able to present to the Regulatory Staff adequate support for his proposal through the use of simple models and conservative parameter values, while another applicant cannot prove his case so easily. There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements. The use of the simpler procedure may, however, introduce a wider range of uncertainty in estimated doses than a more complicated analysis. Hence the proper choice of parameter values for a simple calculation might be more conservative than values appropriate for a more precise calculation.

*In the Matter of Rulemaking Hearing Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as Practicable" for radioactive material in Light-Water-Cooled Nuclear Power Reactor Effluents, CLI-75-5, 1 NRC 277, 339 (1975).*

Nevada's assertions related to "duration" are even more incoherent. Nevada asserts that DOE's process is arbitrary and without physical basis because it uses a two-step process for calculating percolation of water from one soil node to the underlying soil. However, as is explained on page 6-29 of LSN# DEN001575070, the two-step procedure allows for water percolation not only during the duration of the precipitation, but also during the period following the precipitation. This process allows for percolation during the entire day of the precipitation event, and not just during the duration of the event itself (thereby increasing net infiltration into the bedrock). Significantly, Nevada has not asserted that this methodology would understate the projected effects.

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. The contention merely alleges that use of a more realistic model would “widen the range” of estimates of net infiltration. However, the contention does not claim that a more realistic model (which Nevada fails to name or describe) would increase the amount of net infiltration estimated by DOE. Indeed, Nevada does not state that the MASSIF model is unrealistic. To the contrary, the contention states on page 203 of the Petition that the concept of field capacity does approximate the underlying soil physics, although in Nevada's view “crudely.” It is well-established that the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 543-44, 550 (1985). See Section V.A.3.c of this Answer for a discussion of the reasonable expectation standard that 10 C.F.R. 63.31(a)(2) identifies as the general standard for evaluating postclosure matters.

Further, as DOE discusses in some detail on pages 2.3.1-77 and 78 and pages 2.3.1-87 and 88 of the SAR, results from the MASSIF infiltration model were compared against models that use the Richards equation-based model called HYDRUS-1D. The MASSIF results compared well with the results of the HYDRUS-1D model, thereby corroborating the MASSIF model used by DOE. *Id.* The contention does not address or take issue with those conclusions, and therefore does not establish a genuine dispute of material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and

complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**34. NEV-SAFETY-34 - Representation Of Storm Duration For Net Infiltration Modeling**

SAR Subsections 2.3.1.3.2 and 2.3.1.3.3 and similar subsections use an incorrect representation of storm duration for modeling of net infiltration.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a

difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does

not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's

supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Michael C. Thorne, Adrian P. Butler, Howard S. Wheeler, and Richard E. Chandler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention alleges that DOE's representation of storm duration is incorrect because it masks extreme variability in duration, in particular, that DOE's approach of fitting actual data to a linear model of total precipitation versus duration of the rainfall will underrepresent short duration, high intensity rainfall events. The contention should be rejected because, for the reasons discussed below, it does not establish a genuine dispute of material fact.

First, contrary to 10 C.F.R. § 2.309(f)(vi), the contention lacks the requisite specificity because, although it refers generally to SAR Sections 2.3.1.3.2 and 2.3.1.3.3, Nevada makes no attempt to focus the Board on any specific portions of those sections which encompass almost 40 pages of detailed information. As a result, it is entirely unclear which statements in the license application are subject to question

Second, DOE's description of its infiltration model, LSN# DEN001575070, pp. 6-56 to 6-59, recognizes that a certain amount of error will result in all cases where actual data is fit to a linear curve. As a result, the model used by DOE includes the calculation of a standard error. *Id.* Nevada has not alleged in this contention that DOE has improperly calculated or accounted

for that standard error. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Indeed, the NRC has recognized that a substantial amount of uncertainty will exist in any model attempting to predict the future of complex systems. *See* 66 Fed. Reg. 55732, 55747 (Nov. 2, 2001) (“The first-of-a-kind nature of the repository and the evaluation over a very long time period result in significant uncertainty being included in the performance assessment.”) For this reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but rather only that DOE “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” This is precisely what DOE has done. As described in SAR, at 2.3.1-44, DOE explicitly notes that there is a large standard error associated with this linear function and, as discussed in Section 2.3.1.3.3.2.2, performed sensitivity analyses for the duration of the daily precipitation parameter (as well as a number of others) (*see* SAR Tables 2.3.1-23 and 24). Based upon the sensitivity analysis, DOE determined that the uncertainty associated with most of the parameters (including duration of daily precipitation) explains less than 3% of the variance in mean net infiltration and therefore that the uncertainty is not important. Nevada’s contention does not challenge this conclusion, and therefore does not establish a genuine issue of material fact.

Third, as stated in the SAR, at 2.3.1-43, “very extreme rainfall events are likely to result in significant overland flow and runoff, and will not greatly affect net infiltration.” Similarly, as noted on page 2.3.1-70 of the SAR: “For example, annual precipitation may be very high because of an especially high amount of precipitation occurring on a single day. In such a case, runoff would tend to be higher and net infiltration lower than if several days during the year experienced large amounts of precipitation, but the annual total was less.” Because Nevada has not demonstrated that greater accuracy in estimating the length of intense rain events of short duration will increase net infiltration rather than merely increasing runoff, it has not established a genuine issue of material fact.

Finally, the contention is also deficient because it fails to allege, let alone determine what effect, if any, acceptance of the contention would have on dose to the RMEI. The contention only states the conclusion, without any stated support, that “potentially” significant changes would result. Petition at 209. This is precisely the type of unsupported, conclusory opinion that the Commission has repeatedly rejected as inadequate. *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998)). Moreover, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility)*, LBP-01-35, 54 NRC 403, 422 (2001). Thus, it is Nevada’s

burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this point.

In summary, this contention does not establish a genuine issue of material fact.

Therefore, the contention should be rejected.

**35. NEV-SAFETY-35 - Episodic Nature Of Infiltration Fluxes In Net Infiltration Analysis**

SAR Subsection 2.3.1.3.3 and similar subsections, which describe the net infiltration analysis, fail to consider the episodic nature of infiltration fluxes and accordingly the model used is incomplete.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the

contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Adrian P. Butler, Michael C. Thorne, Richard E. Clark, and Howard S. Wheeler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention alleges that the input to the net infiltration (MASSIF) model used by DOE in the TSPA to estimate net infiltration fluxes to the unsaturated zone is an annual average sampled from 1000 years, thereby losing the effect of potential extreme events. For several reasons, this contention does not establish a genuine dispute of material fact.

First, Nevada's assertion appears to be that the input to the MASSIF model (presumably precipitation) smoothes extreme precipitation events. This misreads the LA and suggests a misunderstanding of the model. In contrast to Nevada's assertion, precipitation input to the MASSIF model is not an annual average precipitation but, rather daily amounts. As explained on page 2.3.1-32 of the SAR, "[w]ater enters the infiltration model domain as precipitation, which is simulated from a stochastic model of daily precipitation based on historical weather records from Yucca Mountain and analogue sites." In the same vein, on page 2.3.1-58, the SAR explains that precipitation with an effective duration of hours for each day on which precipitation occurs is input.

Second, in essence, Nevada's challenges DOE's use of an annual mean value for net infiltration flux to the unsaturated zone, apparently, rather than fluxes calculated at a shorter time step. Nevada's assertion is that the calculation of a mean annual flux necessarily discounts or eliminates the effect of extreme precipitation events lasting hours or days. Nevada's assertion is misplaced and, again suggests a misunderstanding of the MASSIF infiltration model. As discussed on page 2.3.1-42 of the SAR, the manner in which the annual mean infiltration flux is calculated in MASSIF recognizes and takes into account the effects of extreme events, but gives them the appropriate weight.

Given the nature of this contention (which asserts, incorrectly, that DOE has not accounted for the temporal nature of net infiltration), it is especially important for Nevada to provide some indication of the significance of its allegation because other portions of the license application indicate that temporal variations in net infiltration are attenuated by the Paintbrush Nonwelded Unit (PTn) that overlays the repository. As stated in Section 2.3.2.4.2.1.2 of the SAR:

The net surface infiltration at the bedrock surface (on top of the TCw unit) is conceptualized as episodic, with significant pulses occurring only once every few years (SNL 2008a, Section 6.5.7.5). Spatially and temporally variable pulses of moisture percolate rapidly through the highly fractured tuffs of the TCw. However, at the TCw-PTn interface—where welded tuffs grade sharply into nonwelded tuffs—flow behavior changes from fracture dominated to matrix dominated flow. The highly porous PTn unit attenuates the episodic infiltration flux significantly such that the net episodic surface infiltration, once crossing the PTn, can be approximated as steady state (SNL 2007a, Section 6.2.2).

Therefore, Nevada's allegations are not material given the attenuation of the temporal pulses provided by the nonwelded tuff.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada’s contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. See Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**36. NEV-SAFETY-36 - Corroboration Of Model Results In Post-Model Validation Of Net Infiltration Simulations**

SAR Subsection 2.3.1.3.4.2 and related subsections, which describe confidence building and abstraction of the net infiltration model for post-model development validation, do not provide an adequate basis for safety assessment because comparisons with data and alternative models are inadequate to support the net infiltration results.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention asserts that the following information is inadequate to corroborate the DOE's infiltration model (which is referred to as the "MASSIF" model): 1) neutron logging data, including the infiltration data from Pagany Wash, as described in Section 7.2.1.1 of LSN# DEN001575070, 2) regional estimates of net infiltration; and 3) a model used by the Center for Nuclear Waste Regulatory Analyses (CNWRA), a contractor to the NRC. Petition at 216-18. As discussed below, Nevada's assertions do not establish a genuine dispute on a material issue of fact or law.

LSN# DEN001575070, "Simulation of Net Infiltration for Present-Day and Potential Future Climates," documents the development and validation of the DOE's MASSIF infiltration model. Nevada's Petition at 217 contends that the neutron logging data as described in Section 7.2.1.1 of LSN# DEN001575070 "are inadequate to support objective evaluation of model performance." DOE agrees. As stated on page 2.3.1-84 of the SAR, "the neutron logging data is not reliable for calculating net infiltration flux due to the preferential pathways through bedrock induced during drilling." Therefore, there is no dispute that it would be inappropriate to use that data for comparison against the results of MASSIF, and DOE has not used that data to support its position in the LA.

Nevada contends that regional estimates of mean net infiltration are not relevant to modeling of mean net infiltration at Yucca Mountain, given the heterogeneity of net infiltration. As support for this assertion, Nevada cites the ORISE Report, LSN# DEN001595302, which states that the "fact that results [of MASSIF] are generally consistent with other regional estimates for mean net infiltration is not proof that they are correct for Yucca Mountain." This

quotation is taken from the Executive Summary of the ORISE Report. The more complete expression of this thought appears at page 4 of the Report, which states:

At the entire-domain scale, the model may adequately represent the regional water balance; its spatially averaged results and uncertainty bounds for the entire site are generally consistent with other regional estimates for mean annual net infiltration. However, this agreement among estimates does not necessarily mean that the spatially averaged results from the MASSIF model correctly represent long-term infiltration rates for the mountain as a whole or, more importantly, that infiltration for significant areas of the domain (such as upland convergent areas and upper reaches of ephemeral streams/washes) is not underestimated by the modeling approach, which assumed uniform conditions over large areas of heterogeneous soils. The spatial representation of the net infiltration at Yucca Mountain is acknowledged by the authors of the report to be of low confidence.

Thus, in context, the concern of ORISE pertains to the ability of MASSIF to model the spatial distribution of net infiltration.

DOE agrees that there is significant uncertainty regarding the ability of MASSIF to predict the spatial distribution of net infiltration. Specifically, the SAR, at 2.3.1-44 states:

Since there is very little direct information about such a spatial distribution, there is considerable and significant uncertainty in the spatial distribution of net infiltration results. Furthermore, because soil and bedrock properties are represented as uniform over a spatial area assumed to define a given soil or rock type, the actual spatial variability of net infiltration is likely underestimated by the model.

For this reason, DOE evaluated the effect of the uncertainty in the spatial distribution in net infiltration. That evaluation shows that spatial variability in net infiltration does not significantly affect the mean net infiltration over relatively large areas, such as the repository footprint.

Thus, there is no material dispute that there is significant uncertainty regarding the ability of MASSIF to predict the spatial distribution of net infiltration. Yet, there is also no material dispute that MASSIF conservatively predicts mean net infiltration (which is the important factor for users of the model output). SAR at 2.3.1-71, 2.3.1-80-81, and 2.3.1-91. As a result, it is appropriate to compare the results of regional estimates of net infiltration against the results of MASSIF for mean net infiltration, which are calculated over the repository emplacement area. Nevada's assertions on this issue are simply not material, because those arguments pertain to the ability of MASSIF to calculate spatial distribution of net infiltration rather than the mean net infiltration over the repository footprint.

In any event, as discussed in SAR Section 2.3.2.2.1.2, the presence of the nonwelded Paintbrush unit above the repository emplacement area will effectively dampen and homogenize downward moving pulses of transient net infiltration events; therefore, the uncertainties in spatial distribution of net infiltration are not considered to be significant to the repository. SAR, pp. 2.3.1-71, 2.3.1-80-81, and 2.3.1-91. As the SAR states, "small scale spatial variations in net infiltration are not important for downstream users of model output." SAR at 2.3.1-44. Nevada has not contested this conclusion.

Nevada also contends that the CNWRA Model does not provide an adequate basis for comparison with MASSIF, because it is a one-dimensional and highly abstracted model. In this regard, Nevada asserts that the CNWRA Model is based upon only ten years of meteorological data, and states (without any explanation or specific reference) that the CNWRA Model suffers from the same deficiencies in soil and rock property data "discussed above." However, the fact that the CNWRA Model has abstractions is not an adequate basis for contesting its adequacy as a basis for comparison with MASSIF. Indeed, the NRC has recognized the appropriateness of

using simplified assumptions in models that estimate post-closure performance of the Yucca Mountain Repository, and therefore, that in and of itself, is not a sufficient basis for criticizing the model. As stated in the Final Report, Yucca Mountain Review Plan, NUREG-1804, Rev. 2 (July 2003) (YMRP):

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use conservative assumptions to simplify its approaches and data collection needs.

Indeed, NUREG-1804 on page 2.2-57 recognized this specifically in the context of climate models:

To review the abstraction of climate and infiltrations, recognize that models used in the total system performance assessment may range from highly complex process-level models to simplified models, such as response surfaces or look-up tables. Evaluate model adequacy, regardless of the level of complexity.

YMRP at 2.2-2. The Commission has also noted this in the context of simplified dose calculations:

Mathematical models describing the various sequences of natural phenomena which relate releases of radioactive material to radiation dose vary in detail and complexity. This was frequently observed in the hearing. Through circumstances peculiar to his case, one applicant may be able to present to the Regulatory Staff adequate support for his proposal through the use of simple models

and conservative parameter values, while another applicant cannot prove his case so easily. There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements. The use of the simpler procedure may, however, introduce a wider range of uncertainty in estimated doses than a more complicated analysis. Hence the proper choice of parameter values for a simple calculation might be more conservative than values appropriate for a more precise calculation.

*In the Matter of Rulemaking Hearing Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as Practicable" for radioactive material in Light-Water-Cooled Nuclear Power Reactor Effluents, CLI-75-5, 1 NRC 277, 339 (1975).*

With one exception, Nevada has not contested that the CNWRA Model meets the reasonable expectation standard or used assumptions that are cautious but reasonable assumptions that reflect current knowledge. Nevada refers to a statement in the CNRWA Report, which discusses an error in an input file for the Model that was expected to increase evaporation rates by 37 to 46 percent over that assumed in the Model. However, Nevada has taken this statement out of context. The complete quotation is provided below:

The mistyped value would be expected to increase evaporation rates by approximately 37 to 46 percent, thereby reducing bare-soil infiltration. The mistyped value has been used for all analyses using ITYM [the CNRWA Model] to date, but is not expected to strongly affect ITYM infiltration estimates, because the ITYM plant uptake abstraction uses parameters that, in effect, compensate for higher evaporation with reduced transpiration. Stothoff and Walter (2007) compared ITYM estimates (which are based on the mistyped value) to available site and regional observations and concluded that the ITYM estimates were consistent with observations. (LSN# NRC000029713 at xv).

Thus, the very report cited by Nevada essentially concludes that the error has no material effect on the results of the Model. As another licensing board has stated, supporting material provided by a petitioner, including those portions thereof not relied upon, is subject to Board scrutiny, “both for what it does and does not show.” *See Yankee Atomic Elec. Co.*, LBP-96-2, 43 NRC 61, 90 (1996), *rev’d in part on other grounds and remanded*, CLI-96-7, 43 NRC 235 (1996).

Finally, this contention neglects to mention that there are other sources of information that DOE used to validate the MASSIF model. For example, MASSIF was also validated by comparison against the results of the HYDRUS-1D model. *See SAR Section 2.3.1.3.4.2.3 at 2.3.1-87.* Additionally, MASSIF was validated by comparison against other models, such as the Maxey-Eakin Model and the Maurer and Berger Model. *See SAR, at 2.3.1-85.* This contention does not contest the validity of those comparisons. Therefore, even if Nevada’s contention were to be accepted, there is still a sufficient basis for a finding that the MASSIF model has been appropriately validated. Therefore, this contention does not materially affect any conclusions on this point in the LA.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**37. NEV-SAFETY-37 - Net Infiltration Model Methodology**

SAR Subsection 2.3.1.3.2 and similar subsections, which present the procedure for estimating long-term mean net infiltration from the MASSIF computer simulations, use a method that is not generally accepted and is not based on sound statistical principles.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the

contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Howard S. Wheeler and Richard E. Chandler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes DOE for estimating long-term net infiltration by calculating a weighted mean net infiltration for ten representative years corresponding to various recurrence intervals from 1 to 1000 years. The contention asserts, without any support, that this approach will work only if the within-stratum variation in net infiltration is substantially smaller than the between-strata variation. For several reasons, this contention does not establish a genuine dispute of material fact.

First, the contention provides no explanation or justification for its assertion. Even if this assertion were construed to have been submitted by an expert, the absence of any basis for the opinion makes it insufficient to support the contention. As the Commission has stated, "an expert opinion that merely states a conclusion (e.g., the application is 'deficient,' 'inadequate,' or 'wrong') without providing a reasoned basis or explanation for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion" of the alleged basis for the contention. *USEC, Inc. (American Centrifuge Plant)*, CLI-

06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998).

Second, even if Nevada's assertion were to be accepted, the contention provides no basis for believing that it would have any material effect on net infiltration as calculated by DOE. In particular, the contention does not allege, even qualitatively, that use of a different method would result in an increase in net infiltration. Indeed, it merely speculates without basis that a "poor choice of strata may lead to reduced precision ...." Petition at 222. As a licensing board has ruled in another proceeding, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Electric Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 543-44, 550 (1985). Because the contention neither alleges, nor provides a basis for concluding that DOE's results do not represent reasonable expectation, it does not establish a genuine issue of material fact. See Section V.A.3.c of the Answer for a more detailed discussion of the reasonable expectation standard that Section 63.31(a)(2) identifies as the general standard for evaluating post closure matters. Furthermore, the contention never explains the basis for its statement that DOE uses a method "that is not generally accepted," (Petition at 220), nor does it ever explain how DOE's approach violates the principle regulatory provision that it cites (10 CFR § 63.21(c)(15)).

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**38. NEV-SAFETY-38 - Parameter Correlations In Net Infiltration Model**

SAR Subsection 2.3.1.3.3 and similar subsections, which address the treatment of parameter uncertainty in the net infiltration model, fail to properly account for parameter correlations.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the

contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Michael C. Thorne, Howard S. Wheeler and Richard E. Chandler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention states that DOE's use of Latin Hypercube Sampling (LHS) for estimating the effects of uncertainties in parameters is valid only if the parameters are not correlated. The contention then quotes from DOE's description of its net infiltration model, which states that no technical basis for a correlation was identified. Based upon this statement, Nevada then infers that DOE neglected correlations between parameters. Petition at 224-225. For several reasons, this contention does not establish a genuine dispute of material fact.

First, reading the DOE's report confirms that it does not state what the contention suggests that it states, namely that DOE neglected correlations. Rather, the report states:

Correlations between parameters have been considered in order to constrain the LHS sample of input parameters to physically realistic combinations. The sample size of each probabilistic analysis was limited to 20. Up to fifteen parameters were sampled to generate the inputs for each of the 20 realizations. For the physical parameters (parameter related to physical properties of materials), no technical basis justifying imposing correlations between parameters was identified. Therefore, no correlations were applied." (LSN# DEN001575070, at 8-19).

Moreover, the paragraph immediately following the one quoted above demonstrates that contrary to the contention, DOE evaluated correlations, and when evidence existed that a correlation existed, appropriately took this into account in its approach. In that case, DOE identified and accounted for correlations among precipitation parameters. Since a petitioner's imprecise reading of a document cannot be the basis for a litigable contention, *Ga. Inst. of Tech. (Georgia Tech Research Reactor)*, LBP-95-6, 41 NRC 281, 300 (1995), the contention does not establish a genuine issue of material fact.

Second, the contention does not identify or even allege that there should be correlations between parameters that DOE has not applied, or that DOE has applied correlations that should not be present. Furthermore, even if it is assumed that there is such a correlation, the contention does not allege, or provide any basis for an allegation, that DOE has underestimated net infiltration. Therefore, the contention does not establish a genuine issue of material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on repository performance. The petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility)*, LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE,

and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, it should be rejected.

**39. NEV-SAFETY-39 - Temperature Lapse Rate Verification**

SAR Subsection 2.3.1.3.2 and similar subsections, which address the temperature component of the net infiltration model, are inadequate because no attempt is made to verify the temperature lapse rate with elevation or the associated uncertainty using empirical observations.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently

greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of mean net infiltration.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the

contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Michael C. Thorne, Howard S. Wheeler and Richard E. Chandler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes DOE for taking the rate of change in temperature with elevation from a textbook, rather than verifying the rate of change from available temperature data. Based upon this allegation, Nevada asserts that the evapotranspiration component "could be" incorrectly estimated. For several reasons, this contention does not establish a genuine dispute of material fact.

First, this contention does not allege, and provides no basis for an allegation, that DOE's assumption of a 1 degree Celsius decrease per one hundred meter elevation rise is incorrect or unreasonable. That value was taken from the *Handbook of Hydrology*, as discussed on SAR page 2.3.1-39 and LSN# DEN001575070, at 6-46. Furthermore, as discussed in the SAR at 2.3.1-39, DOE in fact used actual data including temperature, obtained from weather stations on Yucca Mountain for its model. Nevada does not point to any actual temperature data that is inconsistent with the data used in DOE's analyses. Nevada also does not contend that the rate of change of temperature taken from the scientific literature was inaccurate or incorrect. Therefore,

this contention does not establish a genuine issue of material fact on the rate of change in temperature.

Second, even if it is assumed that DOE used an incorrect rate of change in temperature, this contention merely postulates that evapotranspiration “could be” incorrectly estimated and the net infiltration could be underestimated. It does not allege, or provide any basis for an allegation, that evapotranspiration was actually incorrectly estimated or that net infiltration was underestimated. Therefore, even if the premise of this contention regarding rate of change in temperature were to be accepted, Nevada has not established such a premise would have any material affect on net infiltration. Indeed it merely speculates without basis that “the evapotranspiration component could be incorrectly estimated, therefore potentially underestimating infiltration ....” Petition at 228.

Thirdly, DOE has demonstrated that uncertainty in the temperature lapse rate has no meaningful effect on uncertainty in the output of the infiltration model (LSN# DEN001575070, Section 7.1.4; temperature lapse rate is variable TEMP\_LR in Table 7.1.4-1). Thus, even if DOE used an incorrect rate of change in temperature, DOE has demonstrated that the estimates of net infiltration would not be different.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 229. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada

that must show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact.

Therefore, it should be rejected.

**40. NEV-SAFETY-40 - Parameter Uncertainty Treatment In Net Infiltration Model**

The net infiltration modeling, reflected in SAR Subsections 2.3.1.3.2 through 2.3.1.3.4 and similar subsections, is invalid because the representation of parameter uncertainty in the net infiltration modeling is inadequate and the methodology for selecting net infiltration values for unsaturated zone modeling is ad hoc, inconsistent, and incorrect.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing net infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application

and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Howard S. Wheeler and Richard E. Chandler) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

For example, Nevada's Petition at 232 – 234 presents a series of six bullets, criticizing the uncertainty analyses of DOE. However, five of the six bullets provide no references to any expert opinion or documents (other than DOE's own reports). The remaining bullet at the bottom of page 233 of Nevada's petition does include a citation to an external document; however, Nevada does not cite that document to support its criticism of DOE's methodology but instead as a reference for an alternative methodology. Thus, the bullets appear to represent nothing but the arguments of counsel, and are insufficient to satisfy the standards in 10 C.F.R. § 2.309(f)(1)(v).

Similarly, much of the rest of this contention suffers from the same defect. In fact, in this 7-page contention, Nevada cites to only two external documents for support. The first, the ORISE Report, LSN# DEN001595302, is cited by Nevada at pg. 231 and 235 of their Petition, for the propositions that use of the pedotransfer function introduces substantial uncertainty and the bounds of uncertainty have not been fully defined due to lack of site-specific data for determining spatial variability. Both of those issues are addressed in more detail in DOE's response to NEV-SAFETY-26. For the reasons discussed in that response, this issue does not establish a genuine issue of material fact.

The second document, a report by the Nuclear Waste Technical Review Board (NWTRB), is cited at pg. 235 of the Petition for the proposition that the Generalized Likelihood Uncertainty Examination (GLUE) procedure used by DOE does not have a strong technical basis, and that the NWTRB does not endorse the use of GLUE. However, as described by the NWTRB, the GLUE methodology gives higher statistical probabilities to the lower range of the statistical distribution (the 10th percentile) of the MASSIF estimated net infiltration, a fact that Nevada neglects to mention. *See* LSN# NEN000000673, pg. 14. Thus, GLUE increases the probability calculated by MASSIF that a specified net infiltration will occur. This is depicted graphically in LSN# DEN001581961, Fig. 4. Although use of this process was criticized by the NWTRB, that criticism provides no basis for a contention because the process is cautious but reasonable and thus consistent with the reasonable expectation standard.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For several reasons, Nevada's criticisms of DOE's uncertainty analyses do not establish a genuine issue of material fact.

First, the Petition at 231-232 incorrectly asserts that DOE did not consider certain uncertainties. As shown below, DOE did address each of those uncertainties:

- The uncertainty associated with deriving soil physical properties from pedotransfer is addressed on SAR pages 2.3.1-46 and 72.
- The effect of sub-grid heterogeneity is addressed on SAR pages 2.3.1-44 to 45.

- Temporal lumping of model parameters is addressed on SAR page 2.3.1-69-70, and Section 2.3.1.3.3.2.2.
- Spatial variation in soil and vegetation properties within a soil class is addressed on SAR pages 2.3.1-44 to 48.
- Spatial distribution of vegetation, soil and rock properties is addressed on SAR page 2.3.1-48-55 and Section 2.3.1.3.3.2.2.

Any contention that mistakenly asserts that the application does not address a relevant issue can be dismissed. *See Sacramento Municipal Utility District (Rancho Seco Nuclear Generating Station)*, LBP-93-23, 38 NRC 200, 247-48 (1993), *review declined*, CLI-94-2, 39 NRC 91 (1994); *Tex. Util. Elec. Co. (Comanche Peak Steam Electric Station, Unit 2)*, LBP-92-37, 36 NRC 370, 384 (1992); *Tenn. Valley Auth. (Bellefonte Nuclear Power Plant Units 3 and 4)*, LBP-08-16, 68 NRC \_\_\_\_ (slip op. at 29, 64-65) (Sept. 12, 2008).

Second, the contention is largely argumentative and does not provide facts or analyses to dispute the statements in the SAR. For example:

- Nevada's Petition at 232 complains about the uniform uncertainty distributions for precipitation and temperature, asserting that the distribution would not be uniform if DOE had used a different model parameterization. However, Nevada provides no facts or analyses that would indicate that a uniform distribution is inappropriate given the model parameterization actually used by DOE.
- Nevada's Petition at 233 criticizes the standard deviation calculated from data from two stations, stating that because there are only two stations, the standard deviation is largely meaningless. However, Nevada has misinterpreted DOE's documents. As indicated in

Section F2.2 of LSN# DEN001575070, DOE calculated the standard deviation of the data from each station, not the standard deviation of the average of each station.

- Nevada's Petition at 233 states that DOE used different estimates of uncertainty for temperature and precipitation, and then asserts that those differences constitute an inconsistency. However, Nevada never explains why it is inappropriate to treat temperature and precipitation differently, and presents no analyses or facts to support its assertions.
- Nevada's Petition at 233 complains about the uncertainty distributions that DOE assigned to the Monsoon Climate, but does not specify what distribution DOE allegedly should have used.
- Nevada's Petition at 234 complains about the uncertainties assigned to DOE's estimates of wind speeds during the three climatic states, but provides no facts to dispute DOE's estimates and does not specify what the wind speeds should be.

Third, the contention mischaracterizes the SAR. For example, on page 234, Nevada's Petition asserts that DOE has not appropriately accounted for the uncertainty in rock properties because its uncertainty analyses allegedly exclude 70% of the modeled area. However, this assertion is essentially a repeat of NEV-SAFETY-28. Our response to that contention demonstrates that Nevada's assertions are both factually and legally defective.

Finally, even if all of Nevada's assertions were to be accepted, Nevada has not shown that it would make any difference to the outcome of this proceeding. Nevada asserts that DOE's estimates of net infiltration are "biased." In fact, DOE has shown that its estimates are biased - - biased in the conservative direction so that they overestimate net infiltration. *See* SAR at 2.3.1-

91. Since this contention does not allege that DOE's estimates are unconservative, it does not establish a genuine issue of material fact.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**41. NEV-SAFETY-41 - Erosion FEP Screening**

DOE's exclusion of land-surface erosion (FEP 1.2.07.01.0A), as reflected in SAR Subsections 2.2.1.1 and 2.2.1.2 and similar subsections, is incorrect because modeling studies and actual observations demonstrate that erosion will significantly affect infiltration and seepage fluxes at Yucca Mountain within the first 10,000 years after closure and will progressively and grossly modify the topography of the mountain within one million years.

**RESPONSE**

This contention states that erosion will significantly affect infiltration and seepage fluxes at Yucca Mountain within the first 10,000 years after closure and will progressively, and grossly, modify the topography of the mountain within one million years. Therefore, it alleges that DOE incorrectly estimated erosion rates at Yucca Mountain and improperly excluded FEP 1.2.07.01.0A, "Erosion/Denudation," from consideration in the TSPA.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada makes various assertions regarding erosion during the time period beyond 10,000 years, after permanent closure of the repository. For instance, Nevada states that "the Paintbrush Tuff may get locally completely eroded between 100,000 years and one million years." Petition

at 241-42. It goes on to assert that “the emplacement drifts may be exposed at the Earth’s surface in 500,000 years.” *Id.* at 242. Nevada asserts that its estimates of erosion are significant because they “demonstrate that the ongoing erosion process will be of significance to safety assessment [sic] both in the period before 10,000 years and in the longer term.” *Id.* at 241.

NRC regulations make it clear that, when assessing FEPs for the potential to adversely impact the performance of the repository, DOE is *not* required to extend its assessment of excluded FEPs to the period beyond 10,000 years after closure. *See* 10 C.F.R. § 63.342. To the contrary, DOE must base any performance assessment conducted for the post-10,000 year period on the “continued effects of the features, events, and processes included in [the performance assessment for the first 10,000 year period].” *See* 70 Fed. Reg. 53,313, 53,318-19 (Sept. 8, 2005) (proposing a revised 10 C.F.R. § 63.114). To the extent that this contention is claiming that DOE is required to evaluate FEPs based on effects in the post-10,000 year period, or provides support regarding only the post-10,000 year period, the contention is immaterial and represents an impermissible collateral attack on NRC regulations at 10 C.F.R. §§ 63.342 and 63.114. Thus, it falls outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 238-39. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 239. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant

regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing erosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in

quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that DOE improperly excluded FEP 1.2.07.01.0A, “Erosion/Denudation,” because it relied upon allegedly-incorrect erosion rates that are inconsistent with observed debris flows. *See* Petition at 238. However, Nevada fails to demonstrate that this issue could produce any alternative TSPA results, creates no reasonable expectation that postclosure performance objectives cannot be met, or is otherwise material to any finding the NRC must make to authorize construction of the repository. A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but also the use of such data” could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339 (2006).

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3, above, discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the only documents referenced by the contention, other than the license application and DOE's supporting documents, do not support Nevada's position or raise issues outside the scope of this proceeding; (2) the contention mainly contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Steven A. Frishman, Stephan K. Matthäi, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada's bases for its challenge to the exclusion of FEP 1.2.07.01.0A, "Erosion/Denudation," are that observed and modeled erosion rates suggest that erosion will be "much higher" than modeled by DOE. Petition at 240. Nevada fails to provide supporting references for its contention because Stuewe, *et al.*, the document cited for its claim that erosion rates will be much higher than predicted by DOE, in part supports assertions that are outside the scope of this proceeding, and in part does not support certain other statements made in the

contention. *See Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998) (“the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention”).

For example, Stuewe *et al.* states: “It may be seen that there is little apparent change [in Yucca Mountain] within the first 1 my [million years], but that the entire Yucca Mountain region is substantially denuded after 5 my.” LSN# NEV000005187 at.7. Additionally, the document predicts significant erosion within 500,000 to 5,000,000 years *only* with “conservative estimates for all involved parameters.” *Id.* at 1. This reference does not directly support Nevada’s contention, and moreover, it shows that Nevada’s proffered erosion rates are not material to compliance with NRC regulations that require that DOE vary factors related to geology based upon “cautious, but *reasonable* assumptions” that could affect Yucca Mountain. 10 C.F.R. § 63.305(c) (emphasis added).

Stuewe *et al.* also does not provide support for this contention because it does not address the effects of erosion in the first 10,000 year period, which is the focus of any FEP screening decision. *See* 10 C.F.R. §§ 63.114 and 63.342; *see also* 70 Fed. Reg. 53,313, 53,319 (Sept. 8, 2005) (providing proposed 10 C.F.R. § 63.342(c), which states in part that “[f]or performance assessments conducted to show compliance with §§ 63.311(a)(2) and 63.321(b)(2), DOE’s performance assessments shall project the continued effects of the features, events, and processes included in paragraph (a) of this section beyond the 10,000 year post-disposal period through the period of geologic stability”); 70 Fed. Reg. at 53,319 (providing proposed 10 C.F.R. § 63.114(b), which states that “[a]ny performance assessment used to demonstrate compliance with § 63.113

for the period of time after 10,000 years through the period of geologic stability must be based on the performance assessment specified in paragraph (a) of this section").

In addition, Stuewe, *et al.* cannot sustain Nevada's contention because it is not a published document, so it is unclear to what extent – if at all – it has been peer reviewed or vetted. In fact, it has merely been submitted for publication to *GEOMORPHOLOGY*. See LSN# NEV000005187 at 24. At best, this “manuscript draft,” see LSN# NEV000005187 at cover page, could be considered a proffered expert statement, as it also lacks an accompanying affidavit.

Nevada also fails to provide adequate support for the other basis for its position that DOE erroneously excluded FEP 1.2.08.01.0A, “Erosion/Denudation.” Nevada alleges that “actual observations demonstrate that erosion will significantly affect infiltration and seepage fluxes at Yucca Mountain.” Petition at 238. Nevada cites two documents for its proposition that “debris flows at Yucca Mountain triggered by thunderstorms in 1984 and 2003 each locally removed much more material than suggested by [the erosion rates estimated by Stuckless and Levich].” Petition at 240. One of these documents is cited only “for description of general characteristics of such events.” *Id.* The other document, Coe, *et al.*, was published in 1997, and thus contains no description, nor anticipation, of a debris flow in 2003. Coe, J.A., Glancy, P.A., Whitney, J.W. "Volumetric Analysis and Hydrologic Characterization of a Modern Debris Flow Near Yucca Mountain, Nevada" *GEOMORPHOLOGY*, Vol. 20 (1997) at 11-28 (hereinafter Coe, *et al.*).

As discussed in what follows, regarding the 1984 event, Coe, *et al.* do not provide support for Nevada's assertion that this observed event demonstrates that erosion will significantly affect infiltration and seepage at Yucca Mountain. Any supporting material provided by a petitioner, including those portions thereof not relied upon, is subject to Board

scrutiny, “both for what it does and does not show.” See *Yankee Atomic Elec. Co.*, LBP-96-2, 43 NRC 61, 90 (1996), *rev’d in part on other grounds and remanded*, CLI-96-7, 43 NRC 235 (1996).

First, the mean depth of erosion for the overall study area as determined by Coe *et al.* is approximately 5 cm, see Coe, *et al.* at 26, which is not inconsistent with the erosion rates proffered by Stuckless and Levich, see LSN# DEN001584824 at 6-182. Those erosion rates necessarily incorporate large-scale erosion and deposition events, such as the 1984 debris flow, rather than represent a constant rate of erosion. See LSN# DEN001584824 at 6-183 (“Debris flows ... are the primary mechanism for hillslope erosion of unconsolidated deposits in the Yucca Mountain region”). It should also be noted that the study area referenced in Coe *et al.* was not at Yucca Mountain, but at Jake Ridge, which is “at the southern extremity of a north-south-trending ridge east of Yucca Mountain.” Coe, *et al.* at 12.

Consistent with Stuckless and Levich’s long-term erosion rates of 0.2 to 6 cm per 10,000 years, Coe, *et al.* predict that the 1984 event was “quite rare.” Coe, *et al.* at 11. They conclude that “[a]lthough the recurrence interval of storms of the same intensity as the July 21, 1984 storm appears to be on the order of 500 years or greater, the recurrence of an erosional event comparable to the July, 1984 event is probably much longer.” *Id.* at 26. Moreover, they “suggest that the amount of hillslope erosion caused by the 1984 storm has a *significantly longer* recurrence interval than the precipitation event because the amount of erosion is dependent on the intensity of the storm, on the amount of colluvium on the slope, and the maturity of the drainage network.” *Id.* (emphasis added). Especially relevant is their finding that “the erosive ability of successive storms of equal intensity will decrease because such storms would tend to progressively isolate and reduce the amount of colluvium available.” *Id.* at 11. Accordingly, the

study provided by Nevada to support its contention is, in fact, consistent with DOE's FEP exclusion justification and tends to support DOE's erosion rates instead.

In addition to the aforementioned flaws, Nevada simply cites to its reference documents in their entirety, rather than pinpointing a specific page or section for support. Vague references to documents are not permissible. A petitioner has the obligation to identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). In this proceeding, especially, petitioners must ensure that documentary references "be as specific as reasonably possible." *U.S. Dep't of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7). Therefore, Nevada's references are not sufficient to satisfy Section 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's contention presents an issue that, in some respects, is not within the scope of this proceeding, and in all respects, not material. For these reasons, and for the reasons discussed below, this contention does not establish a genuine dispute on an issue of material fact.

First, Nevada alleges that the "debris flows at Yucca Mountain triggered by thunderstorms in 1984 and 2003 each locally removed much more material than suggested by [the erosion estimates provided by Stuckless and Levich]." Petition at 240. As established above, Nevada fails to provide *any* support for such an event in 2003, and does not provide adequate support for its position that the 1984 event on Jake Ridge is inconsistent with DOE's predicted erosion rates at Yucca Mountain. Nor does it evaluate the differences in mineralogy and geology between Yucca Mountain and Jake Ridge that could result in differing erosion processes. In addition, Stuckless and Levich (2007) discuss the intense thunderstorms that

occurred in 1984 to illustrate their finding that “precipitation and runoff that produces streamflow in Fortymile Wash generally occurs only during infrequent but intense local thunderstorms.” Stuckless, J.S. and Levich, R.A., eds., “The Geology and Climatology of Yucca Mountain and Vicinity, Southern Nevada and California,” (2007) (LSN# DEN0016066227 at 81). Accordingly, Nevada’s assertion regarding this observed event fails to establish a genuine dispute with respect to the erosion rates modeled in DOE’s FEP exclusion justification.

Second, Nevada’s reference to the erosion rates of Stuewe *et al.*, discussed above, fails to raise a genuine dispute because those erosion rates may result only with “conservative estimates for all involved parameters.” LSN# NEV000005187 at.1. This result does not raise a material issue because it is inconsistent with the requirements of 10 C.F.R. § 63.305(c), which states in part that DOE must vary factors related to geology based upon “cautious, but *reasonable* assumptions consistent with present knowledge of factors that could affect Yucca Mountain.” The erosion rates set forth in FEP 1.2.07.01.0A, “Erosion/Denudation” were consistent with this requirement, as established in the supporting documentation. *See* Stuckless and Levich at 83-84. In light of this support and the requirement of 10 C.F.R. § 63.305(c), Nevada nonetheless made no attempt to show that DOE’s assumptions were *unreasonable*.

Moreover, Nevada’s proffered erosion rates are inconsistent with the geologic record, and therefore *not consistent with present knowledge* of factors that could affect Yucca Mountain, contrary to 10 C.F.R. § 63.305(c). Located on both the east and west flanks of Yucca Mountain are fans that contain the Bishop Tuff (758 Ka). *See* Quaternary Paleoseismology and Stratigraphy of the Yucca Mountain Area, Nevada (LSN# DEN001584628 at 20). These well-dated fan deposits, some up to 700 thousand years old, indicate long term stability as relates to erosion at Yucca Mountain. *See id.* at 42. This example of relevant site data illustrate the

*unreasonableness* of Nevada’s proffered erosion rates, contrary to the requirements of 10 C.F.R. § 63.305(c).

Third, 10 C.F.R. § 63.114(e) – which Nevada cites in its contention – requires DOE to provide the technical basis for inclusion or exclusion of a FEP if the dose to the RMEI or release to the accessible environment would be “*significantly* changed” by its omission. *See* 10 C.F.R. § 63.114(e) (emphasis added). Petitioner falls far short of this standard, in that it fails to quantify how inclusion of this FEP could *significantly* change the outcome of the TSPA, and therefore does not establish a genuine dispute on a material issue.

Furthermore, as discussed above, Nevada’s cited reference to Stuewe *et al.* does not address erosion within the first 10,000 years, which is the focus of any FEP screening decision. *See* 10 C.F.R. §§ 63.114 and 63.342; 70 Fed. Reg. at 53,318-19; SAR § 2.2.1.2. Therefore, that reference does not establish a genuine dispute on a material issue of fact, contrary to 10 C.F.R. § 2.309(f)(1)(vi), and should be rejected.

**42. NEV-SAFETY-42 - Validation Of Unsaturated Zone Flow Model By Simulation Of Natural Chloride Distribution In Pore Waters**

In SAR Subsection 2.3.2.5.1.2 and related subsections the method for validating the unsaturated zone (UZ) flow model with observed chloride contents of pore waters makes an unexplained assumption about the chloride content of net infiltration; this means that uncertainties in the method have not been adequately addressed and that alternative models have not been adequately represented.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing

by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing flow in the UZ is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. §

2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Don L. Shettel, Adrian Butler, and Adrian Bath) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of the contention does reference two articles for the proposition that chloride concentrations in net infiltration are higher than in precipitation due to concentration by evapotranspiration. However, that principle is not in dispute. See, e.g., LSN# DEN001572665, pg. 6-63. The remainder of the contention does not cite any expert opinion or documents, other than DOE's own supporting documents.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention contains two allegations: 1) the assumptions in LSN# DEN001572665 related to evapotranspiration are not explained; and 2) the modeled profiles of chloride do not have a good fit with the measured values of chloride in the UZ. As demonstrated below, neither of these allegations is sufficient to establish a genuine issue of material fact.

With respect to evapotranspiration, Nevada has not accurately characterized the application and the supporting documents. For example, SAR, pp. 2.3.1-60 to 66 describes in detail DOE's modeling assumptions related to evapotranspiration, and LSN# DEN001572665, pg. 6-63 explains that evapotranspiration leaves chloride behind. Nevada presents no facts or analysis to dispute any of the statements in LSN# DEN001572665, let alone the license application. In essence, Nevada is stating that it cannot determine whether the statements in LSN# DEN001572665 (and by implication, the SAR), are correct. Such a statement does not establish a genuine dispute of material fact.

With respect to the fit between the measured and calculated chloride values, the SAR states:

The weak diffusion of chloride means that the model cannot be expected to match point measurements, because of the spatial averaging inherent to the model grid structure over distances on the order of 100 m. The model can only be expected to represent an average of the chloride concentration measurements. The number and spatial range of chloride concentration measurements provide a meaningful representation of spatial average values (Figures 2.3.2-18 to 2.3.2-28) for comparison with the model results. (SAR, at 2.3.2-65)

The contention does not address this information in the SAR, or otherwise dispute this conclusion. Therefore, the contention does not establish a genuine issue of material fact.

In any event, Nevada does not claim that acceptance of this contention would have any material effect on the results of the calculation of water flow in the UZ or the impact of any change on dose. As a result, this contention does not establish a genuine issue of material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not

attempted to determine what effect, if any, acceptance of their contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**43. NEV-SAFETY-43 - Validation Of Unsaturated Zone Flow Model By Carbon-14 Contents, Strontium Isotope Compositions And Calcite Mineral Precipitate Abundances**

Uncertainties in the interpretations of carbon-14 contents in the gas phase of the unsaturated zone (UZ), in strontium (Sr) contents and strontium isotope compositions of pore waters, and of the amounts of calcite mineral that have accumulated in pore spaces could be greater than calculated by DOE as described in SAR Subsection 2.3.2.5.1.2 and related subsections, and assumptions and simplifications have not been explained, so the support that these data sources give to the UZ flow model and to the low values of modeled infiltration rates is weak.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63

with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing flow in the UZ is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the analysis in the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Don L. Shettel, and Adrian Bath), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada's contends that uncertainties "could" be greater than calculated by DOE, and that the support provided by the data on C-14, strontium, and calcite is "weak." However, Nevada does not contend that DOE's calculations of flow in the UZ are incorrect or unconservative. As a result, Nevada has not established that this issue has a material effect on the results of DOE's calculations. Consequently, this contention should be dismissed, without the need to address Nevada specific allegations in paragraph 5 of the contention. Nevertheless, as explained below,

even if the allegations in paragraph 5 are considered, they do not establish a genuine dispute of material fact.

For example, the contention speculates that the strontium contents and strontium isotope compositions of pore water, and the amount of calcite in pore spaces, could be greater than calculated by DOE. However, Nevada has not provided any support for such speculation. In fact, paragraph 5 of the contention, which purportedly provides the facts that support this contention, does not even discuss strontium or calcite, other than to refer to unidentified and unspecified “uncertainties in interpretative models.” Therefore, Nevada’s allegations related to calcite and strontium are vague and unsupported, and do not establish a genuine issue of material fact. As stated by the Commission, a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Furthermore, DOE has accounted for the uncertainties in strontium concentrations, as show on Figure 7.6-1 of LSN# DEN001572665, which plots measured strontium concentrations against various percentiles of strontium concentrations calculated by DOE’s model. Similarly, DOE has accounted for uncertainties in calcite through the use of different net infiltration rates (including upper and lower bounding rates) in the calcite model, as discussed in Section 7.7.4.3 of LSN# DEN001572665. Thus, Nevada has not accurately characterized DOE’s evaluations.

Nevada asserts that travel times obtained from DOE’s model simulations are higher than the measured C-14 ages. However, as indicated in the SAR, at 2.3.2-88, the percolation rates calculated using the C-14 data are smaller than the net infiltration rates in the UZ as used in DOE’s model; therefore, the net infiltration rates are conservative for use in predicting repository

performance. Nevada does not allege that these calculated rates are not consistent with the reasonable expectation standard discussed in section V.A.3.C. If Nevada believes that quantification would show that DOE's rates are not consistent with that standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim

Based upon Section 7.5 of LSN# DEN001572665, Nevada also asserts that the measured C-14 ages are single values and not ranges, because uncertainties have not been considered. Section 7.5 of LSN# DEN001572665 discusses that the purpose of using the C-14 ages was to validate DOE's model. As shown in Figures 7.5-1 and 7.5-2, DOE did compare the C-14 ages against DOE's 10th and 30th percentile UZ flow models, which provides a measure of the uncertainty in DOE's model. As such, the contention is incorrect in its assertion that DOE did not consider uncertainties. Therefore, this contention does not raise a genuine issue of material fact.

Nevada also asserts that DOE's documents do not provide detailed information regarding 1) the assumption that the C-14 of pore waters is 50 to 100% of atmospheric carbon dioxide, or

2) the extent of C-14 loss to solid carbonates that precipitate from pore waters. However, Nevada has not disputed the information in the application, nor has it contended that the application is legally required to contain more information on this topic. Therefore, Nevada's assertion does not establish a genuine dispute of fact or law.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention should be rejected.

**44. NEV-SAFETY-44 - Flow In The Unsaturated Zone From Episodic Infiltration**

Screening of FEP 2.2.07.05.0A “Flow in the UZ from episodic infiltration” from performance assessments in SAR Subsection 2.2.1.2 and related subsections and as specifically stated at SAR Table 2.2-3 at 2.2-127 is not justified.

**RESPONSE**

This contention alleges that episodic infiltration will persist through the UZ to repository depth, and therefore DOE wrongly excluded FEP 2.2.07.05.0A, “Flow in the UZ from Episodic Infiltration,” on the basis of low consequence. Petition at 254. Nevada claims that the PTn will not effectively damp episodic infiltration, as evidenced by (1) chlorine-36 data, and (2) studies showing the existence of fault zones and resulting fast pathways through the PTn.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada’s contention does not present a material issue. Nevada asserts that DOE did not comply with regulations regarding postclosure performance assessments and FEP screening. *See*

Petition at 257. Essentially, it alleges that the PTn unit may not effectively damp episodic infiltration. *See id.* at 256-257.

Nevada, however, fails to establish how inclusion of the subject FEP will “significantly change[.]” “the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment.” 10 CFR § 63.114(e). Notably, Nevada has not established how inclusion of this FEP would “significantly” change the performance assessments, which is the basis for any FEP screening decision under 10 C.F.R. § 63.342. Indeed, at best, Nevada asserts that the exclusion of this FEP may have resulted in an underestimation of “local infiltration rates” during brief episodes of high precipitation. Petition 254. Yet, it has not asserted what effect, if any; brief increases in infiltration of a localized nature will have on performance. Nevada has also not claimed that exclusion of the FEP underestimates *net* infiltration over longer periods of time. Indeed, although Nevada bases its contention almost exclusively upon chlorine-36 (Cl-36) data suggesting so-called “fast pathways,” (something that DOE has acknowledged, yet concluded it was of no significance in the low consequence exclusion justification for FEP 2.2.07.05.0A, *see* LSN# DEN001584824 at 6-935), Nevada admits that it is unaware of what proportion of infiltration during these short episodes may result from these limited pathways: “the proportion of infiltration that [fast pathways] could represent is not quantifiable....” Petition at 256. This, as well as the contention’s assertion that “[e]pisodic infiltration with transiently high rates of downwards movement of pore waters *would potentially* change the overall rate of infiltration ...,” Petition at 255 (emphasis added), indicates that Nevada itself is not clear as to whether the issue is material. As such, Nevada has not established that the contention’s resolution would make a difference in the outcome of the proceeding.

Specifically, Nevada also fails to establish that the Cl-36 evidence gives rise to a material issue, especially with respect to DOE's predicted infiltration rates. This contention proposes the following "back of the envelope," unsupported analysis of the Cl-36 evidence:

As an illustration, it is estimated that such a chlorine-36 anomaly in a fracture at ESF depth would indicate a local infiltration rate of around 1350 mm/yr (i.e., percolation through 450 meters of UZ, typical porosity 0.15, infiltration of Cl-36 in precipitation at ground surface at ~50 years ago).

Petition at 256. Nevada provides this summary to illustrate its assertion that infiltration rates will be "considerably more than the assumed average flux of 32 mm/yr." Petition at 254. It also states that:

It has been suggested that the quantity of water that penetrates the PTn through fast pathways is about 1% of the total infiltration. ... DOE claims that this small proportion of potential "fast pathway" infiltration is negligible. This is not consistent with the Cl-36 evidence.

Petition at 256 (citations omitted). Nevada neglects, however, to provide any explanation of how Cl-36 evidence challenges DOE's estimation. Nor does it specifically challenge DOE's incorporation of the Cl-36 evidence in its analyses, provided in FEP 2.2.07.05.0A and supporting documents. *See* LSN#DEN001584824 at 6-935.

In Appendix H of the UZ Flow Model referenced in the subject FEP exclusion justification, Cl-36 groundwater transport times were modeled using the three-dimensional UZ Model grid with a present-day, mean infiltration rate in order to investigate groundwater transport times from the ground surface to the repository level and Cl-36 transport phenomena under steady-state unsaturated zone flow conditions. UZ Flow Models and Submodels, LSN# DN2001630459 at H-6 – H-8 (Nov. 1, 2004). The modeling results show that there is an approximately 1 % mass breakthrough during 10 to 100 years after tracer release on the ground.

*See id.* This indicates the existence of possible fast flow pathways (with a transport time of 50 years) from the ground surface to the repository level, even under the steady state unsaturated zone flow condition. *See id.* The average groundwater transport times from the surface to the repository level are estimated to be between 5,000 to 20,000 years using the 50 percent mass breakthrough curves of from the four simulation results. *See id.*

This indicates that the UZ Flow Model results using steady flow are generally consistent with the observed CI-36 data and that rapid transport implied by the CI-36 data can be explained without transient flow processes. *See id.* It also is consistent with DOE's "low consequence" FEP exclusion justification, which concludes that flow through fast pathways is "negligible with respect to repository performance," LSN# DEN001584824 at 6-935, and that exclusion of the subject FEP "will not result in a *significant adverse change* in the magnitude or time of radiological exposures to the RMEI or radionuclide release to the accessible environment." *Id.* at 6-936 (emphasis added) Nevada has not shown otherwise, and therefore has failed to establish the materiality of its allegations.

In addition, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 254-255. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* at 255. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would

make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Petitioner has not made any showing in this regard.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing episodic infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in

quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and

(3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (by Howard S. Wheeler, Don L. Shettel, Jr., Adrian P. Butler, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Apart from its references to Commission regulations, the SAR, and the FEP AMR, Nevada cites only to DOE reference documents, and then only to support its summary of DOE’s analyses. Therefore, they do not support Nevada’s allegation that DOE’s FEP 2.2.07.05.0A, “Flow in the UZ from Episodic Infiltration” was wrongly excluded. To the contrary, these documents demonstrate the thoroughness and reasonableness of DOE’s screening justification.

Therefore, apart from these two documents, which support the reasonableness of DOE’s FEP exclusion, Nevada fails to provide *any* references or support, contrary to its burden to present “claims rooted in fact, documents, or expert opinions.” *Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309).

A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). As written, Nevada’s bare assertions and unsupported conclusions amount to little more than pure speculation by counsel, and therefore do not provide the support for the contention that is required by the regulation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's claim regarding DOE's exclusion of FEP 2.2.07.05.0A, "Flow in the UZ from Episodic Infiltration," presents an issue that is not material. In addition, as discussed above, the contention is also unduly speculative, provides references that negate its position, and neglects to specify the ramifications of its alleged errors. Accordingly, it does not establish a genuine dispute of material fact.

In particular, as noted above, Nevada's reference documents support a finding that exclusion from the TSPA of episodic flow in the UZ was reasonable and consistent with regulatory requirements. First, 10 C.F.R. § 63.342(a) provides that DOE's performance assessments conducted to show compliance with the postclosure protection standards need not consider those FEPs that would not *significantly* impact the results of the performance assessment.

Additionally, Nevada's reference documents illustrate DOE's adherence to 10 C.F.R. 63.305(c), which requires in part that DOE "vary factors related to the geology, hydrology, and climate based upon cautious, *but reasonable* assumptions consistent with present knowledge of factors that could affect the Yucca Mountain disposal system" (emphasis added). Zhang *et al.* (2006) concludes that "[s]imulation results show the existence of damping effects within the PTn unit and also indicate that the assumption of steady-state flow conditions below the PTn unit is reasonable." K. Zhang, Y. Wu & L. Pan, "Temporal Dumping Effect at the Yucca Mountain Fractured Unsaturated Rock on Transient Infiltration Pulses" (Feb. 10, 2006) (LSN# DN2002209213 at 235).

Similarly, beyond simply alleging that it did, Nevada neglects to demonstrate that DOE did not comply with 10 C.F.R. § 63.114(e), which requires that DOE provide the technical basis

for inclusion or exclusion of FEPs, and evaluate FEPs in detail if their omission would significantly affect the magnitude or timing of the release of radionuclides or the dose to the RMEI. To the contrary, even a cursory reading of DOE's FEP exclusion justification shows that DOE fully complied with this requirement. This also can be seen in the documents Nevada cite. For example, "UZ Flow Models and Submodels" concludes that:

[The PTn] has been shown to effectively damp spatial and temporal variations in percolation flux. Therefore, water flow through the UZ is modeled to occur under steady-state conditions. Transient "fast pathway" flow is considered to contribute insignificantly to the total flow below the PTn through the UZ.

LSN# DN2001630459 at 6-19 (citations omitted). These results support DOE's finding that "[t]he influence of rapid flow through preferential pathways formed by fractures in the PTn is considered to be volumetrically insignificant compared to flow through the matrix. Episodic infiltration would therefore have no significant effect on radionuclide releases to the accessible environment." Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-933 (Mar. 6, 2008).

If anything, this contention merely alleges that the Cl-36 evidence raises uncertainties regarding the amount of infiltration that could persist through fast pathways during short-lived events, over localized areas. As discussed above, Nevada has not established the materiality of this issue, nor has it provided sufficient information to give rise to a genuine dispute with DOE's treatment of the Cl-36 evidence as summarized in FEP 2.2.07.05.0A. *See* LSN# DEN001584824 at 6-935. Moreover, the NRC has recognized that a substantial amount of uncertainty will exist in any model attempting to predict the future of complex systems. *See* Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55,747 (Nov. 2, 2001) ("The first-of-a-kind nature of the repository and the

evaluation over a very long time period result in significant uncertainty being included in the performance assessment.”) For that reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but that DOE “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” This is precisely what DOE has done. As described in SAR Section 2.3.2, DOE explicitly notes that there is variability and uncertainty regarding description of the site conditions, and, as discussed in Section 2.3.2.3, it considered a probabilistic range of properties. DOE also used alternative representations of flow through faults in the UZ flow model to account for uncertainties in flow. *See* SAR Section 2.3.2.6, at 2.3.2-96. Nevada’s contention does not challenge DOE’s uncertainty analyses, and therefore does not establish a genuine issue of material fact. *See Duke Energy Corp.*, LBP-03-17, 60 NRC at 236-38, *aff’d*, CLI-03-17, 58 NRC 419.

Lastly, as discussed in the applicable Legal Standards section and section (d) above, this contention alleges potential errors, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies. Nevada’s language at Paragraph 6 essentially admits that it does not know whether this contention is material, and attempts to shift the burden to DOE to demonstrate that its contention is *not* material, contrary to the requirements of 10 C.F.R. § 2.309(f)(1)(vi). *See* Petition at 257-258; *see also Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 43, 422 (2001). For this and the aforementioned reasons, this contention does not establish a genuine dispute of a material issue and therefore must be dismissed.

**45. NEV-SAFETY-45 - Effects Of Episodic Flow**

SAR Subsection 2.3.2.4.2.1.2, and similar subsections, which states that one of the two primary large-scale processes that prevents or substantially reduces the movement of water through the unsaturated zone (UZ) and into the emplacement drifts of the repository is the damping of episodic pulses of precipitation and infiltration, fails to provide an appropriate technical basis for excluding FEP 2.2.07.05.0A (Flow in the UZ) from episodic infiltration as the effects of horizontal heterogeneity have not been adequately represented.

**RESPONSE**

This contention alleges that, in “SAR Subsection 2.3.2.4.2.1.2, and similar subsections,” DOE incorrectly modeled the PTn layer, ignoring the horizontal heterogeneity of the rock formation and wrongly concluding that it could attenuate episodic flow, and therefore erroneously excluded FEP 2.2.07.05.0A, “Flow in the UZ from Episodic Infiltration.” Petition at 259.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada asserts that DOE did not comply with regulations regarding postclosure performance assessments and FEP screening. *See* Petition at 262-63. Essentially, it alleges that DOE did not adequately consider the effects of horizontal heterogeneity on damping in the PTn unit. *Id.* at 259.

Nevada, however, fails to establish how inclusion of the subject FEP will “significantly change[]” “the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment.” 10 CFR § 63.114 (e). Notably, Nevada has not established how inclusion of this FEP into DOE performance assessment will produce any alternative TSPA results. The simple conclusion presented in Paragraph 5 that “the assumption that the PTn is able to attenuate episodic events sufficiently to allow the assumption that flow in the underlying Topopah Spring Tuff formation ... is constant ... is inappropriate,” Petition at 262, does not suffice to present a litigable issue. A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-40 (2006). Similarly, Nevada’s assertion that “[a] changed pattern of flow will affect both the amount of composition of water impacting on the engineered barrier system with consequences for rates of corrosion and release and transport of radionuclides from degraded waste packages,” Petition at 262, lacks the specificity necessary to demonstrate a material issue.

In addition, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 259-60. Nevada concludes this general description of various sections of 10 C.F.R. Part 63

with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 260. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Nevada has not made the required showings in the instant contention.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing episodic infiltration is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. To the extent it relies on expert opinion, this contention fails to meet those standards. Nevada's Petition attaches several affidavits (by Howard S. Wheeler, Don L. Shettel, Jr., Adrian P. Butler, and Michael C. Thorne) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's contention regarding DOE's exclusion of FEP 2.2.07.05.0A, "Flow in the UZ from Episodic Infiltration," presents an issue that is not material. For this reason, and for the reasons set forth below, this contention does not establish a genuine dispute of material fact.

This contention includes certain mischaracterizations of DOE's analysis of episodic flow events. Nevada erroneously states that "[various modeling studies relied upon by DOE] have not considered the effect of horizontal heterogeneity in the PTn layer, in particular the large number of faults present in the rock formation." Petition at 261. As summarized in Nevada's referenced document, however, these studies *have* included those considerations. First, explaining the modeling study of damping effects conducted by Zhang et al. (2006), "UZ Flow Models and Submodels" states that "[t]he three-dimensional model incorporates a wide variety of field-

specific data for the highly heterogeneous formation at the site.” “UZ Flow Models and Submodels” at 6-125, LSN# DEN001572665. Second, it states that the results of the modeling study show that “a small percentage of percolation flux is diverted into faults,” and that “[a]long fault columns, both lateral flow and rock water storage play an important role.” “UZ Flow Models and Submodels” at 6-126, LSN# DEN001572665. Third, it reports that field tests “suggested that the PTn matrix has few discrete flow paths that can transmit water quickly.” “UZ Flow Models and Submodels” at 6-126, LSN# DEN001572665.

The contention also erroneously claims that one-dimensional modeling analyses of episodic flow fail to account for heterogeneity on flow pathways. Petition at 262. The statement that one-dimensional models ignore heterogeneity is incorrect because rock properties in the one-dimensional systems were extracted from the heterogeneous three-dimensional site-scale UZ model and therefore, hydrological properties varied with depth. *See* “UZ Flow Models and Submodels,” SNL 2007 p. 6-126, LSN# DEN001572665. While a one-dimensional model does not represent flow focusing resulting from lateral flow, calculations with the three-dimensional site-scale model indicated that lateral flow above the repository is negligible. *See* SAR Subsection 2.3.2 at 2.3.2-79. Accordingly, to the extent that Nevada failed to understand DOE’s methodology and rationale, this contention fails to raise a genuine dispute.

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts that the Application fails to address an issue that the Application does address, is defective. Nevada’s contention suffers from this deficiency. Nevada completely ignores the relevant portions of the Application and fails to explain how the alleged defects in the Application will significantly affect the performance assessments. In short, this contention is inadmissible because “the Petitioner’s

assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[].” *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff’d*, CLI-04-6, 60 NRC 631 (2004).

Nevada’s reference documents support a finding that exclusion from the TSPA of episodic flow in the UZ was reasonable and consistent with regulatory requirements. First, 10 C.F.R. § 63.342(a) provides that DOE’s performance assessments conducted to show compliance with the postclosure protection standards need not consider those FEPs that would not *significantly* impact the results of the performance assessment. Nevada’s referenced documents support the low consequence exclusion of FEP 2.2.07.05.0A, “Flow in the UZ from Episodic Infiltration,” consistent with 10 C.F.R. § 63.342(a). For example, Zhang et al. (2006) concludes that its 3-D model, which “incorporates a wide variety of field-specific data for the highly heterogeneous formation at the site,” and its 1-D vertical column model show that only “a small percentage of percolation flux is diverted into faults.” Zhang et al., LSN# DN2002209213 at 246-247. These results support DOE’s finding that “the volume of flow through pathways that could lead to episodic flow in the repository host rock has been shown to be small,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-935 (Mar. 6, 2008), and, ultimately, that “episodic infiltration would therefore have no significant effect on radionuclide releases to the accessible environment,” LSN# DEN001584824, 6-933.

Additionally, Nevada’s reference documents illustrate DOE’s adherence to 10 C.F.R. 63.305(c), which requires in part that DOE “vary factors related to the geology, hydrology, and climate based upon cautious, *but reasonable* assumptions consistent with present knowledge of factors that could affect the Yucca Mountain disposal system” (emphasis added). Zhang et al.

(2006) concludes that “[s]imulation results show the existence of damping effects within the PTn unit and also indicate that the assumption of steady-state flow conditions below the PTn unit is reasonable.” LSN# DN2002209213 at 235.

Similarly, beyond simply alleging that it did, Nevada neglects to demonstrate that DOE did not comply with 10 C.F.R. § 63.114(e), which requires that DOE provide the technical basis for inclusion or exclusion of FEPs, and evaluate FEPs in detail if their omission would significantly affect the magnitude or timing of the release of radionuclides or the dose to the RMEI. To the contrary, Nevada references DOE’s technical basis and exclusion justification for the subject FEP, *see* Petition at 259, and does not establish – and does not even assert – that episodic flow in the UZ could significantly affect radionuclide transport and release.

If anything, this contention alleges that DOE did not adequately consider the uncertainties in UZ flow and infiltration that may result from horizontal heterogeneity in the PTn unit. Indeed, the NRC has recognized that a substantial amount of uncertainty will exist in any model attempting to predict the future of complex systems. *See* Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55,747 (Nov. 2, 2001) (“The first-of-a-kind nature of the repository and the evaluation over a very long time period result in significant uncertainty being included in the performance assessment.”) For that reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but that DOE “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” This is precisely what DOE has done. As described in the SAR at 2.3.2-96, DOE explicitly notes that there is variability and uncertainty regarding description of the site conditions, and as discussed

in Section 2.3.2.3, considered a probabilistic range of properties – including distribution and characteristics of fractures and faults – for the site-scale UZ flow model. DOE also used alternative representations of flow through faults in the UZ flow model to account for uncertainties in flow. *See* SAR Section 2.3.2.6, at 2.3.2-96. Nevada’s contention does not challenge DOE’s uncertainty analyses, and therefore does not establish a genuine issue of material fact. *See Duke Energy Corp.*, LBP-03-17, 58 NRC 221, 236-38, *aff’d*, CLI-03-17, 58 NRC 419.

Because Nevada has not demonstrated that DOE’s allegedly inadequate representation of horizontal heterogeneity will increase release and transport of radionuclides, it has not established a genuine issue of material fact. Nevada does not allege that the resulting increase in release and transport is inconsistent with the reasonable expectation standard discussed in section V.A.3.C. If Nevada believes it is not consistent with that standard, the burden is on Nevada to show what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim

Finally, this contention alleges potential errors, uncertainties, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies.

Nevada's language at Paragraph 6 essentially admits that it does not know whether this contention is material, and attempts to shift the burden to DOE to demonstrate that its contention is *not* material, contrary to the requirements of 10 C.F.R. § 2.309(f)(1)(vi). *See* Petition at 263; *see also Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 43, 422 (2001). For this and the aforementioned reasons, this contention does not establish a genuine dispute of a material issue and therefore must be dismissed.

**46. NEV-SAFETY-46 - Extreme Events Undefined**

SAR Subsection 2.1.2.1.2, and similar subsections, which state that one of the two primary large-scale processes that prevents or substantially reduces the movement of water through the unsaturated zone (UZ) and into the emplacement drifts of the repository is the damping of episodic pulses of precipitation and infiltration, fail to provide an appropriate technical basis for excluding FEP 2.2.07.05.0A (Flow in the UZ from episodic infiltration) as the effects of extreme events on UZ flow have not been considered in a rigorous manner because an extreme event has not been formally defined or appropriately modeled.

**RESPONSE**

This contention alleges that DOE failed to define or justify the “extreme event” used to model episodic infiltration in the UZ, and therefore the conclusions drawn from relevant analyses are “unreliable” and cannot support the exclusion of FEP 2.2.07.05.0A, “Flow in the UZ from Episodic Infiltration.” Petition at 266-267.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 264-265. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 265. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic

setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing episodic flow is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that DOE did not comply with regulations regarding postclosure performance assessments and FEP screening. *See* Petition at 264. Essentially, it faults DOE for failure to define or defend its interpretation of “extreme events” related to precipitation and infiltration. *See id.* However, as stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide

even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada neglects to establish how exclusion of the subject FEP or additional defense for the extreme infiltration events modeled could produce any alternative TSPA results. The simple conclusion presented in Paragraph 5 that “[w]hilst this approach may appear to represent an extreme event, no support for this ... has been provided” does not suffice to present a litigable issue. Petition at 266. Nevada fails to provide any qualitative, let alone *quantitative*, results of this alleged deficiency. Nor does Nevada even claim that the hypothetical extreme event used was not conservative.

Likewise, Nevada’s assertion that DOE’s use of infiltration rates for an “extreme event,” (as opposed to precipitation rates), leads to conclusions that are “unreliable,” also fails to present a litigable issue. Petition at 267. Nevada asserts that DOE’s use of infiltration rates “ignores the connection of rainfall, surface runoff, infiltration and subsurface flows.” Petition at 267. Yet Nevada fails to note that, for the same reasons, use of infiltration rates is *more conservative* than using precipitation. Nor does it even allege that DOE was not conservative.

A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006). As these two examples illustrate, Nevada falls far short of that requirement, as it fails to even *allege* that more accurate data could be used.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference *any* documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Howard S. Wheeler, Don L. Shettel, Jr., Adrian P. Butler, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Apart from its references to Commission regulations, the SAR, and the FEP AMR, Nevada cites only to DOE reference documents and then only to support its summary of DOE's analyses. Although these documents provide support for the limited propositions for which they are cited, they do not support Nevada's conclusion that FEP 2.2.07.05.0A, "Flow in the UZ from Episodic Infiltration," was erroneously excluded. *See Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998) ("the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention").

To the contrary, these documents provide substantial support for DOE’s screening justification. For example, one of Nevada’s cites finds the extreme condition used “is conservative for the investigation of the PTn damping effect.” K. Zhang, Y. Wu & L. Pan, “Temporal Dumping Effect at the Yucca Mountain Fractured Unsaturated Rock on Transient Infiltration Pulses” (Feb. 10, 2006) (LSN# DN2002209213). It also concludes that “[t]his study justifies the reasonableness of assuming steady-state flow conditions below the PTn unit.” LSN# DN2002209213 at § 4. These references do not support Nevada’s contention because they show that DOE’s FEP exclusion was consistent with 10 C.F.R. § 63.342 and reasonable, in compliance with 10 C.F.R. § 63.305(c).

Apart from the DOE reference documents, Nevada fails to provide any references or support for *its own* assertions, notwithstanding its burden to present “claims rooted in fact, documents, or expert opinions.” *Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). Without support, Nevada’s contention amounts to little more than bare speculation, and should be dismissed. *See Fansteel*, CLI-03-13, 58 NRC at 203.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s contention regarding DOE’s exclusion of FEP 2.2.07.05.0A, “Flow in the UZ from Episodic Infiltration,” presents an issue that is not material. In addition it is also unduly speculative, misconstrues DOE’s analysis, and neglects to specify the ramifications of its alleged errors. Accordingly, this contention does not establish a genuine dispute of material fact.

This contention mischaracterizes DOE’s analysis of episodic flow events. Nevada erroneously states that “the episodic events used in these studies were arbitrarily selected, both in

terms of intensity, duration, and frequency.” Petition at 266. However, DOE based the water flux boundary conditions for one-dimensional episodic flow simulations on infiltration model results for the maximum annual infiltration rate that had a 333-year return period. *See* “UZ Flow Models and Submodels,” LSN# DEN001572665 at 6-127. Thus, the statements in the contention that claim that no return period was specified are incorrect. *See* Petition at 266. The episodic periods were conservatively selected to occur more frequently, every 50 years, rather than every 333 years. *See* “UZ Flow Models and Submodels,” SNL 2007, LSN# DEN001572665 at 6-127. Because episodic infiltration generally occurs over only a few days in a given year, Simulation of Net Infiltration for Present-Day and Potential Future Climates, SNL 2008, LSN# DEN001575070 Figure 6.5.7.7-6[a], this annual infiltration was focused into a one-week period for the year. The remainder of the period between infiltration episodes was set to the average infiltration rate for the post-10,000 year period, 32 mm/yr. UZ Flow Models and Submodels, SNL 2007 p. 6-127, LSN# DEN001572665. Thus, the specification of the boundary condition was not arbitrary.

The contention also claims that one-dimensional modeling analyses of episodic flow ignore heterogeneity and flow focusing. Petition at 267. The statement that one-dimensional models ignore heterogeneity is incorrect because rock properties in the one-dimensional systems were extracted from the heterogeneous three-dimensional site-scale UZ model and therefore, hydrological properties varied with depth. *See* “UZ Flow Models and Submodels,” SNL 2007 p. 6-126, LSN# DEN001572665. While a one-dimensional model does not represent flow focusing resulting from lateral flow, calculations with the three-dimensional site-scale model indicated that lateral flow above the repository is negligible. *See* SAR Subsection 2.3.2 at 2.3.2-79. To

the extent that Nevada failed to understand DOE's methodology and rationale, this contention fails to raise a genuine dispute.

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts that the Application fails to address an issue that the Application does address, is defective. Nevada's contention also suffers from this deficiency. Nevada completely ignores the relevant portions of the Application and fails to explain how the alleged defects in the Application will significantly affect the performance assessments. In short, this contention is inadmissible because "the Petitioner's assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[]." *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff'd*, CLI-04-6, 60 NRC 631 (2004).

As noted above, documents referenced in this contention support a finding that exclusion from the TSPA of episodic flow in the UZ was reasonable and consistent with regulatory requirements. 10 C.F.R. § 63.342 provides that DOE's performance assessments conducted to show compliance with the postclosure protection standards need not consider those FEPs that would *not significantly* impact the results of the performance assessment.

Nevada's referenced documents support the low consequence exclusion of FEP 2.2.07.05.0A, "Flow in the UZ from Episodic Infiltration," consistent with 10 C.F.R. § 63.342. For example, "UZ Flow Models and Submodels," summarizes studies conducted to evaluate the damping effect of the PTn unit in response to episodic infiltration pulses. It reports that one- and two-dimensional models illustrate the damping effect of the PTn in response to infiltration pulse. LSN# DEN001572665 at 6-125. It explains that Guerin's one-dimensional models, also cited by Nevada in its contention, *See* Petition at 266, showed that "the PTn unit damped infiltration

pulses no matter what infiltration scenarios were applied.” LSN# DEN001572665 at 6-125. It also reports that other models and field studies show that at the bottom of the PTn unit, episodic flow variations are small relative to the uncertainties incorporated in the TSPA. LSN# DEN001572665 at 6-125.

These studies support DOE’s finding that the PTn effectively damps episodic flow, and that “[e]pisodic infiltration would therefore have no significant effect on radionuclide releases to the accessible environment.” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-933 (Mar. 6, 2008). Nevada has not otherwise established – or even alleged – that inclusion of the subject FEP would *significantly change* the results of the performance assessment.

Additionally, Nevada’s reference documents illustrate DOE’s adherence to 10 C.F.R. 63.305(c), which requires in part that DOE “vary factors related to the geology, hydrology, and climate based upon cautious, *but reasonable* assumptions consistent with present knowledge of factors that could affect the Yucca Mountain disposal system” (emphasis added). Zhang et al. (2006) finds that the extreme event modeled “is conservative for the investigation of the PTn damping effect,” Zhang et al., LSN# DN2002209213 at 238, and concludes that “[s]imulation results show the existence of damping effects within the PTn unit and also indicate that the assumption of steady-state flow conditions below the PTn unit is reasonable.” Zhang et al., LSN# DN2002209213 at 235. Nevada has not demonstrated that DOE's assumption in this regard are otherwise *unreasonable*.

Similarly, beyond simply alleging that it did, Nevada neglects to demonstrate that DOE did not comply with 10 C.F.R. § 63.114(e), which requires that DOE provide the technical basis for inclusion or exclusion of FEPs, and evaluate FEPs in detail if their omission would

*significantly affect* the magnitude or timing of the release of radionuclides or the dose to the RMEI. To the contrary, Nevada references DOE's technical basis and exclusion justification for the subject FEP, *see* Petition at 264, and does not establish – and does not even assert – that episodic flow in the UZ could *significantly affect* radionuclide transport and release.

Lastly, as discussed in the applicable Legal Standards section and section (d) above, this contention alleges potential errors, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies. Nevada's language at Paragraph 6 essentially admits that it does not know whether this contention is material, and attempts to shift the burden to DOE to demonstrate that its contention is *not* material, contrary to the requirements of 10 C.F.R. § 2.309(f)(1)(vi). *See* Petition at 268; *see also Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 43, 422 (2001). For this and the aforementioned reasons, this contention does not establish a genuine dispute of a material issue and therefore must be dismissed.

**47. NEV-SAFETY-47 - Physical Basis Of Site Scale Unsaturated Zone Flow**

SAR Subsection 2.3.2.4 and similar subsections, which describe the development of the site-scale UZ flow model, fail to provide a reasonable physical basis to support the characterization of the subsurface hydraulic properties at the site of the proposed repository and do not, therefore, provide reliable bounding estimates for drift seepage calculations under present and future climates.

**RESPONSE**

This contention argues that SAR Subsection 2.3.2.4 fails to provide a reasonable physical basis to support the characterization of the subsurface hydraulic properties at the site of the proposed repository and does not, therefore, provide reliable bounding estimates for drift seepage calculations under present and future climates.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that the LA fails to provide a reasonable physical basis to support its characterization of the hydraulic properties at the subsurface of the proposed repository, and that it accordingly fails to accurately estimate drift seepage calculations under present and future climates.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(9), 10 C.F.R. §63.113, 10 C.F.R. § 63.114(c), 10 C.F.R. § 63.114(e), and 10 C.F.R. §63.114(g)). *See* Petition at 269-70. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2 and 3)*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC

from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing water flow through the unsaturated zone is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a

contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada alleges that DOE fails to provide bounding estimates for drift seepage under present and future climate conditions because it allegedly has failed to provide a reasonable physical basis to support characterization of subsurface hydraulic properties, Nevada has not alleged an increase in the mean dose above regulatory limits, and has not otherwise established how the contention's resolution would make a difference in the outcome of the proceeding. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that the layers of fractured and faulted tuff at the site of the proposed repository are “highly complex and heterogeneous” (Petition at 269) and that the parametric relationships used to represent their hydraulic properties lack a physical basis and do not adequately characterize the site. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the

most part, the contention does not reference any documents, other than the LA and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Howard S. Wheeler, Adrian Butler, and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada claims that the LA fails to provide a reasonable physical basis to support characterization of hydraulic properties at the subsurface of the geologic repository, and that in failing to do so, has not provided reliable bounding estimates for drift seepage calculations under present and future climates. DOE used the dual continuum method to model fracture flow and matrix flow within the unsaturated zone. In implementing the dual continuum method, DOE used the active fracture model (AFM) which made use of the Genuchten relationship to model permeability of the rock matrix. This contention includes a number of criticisms regarding discrete aspects of these modeling methods, followed by a conclusion which essentially states that DOE's calculation of fluxes in the unsaturated zone is not reliable given those criticisms. As demonstrated below, neither the discrete criticisms nor Nevada's overall conclusion establishes a genuine issue of material fact. Accordingly, this contention must be dismissed.

First, Nevada makes a number of discrete claims regarding the van Genuchten model and the AFM, but fails to demonstrate how these claims raise a genuine dispute with DOE's results of calculations of flow through the unsaturated zone as demonstrated in the LA. Specifically, Nevada states that a detailed comparison of the AFM with a discrete fracture network model (DFM) showed that the AFM "improved the ability of the dual continuum approach to predict flow," but that the AFM is not fully sufficient to capture the complexity of the flow processes in a one cubic meter discrete fracture network. Petition at 272. SAR § 2.3.2.4.1.1.2 states that while DFMs "are useful as tools for concept evaluation and modeling small-scale systems, they are not feasible for dealing with large-scale applications – such as the Yucca Mountain unsaturated zone." SAR § 2.3.2.4.1.1.2 at 2.3.2-42. Thus, there is no genuine dispute that DFM is useful for modeling small scale applications, such as applications on the scale of a cubic meter. However, the information and citation provided by Nevada are not material to the adequacy of the DFM for modeling large scale applications, such as Yucca Mountain, and do not raise any material dispute regarding the adequacy of the AFM to model large-scale applications.

Next, Nevada states that there is no physical basis for the use of  $m=1-1/n$  in the van Genuchten relationship. Petition at 272. Even if Nevada's claim were to be accepted, the contention provides no basis for believing that it would have any material effect on seepage rates as calculated by DOE. If Nevada believes that the use of  $m=1-1/n$  in the van Genuchten relationship would be inconsistent with the reasonable expectation standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not

provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Nevada then claims, citing to an article by Schaap and Leij (2000) (Schaap, M.G. and Leij, F.J. (2000), "Improved Prediction of Unsaturated Hydraulic Conductivity with the Mualem-van Genuchten Model," SOIL SCIENCE SOCIETY OF AMERICA JOURNAL, Vol. 64 at 843-851), that there is no physical basis for the tortuosity term in the Mualem model used in the van Genuchten relationship, where the degree of saturation ( $S_e$ ) is raised to the power of  $L$ , where  $L$  equals 0.5. Petition at 272-73. Instead, Nevada suggests that  $L$  should be assigned a negative number, such as  $L = -0.5$ . Petition at 273. However, Nevada has inappropriately taken statements from this article out of context, in the following manner.

First, while the article pertains to soils and sands, not the geological formations in the unsaturated zone at Yucca Mountain, Nevada has not provided any basis for applying this article to Yucca Mountain. Second, the conclusions reported in the article do not support Nevada's assertions. For example, Figure 4 in the article shows, that for clay soils, setting  $L=0.5$  produced results that generally are within the 90% confidence band of the results where  $L = -1.26$ , and the results were even closer when  $L$  was set to  $-1.0$ . Although there was more discrepancy when sand was used as the medium, even then setting  $L=0.5$  produced results that are within the 90% confidence band of the results where  $L = -0.73$ , if the relative saturation of the sand is less than 0.4. The article concludes:

This ultimately suggests that the models proposed by Mualem (1976) or Burdine (1953) give too-simplified conceptualization of the hydraulic conductivity of a porous medium. Still, as shown by Kosugi (1999) and the current study, these pore-size distribution models can be used to successfully predict unsaturated hydraulic conductivity from water retention parameters.

Nevada has not accurately characterized the article. In doing so and for other reasons discussed herein, Nevada has failed to raise a genuine dispute of material fact or law. Nevada's incorrect reading of the article does not provide an adequate basis for a litigable contention. *See Ga. Inst. of Tech. (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995).*

Additionally, Nevada states that there are no grounds for assuming that the parameters are horizontally homogeneous. This statement, however, ignores the study discussed in SAR § 2.3.2.4.1.1.4, which assumed small-scale heterogeneity within a geologic layer. SAR § 2.3.2.4.1.1.4 at 2.3.2-45 to -46. The results of this study showed that the heterogeneities within each geologic layer have only a minor effect on site-scale flow processes. *Id.* Nevada has not contested or even addressed this study. As a result, Nevada's contention related to heterogeneities does not establish a genuine issue of material fact.

Furthermore, based upon the assertions discussed above, Nevada concludes that DOE's calculation of water flux through the unsaturated zone is unreliable. However, Nevada never suggests that there are any better or preferable models. More importantly, Nevada never alleges that DOE has underestimated the flux in the unsaturated zone. In short, Nevada never demonstrates that its assertions are material.

Nevada does not allege that DOE's water flux calculations are not consistent with the reasonable expectation standard discussed in section V.A.3.C. If Nevada believes that quantification would show that DOE's water flux calculations are not consistent with that

standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the subsurface hydraulic properties at the proposed repository site. Accordingly, it is impossible to assess what effect, if at all, this would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Petition at 275, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 275. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster*

(Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001).

Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact.

Therefore, the contention should be dismissed.

**48. NEV-SAFETY-48 - Multi-Scale Thermal-Hydrologic Model**

SAR Subsection 2.3.5.4, and similar and related subsections, which state or assume that the multi-scale thermal-hydrologic model accurately models the movement of heat and mass (liquids and gases) from the in-drift to the mountain scale, are incorrect because they ignore the presence of ground support items, especially the hundreds of thousands of ungrouted super Swellex-type stainless steel rock bolts that are to be installed in the emplacement drifts.

**RESPONSE**

In this contention, Nevada alleges that in SAR Subsection 2.3.5.4 and “similar and related” (though unspecified) subsections, DOE’s multi-scale thermal-hydrologic model is “incorrect.” Petition at 276.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3)*. CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate

that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and as explained in the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits of Michael C. Thorne, Don. L. Shettel, Jr., Stephen K. Matthai, which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada is obligated to provide "a concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials." Petition at 277. Yet other than citing the license application, Nevada supplies only one reference, the "Total System Performance Assessment Data Input Package for the Multiscale Thermohydrologic Model" (LSN# DN 2002426865), to support a statement about DOE's conclusion regarding the nominal effect of liners on drift-wall emissivity—a conclusion that Nevada does not challenge. *Id.* at 278.

Not having cited any scientific or factual materials to support its so-called factual assertions, Nevada thus makes a variety of unsubstantiated claims about the possible performance of the rock bolts in the ground support system. First, Nevada's entire contention is premised on the assumption that despite the ventilation of the drifts for the expected 100-year preclosure period, *see* SAR at 1-3, 1.3.1-2, 1.3.1-3, water introduced into the bolts during their installation will remain in the rock bolts for a significant period of time. Petition at 278. Nevada offers no scientific or factual materials to support this assertion, leaving the entire premise of the contention unsubstantiated.

Second, Nevada makes the equally unsupported assertion that the "rock bolts will affect heat transfer from the drifts" and "facilitate heat transfer into the rock." Petition at 278. Nevada then hypothesizes that each rock bolt "may act as a small-scale heat pipe" that will cause water to be boiled at the drift wall end and then to condense at the deeper end in the drift wall, eventually dripping back to repeat the cycle. *Id.* Nevada makes these assertions about the performance of the rock bolt without citing any technical references, documents, or expert affidavits. Thus, these assertions are nothing more than attorney argument, and therefore do not satisfy the requirements of section 2.309(f)(1)(v).

Third, Nevada draws a speculative conclusion about the impact of the rock bolts on the modeling. Nevada claims that the rock bolts "have the *potential* to change the heat distribution around the emplacement drifts, gas phase movement, and saturation patterns in the drift wall rocks." Petition at 278 (emphasis added). Again, however, Nevada cites no technical references and provides no analysis or calculations to substantiate this conclusion. Yet, that is exactly what Nevada was required to do in order to meet its burden of establishing that this contention is admissible. *See Dominion Nuclear Conn.*, CLI-08-17, 68 NRC \_\_\_\_ (slip op. at 11). Nevada is

not entitled to adjudication of a contention such as this, where arguments of counsel are substituted for the requisite references to documentation or expert opinion.

Fourth, there are three, boilerplate expert affidavits that “adopt” this contention, but they are wholly inadequate. *See* Petition Attachment No. 3 ¶ 6, Attachment No. 10 ¶ 5, and Attachment No. 21 ¶ 5. These one-page affidavits contain no reasoning or substantive discussion whatsoever. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

Finally, the contention challenges DOE’s conclusion that rock bolts, like other man-made, small scale items in the ground support systems for the emplacement drifts, will not affect the outcome of the modeling. *See* Petition at 279. While admitting that rock bolts are part of the ground support system, *id.* at 278, the contention implies that rock bolts should be treated differently than other aspects of the ground support system simply because of the sheer number of rock bolts expected to be used. *Id.* at 276 (referring to hundreds of thousands of rock bolts); *Id.* at 278 (referring to thousands of rock bolts). Yet, Nevada offers no data, studies, or scholarly references to show that DOE’s assumptions about the ground support system in general would not apply to the rock bolts. Once again, because of Nevada’s failure to provide any support for its position, the contention must be dismissed.

In summary, the contention does not identify any documents or expert opinion to support it and is therefore inadmissible.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention also must be dismissed because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact.

First, as noted above, the contention alleges that DOE ignored the impact of ground support items, and rock bolts in particular, on the modeling outcome. It clearly is not the case that DOE ignored either ground support items generally, or rock bolts in particular. In fact, the contention admits that DOE concluded that man-made, small-scale features such as ground support items have little or no effect on the outcomes of the modeling. Petition at 279.

Moreover, The “Features, Events, and Processes [FEPs] for the Total System Performance Assessment: Analyses” (LSN# DEN001584824) is replete with FEPs relating to the ground support system, as well as the rock bolts, and shows unequivocally that DOE analyzed the various aspects of the ground support system, including the rock bolts.

For example, regarding FEP 1.1.01.01.0B, which pertains to “Influx Through Holes Drilled in Drift Wall or Crown,” DOE considered the “boreholes drilled through the walls of emplacement drifts [that] are designed for rock bolts and ground support.” LSN# DEN001584824 at 6-24. Similarly, FEP 1.1.07.00.0A, addresses the “repository design,” including the EBS, the ground support system, rock bolts, steel liner, cement, and wire mesh. *Id.* at 6-48. It analyzed the “the ways in which the design influences the evolution of the in-drift environment.” *Id.* at 6-47. Yet another example is FEP 2.1.06.02.0A, “Mechanical Effects of Rock Reinforcement Materials in EBS.” *Id.* at 6-509. Here, DOE screened the degradation of rock bolts, as well as wire mesh and other materials used in ground control that may affect the long-term performance of the repository. *Id.* In FEP 2.1.06.04.0A, DOE analyzed the “Flow Through Rock Reinforcement Materials in EBS,” including the possibility that groundwater may

occur flow through the ground support materials (*e.g.*, wire mesh, rock bolts, and grout). *Id.* at 6-512. In each of these instances, DOE conducted a rigorous screening analysis and determined that the FEP either needed to be included or could be excluded from the TSPA. Thus, Nevada cannot claim credibly that DOE “ignored” ground support items, including the rock bolts. Indeed, the contention itself cites DOE’s consideration of Bernold-type liners. Petition at 278.

Second, Nevada claims that “if any water remains inside [the rock bolts]” after being installed with high-pressure water, the bolts may act as “a small-scale heat pipe.” Petition at 278. Based on this scenario where water remains in the rock bolt, Nevada posits that the water in the rock bolts will boil and then condense, and that this cycle will repeat. *Id.* This entire argument is premised on Nevada’s unsupported view that water might be sealed in the rock bolts after installation, but in fact the rock bolts will left open after installation. *See* “Ground Control for Emplacement Drifts for LA” (July 2007) LSN# DN2002491254 at Figure 6-30. Thus, Nevada does not raise a genuine dispute of material issue of law or fact about whether the rock bolts will act as small scale heat pipes.

Third, Nevada argues that the rock bolts in the ground support system for the emplacement drifts “have the potential to change the heat distribution around the emplacement drifts, gas phase movement, and saturation patterns in the drift wall rocks.” Petition at 278. According to Nevada, DOE’s failure to take into account these “potential” effects of the rock bolts renders “incorrect” DOE’s multi-scale thermal-hydrologic model (which models the movement of heat and mass from the in-drift to the mountain scale).

Nowhere in the contention, however, does Nevada quantify this “potential change” or even allege that the change would have a material effect on the accuracy of the multi-scale thermal-hydrologic model. The multi-scale thermal-hydrologic model takes into account

uncertainty and variability in rock thermal conductivity and percolation flux. See SAR figure 2.3.5-32 at 2.3.5.-214; see also “Multiscale Thermahydrologic Model” (July 2005), LSN# DEN 001575312 at 6.3.16[a]. Nevada has not argued, much less shown, how the rock bolts would have any material impact on the outcome of the model in light of the variabilities and uncertainties that the model includes. Nor has Nevada shown that the rock bolts would have any adverse effect on the EBS. Indeed Nevada could not make such a claim because, according to the risk sensitivity analysis of the TSPA results, host rock thermal conductivity is identified as a “key uncertain input” only for the early failure of waste package scenario. See “Total System Performance Assessment Mode/Analysis for the License Application,” LSN# DEN001579005, at Table K9-1[a], p. K-35[a]). In turn, the early failure of waste package scenario contributes only a very small fraction of the total dose. See SAR Figure 2.4-18, p. 2.4-432 (drip shield and waste package early failure cases combined).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, the contention fails to raise a genuine dispute of a material issue of fact or law and must be dismissed.

**49. NEV-SAFETY-49 - Models Of Fluid Movement In The Unsaturated Zone**

SAR Subsections 2.3.2 and 2.3.5.3, and similar and related subsections, which state or assume diametrically opposed methods of aqueous fluid movement in the unsaturated zone, are inconsistent with each other and will give rise to different chemical results for seepage waters that may contact the engineered barrier systems at some future time.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of Nevada's Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must

make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that the petitioner must show that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3c *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing flow in the UZ is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

As discussed in more detail below in Subsection (f), the issue raised by this contention does not materially affect the results of the calculation of flow in the UZ.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. §

2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Don L. Shettel, Adrian Butler, and Adrian Bath) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention asserts that SAR Subsection 2.3.5.3 (which assumes plug flow in the Topopah Spring Tuff (TSw)) is inconsistent with SAR Subsection 2.3.2, which assumes that the predominate method of flow in the TSw is fracture flow. Petition at 281. This assertion does not establish a genuine issue of material fact.

The contention correctly states that SAR Subsection 2.3.2 assumes that flow in the TSw is predominately fracture flow (which differentiates between flow in the rock fractures versus flow in the rock matrix), and that SAR Subsection 2.3.5 assumes plug flow in the TSw (which does not discriminate between fracture and matrix flow and instead assumes equilibrium between the water in the fracture and matrix). SAR at 2.3.5-23. However, there is nothing inconsistent in these different assumptions. The purpose of SAR Subsection 2.3.2 is to describe the calculation of the flow in the UZ. In contrast, the purpose of SAR Subsection 2.3.5.3 is to describe the calculation of chemistry of the water seeping into the drift. Nevada does not identify anything inappropriate in assuming plug flow for the purposes of calculating water chemistry, and fails to

recognize that the discussion in SAR Subsection 2.3.2 is not intended to assess the chemistry of seepage water.

In this regard, SAR at 2.3.5-30 shows that there is compositional equilibrium between the matrix and matrix-fracture waters, which supports the use of plug flow for the purpose of calculating water chemistry. Nevada does not dispute that conclusion in the SAR. Therefore, the contention does not establish a genuine issue of material fact.

Furthermore, SAR at 2.3.5-43 and 44 explain that the plug flow model is a simplification of the fracture flow model used in SAR Subsection 2.3.2. Transport times simulated using matrix-fracture flow and calculated from plug flow showed minor differences. Thus, contrary to Nevada's assertions, the modeling of flow and transport in SAR Subsections 2.3.2 and 2.3.5.3 is not inconsistent. The contention does not dispute or even address this discussion in the SAR.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 285. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially asserts that DOE must show that Nevada's contention is not material. This assertion constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact.  
Therefore, the contention should be rejected.

**50. NEV-SAFETY-50 - Alternative Discrete Fracture Flow Models**

SAR Subsection 2.3.2.3 and similar subsections demonstrate that DOE has not used discrete fracture network models, which are in common use for representing water flows and radionuclide transport in fractured rocks in the context of postclosure performance assessments; as a consequence, the DOE approach introduces a bias into the TSPA because flow focusing and peak flow rates are underestimated whereas transport distances and times are overestimated.

**RESPONSE**

In this contention, Nevada argues that the LA improperly utilizes a dual porosity conceptual model rather than discrete fracture network (DFN) models to determine water flow and radionuclide transport in fractured rocks in the unsaturated zone, and that accordingly, the LA underestimates the degree of flow focusing and maximum seepage flux through the repository, thereby introducing a bias into the TSPA.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that DOE's failure to use a DFN model to analyze water flow and radionuclide transport in fractured rocks ultimately results in underestimation of flow focusing and peak flow rates. In an attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.102(h), 10 C.F.R. §63.113, and 10 C.F.R. §63.114). *See* Petition at 286-87. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2),

“because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing water flow through the unsaturated zone is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that DOE's application of the dual porosity conceptual model rather than DFN models to unsaturated zone flow is improper because the dual porosity model improperly relies on assumptions and does not adequately represent the physical characteristics of the unsaturated zone at Yucca Mountain. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach two affidavits (by Adrian P. Butler and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada argues that DOE improperly failed to utilize DFN models in analyzing water flow and radionuclide transport in the unsaturated zone, resulting in underestimation of flow focusing and peak flow rates and overestimation of transport times and distance, thereby introducing a bias into the TSPA. As shown below, however, Nevada fails to raise a genuine dispute of material fact or law, because it fails to demonstrate that the dual porosity conceptual model is inadequate to analyze fracture flow and solute transport in the unsaturated zone, and because it fails to show that use of DFN models would lead to a materially different result. Accordingly, this contention must be dismissed.

Nevada claims that the models used in the LA “substantially underestimate[] the degree of flow focusing and the maximum seepage flow through the repository and therefore underestimate[] the dose to the RMEI.” Petition at 290. Nevada does not, however, allege or demonstrate that use of DFN models will show that the LA has inadequately analyzed flow in the unsaturated zone and that, as a result, the repository cannot comply with performance requirements. While failing to specifically criticize the dual porosity model or demonstrate that it is inadequate, Nevada alleges that use of DFN models would lead to more accurate results. Nevada may not rely, however, on a mere allegation that other models are available or that other models might lead to other results as the basis for its claim that the model used by DOE is inappropriate. Because Nevada fails to demonstrate that DOE’s use of the dual porosity conceptual model is improper, this contention must be dismissed. As a licensing board has ruled in another proceeding, the mere fact that a model may not provide completely accurate results, or

does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). A contention challenging the use of a model, in order to be admitted, must show that the model used is defective or incorrect for the purpose used, that the model was used incorrectly or that the model recommended by the petitioner is superior. *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), LBP-03-17, 58 NRC 221, 229 (2003), *aff'd on other grounds*, CLI-03-17, 58 NRC 419 (2003). Here, Nevada has failed to make any of those showings. Nevada fails to show that the model DOE uses is defective or incorrect for the purpose used.

Nevada argues that the “dual porosity (DP) abstraction of fracture flow that DOE uses to assess infiltration . . . underestimates flow focusing and peak flow rates and overestimates transport distances and times.” Petition at 287. Nevada then claims that “[d]iscrete fracture network (DFN) models are available that could overcome these deficiencies and avoid use of the assumptions associated with volume averaging that the DP approach relies on.” Petition at 288. In doing so, Nevada fails to allege, much less demonstrate, that DOE’s failure to utilize DFN models would result in a mean dose to the RMEI that exceeds regulatory limits. Instead, Nevada merely claims that the model Nevada alleges that DOE uses “underestimates the dose to the RMEI.” Petition at 290.

Furthermore, the conceptual models utilized in the LA to analyze water flow and radionuclide transport in fractured rocks is based on conservative assumptions. SAR § 2.3.2.6 at 2.3.2-97. Specifically, the “dual-permeability modeling approach . . . leads to increased flow and transport in the fractures, and shorter radionuclide transport times to the water table” than “is indicated by geologic and geochemical data and observations of past flow.” *Id.* Thus, contrary

to Nevada's assertions, the model used by DOE actually overestimates both water flow and radionuclide transport. The existence of concerns about the reliability of a model does not preclude the use of a model, provided that the analysis is performed in a conservative manner and margins of safety exist. *See Cleveland Electric Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2)*, LBP-85-35, 22 NRC 543-44, 550 (1985). Because DOE's use of dual-permeability modeling in analysis of unsaturated zone flow is conservative, this contention must be dismissed.

Moreover, the LA demonstrates that the modeling approach taken by DOE was appropriate. As an initial matter, contrary to Nevada's claim, DOE does not actually use a dual porosity conceptual model to represent water flows and radionuclide transport in fractured rocks. *See SAR § 2.3.2.1 at 2.3.2-5, 2.3.2.4.1.2.1 at 2.3.2-46.* Instead, it uses a dual-permeability model, which appropriately considers global flow within the matrix continuum, thereby more accurately capturing overall flow and transport processes in fractured rock. Nevada alleges that "DFN models were not considered because of a scarcity of information on fracture geometry and hydrologic properties on the scale of individual fractures, citing to the section of the SAR analyzing water seepage into emplacement drifts," SAR § 2.3.2.4.1.1.2 at 2.3.2-42. Petition at 289. As the LA demonstrates, and contrary to Nevada's claim, DOE considered discrete fracture network methods, but found them to not be "suitable for large-scaled fractured systems . . . such as the Yucca Mountain unsaturated zone. *Id.* Indeed, "the simplicity of the continuum conceptual model [in light of consistent results in a study that compared a DFN model and simplified calibrated fracture continuum model] is considered an advantage over the complexity of the discrete-fracture network model." SAR § 2.3.3.2.3.7.1 at 2.3.3-47.

Finally, Nevada essentially admits, in paragraph 6 of this contention, that it does not know whether this contention raises a genuine dispute of a material issue: allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions” (Petition at 291), Nevada has not determined what effect the contention would have on dose. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed. Nevada’s position constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and this contention must be dismissed.

**51. NEV-SAFETY-51 - Potential Convective Self Organization Of 2-Phase Flow**

The simulation grids used in the mountain-scale thermal-hydrologic seepage model (see SAR Subsections 2.3.2 and 2.3.3.3.1, and similar subsections; see also Wu, Y.S.; Mukhopadhyay, S.; Zhang, K.; and Bodvarsson, G.S. (2006), “A Mountain-Scale Thermal-Hydrologic Model for Simulating Fluid Flow and Heat Transfer in Unsaturated Fractured Rock,” JOURNAL OF CONTAMINANT HYDROLOGY, Vol. 86 at 128-159, Fig. 2 are too coarse to capture the spatial self-organization and accompanying localization of single and two-phase (steam and condensed water) flow which is likely to occur in the thermal loading phase of the repository.

**RESPONSE**

Nevada argues that numerical grids used for certain simulations described in SAR Subsections 2.3.2 and 2.3.3.3.1 and similar subsections, which describe the mountain-scale thermal-hydrologic seepage model, is inadequate, because the model is discretized too coarsely to capture the spatial self-organization and accompanying localization of single and two-phased flow that Nevada believes are likely to occur during the thermal phase following repository closure.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that the numerical grids used in DOE's thermal-hydrologic seepage model are too coarse to capture flow and saturation patterns and flow localization expected following repository closure. But Nevada is silent as to how such purported modeling "inconclusive[ness]" would result in DOE failing to comply with 10 C.F.R. Part 63. Therefore, Nevada has not demonstrated why this proposed contention – even if true – would be material to the findings the NRC must make in this proceeding.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.102(h), 10 C.F.R. §63.113, and 10 C.F.R. §63.114. *See* Petition at 293. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be

read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing water flow through the unsaturated zone is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that the TSPA thermal-hydrologic model is “discretized too coarsely to capture the two-phase flow and saturated patterns and the localization of the flow” expected during the thermal phase after closure of the repository. Petition at 295. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Nevada also cites a number of technical papers without indicating where in those papers its positions are supported. As such, those documents are no more than background information. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach two affidavits (by Adrian P. Butler and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada asserts that the TSPA mountain-scale thermal-hydrologic seepage model is too coarse to capture the spatial self-organization and localization of single and two-phase flow or the convective circulation in the plane of permeable faults. Nevada's claims, however, are vague and unsupported. Nevada may not rest its claim on such assertions that do not allege or demonstrate that any purported inadequacies in mountain-scale thermal-hydrologic model will have any effect on repository performance or dose. Accordingly, this contention fails to raise a genuine dispute of fact or law and must be dismissed.

Nevada does not assert, much less demonstrate, that its claimed "inadequacies" will have any effect on repository design or performance. Nowhere in this contention does Nevada specifically address what will happen if DOE relies on a "spatial resolution of 81 m" or if localized flow and self-organized saturation patterns are not "resolved in three dimensions." Petition at 294. Instead, Nevada provides unsupported allegations about the model's coarseness

that fail to allege what effect, if at all, this would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Nevada's unsupported assertions challenging DOE's mountain-scale thermal-hydrologic models are an insufficient basis for rejecting the model. In particular, the contention does not allege or demonstrate that the use of a different or more discretized method would result in more accurate modeling of the mountain-scale and would lead to conclusive results.

Nevada does not allege that DOE's modeling is not consistent with the reasonable expectation standard discussed in section V.A.3.C. The burden is on Nevada to determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Nevada has alleged only that the mountain-scale thermal-hydrological simulation grids are too coarse, failing to allege or demonstrate that the models are inconsistent with the reasonable expectation standard. In neglecting to do so, Nevada fails to raise a genuine dispute of material fact or law.

Nevada claims that the mountain-scale submodel component of the multiscale thermal-hydrologic TSPA model, “refined to a most detailed spatial resolution of 81 m,” is too coarse to capture the two-phase flow and saturation patterns and localization of flow. Petition at 294.

Nevada further claims that higher resolution thermal-hydrological simulation models exist only at the two-dimensional level, but that these models do not represent first-order heterogeneities and other instabilities “need[ed] to be resolved in three dimensions.” *Id.*

These claims fail to raise a genuine dispute of material fact or law. Thermal-hydrologic modeling at Yucca Mountain is divided into one-, two-, or three-dimensional approaches as required for detail. *See* “Multiscale Thermohydrologic Model,” January 29, 2008, LSN# DEN001575312 at Section 6.2.1. As a consequence, DOE can adequately assess the three-dimensional nature of the heated repository footprint, mountain-scale heat flow, and in-drift components of the engineered barrier system (EBS). More efficient two-dimensional models are used to model thermal-hydrologic parameters in detail, up to several grid elements per meter, within the emplacement drifts and adjoining host rock.

The 81 m spatial resolution of the mountain-scale submodel of the multiscale thermal-hydrologic model refers to the smeared-heat-source, mountain-scale, thermal-conduction submodel grid discretization. *See* “Multiscale Thermohydrologic Model,” January 29, 2008, LSN# DEN001575312 at Section 6.2.5. This submodel discretely represents each emplacement panel and each emplacement drift by using rows of heated gridblocks that are 20 meters in the longitudinal direction, 81 meters perpendicular to the drift axis, and 6 meters thick in the vertical direction. *See id.* at 6.2.5.1. As such, contrary to Nevada’s claim, this submodel is adequately refined for its intended purpose, and is complemented by more finely meshed submodels with appropriate discretization for their intended purposes.

Furthermore, Nevada's claim that the higher resolution thermal-hydrologic simulation models and simulation results exist only in two-dimensions and therefore do not contain first-order heterogeneities like faults is incorrect. As explained in 6.2.1.2 of "Drift-Scale Coupled Processes (DST and TH Seepage) Models," the use of two-dimensional representation of the drift-scale thermal-hydrologic processes used in the thermal-hydrologic seepage model is adequate for its intended analysis of thermal seepage. "*Drift-Scale Coupled Processes (DST and TH Seepage) Models*," MDL-NBS-HS0-000015 REV 02, LSN# DN2001895599.

As explained in Section 6.1 of "Mountain-Scale Coupled Processes," this three-dimensional mountain-scale model uses a coarse grid with spatial resolution of 81 m at the repository horizon. See "Mountain-Scale Coupled Processes," August 24, 2005, MDL-NBS-HS-000007 REV 03, LSN#s DN2002186537 and DEN001592615 at Section 6.1. This resolution better represents the expanded domain the model provides, and because its intended use is limited to the analysis of far-field effects, its use is appropriate.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and this contention must be dismissed.

**52. NEV-SAFETY-52 - Ebs And Near-Field Modeling Approach**

SAR Subsection 2.3.3 and similar subsections describe a sequential and unidirectional linked modeling approach for the engineered barrier system and near-field that is untenable because that modeling approach suppresses emergent behavior and ignores the influence that coupled repository processes have on one another.

**RESPONSE**

This contention claims that DOE's approach for modeling seepage, thermal seepage, and seepage composition, described in "SAR Section 2.3.3 and similar subsections," in its performance assessment for the engineered barrier system and near-field is "untenable" because DOE ignores couplings that are important to predicting these responses. Petition p. 297. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Sections 1 and 5 of the contention mention SAR subsections 2.3.3, and similar subsections. This description is unduly broad because SAR Section 2.3.3 addresses the engineered barrier system and near-field modeling approaches throughout 150 pages. Moreover, Nevada does not specify what process interactions are at issue. As a result, Nevada has not met the pleading specificity requirements of 10 C.F.R. § 2.309(f)(1)(i) and the related obligations of the June 20, 2008 Case Management Order. Accordingly, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be

disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing. Indeed, Nevada has not established how the contention’s resolution would make a difference in the outcome of the proceeding. Nevada has not demonstrated that DOE’s modeling approach underestimates seepage, or the effect of seepage on corrosion.

The method the DOE used in addressing seepage, thermal seepage, and seepage composition for the engineered barrier system and near-field is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are

immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The contention also does not allege, even qualitatively, that the use of a different method would result in more accurate modeling of seepage, thermal seepage, and seepage composition in the engineered barrier system and near-field. If Nevada believes that analysis would show that DOE’s modeling is not consistent with the reasonable expectation standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Not only has DOE been conservative in its modeling approach, as discussed in section (f) below, but also Nevada ignores the demonstration of the conservatism presented by DOE in SAR Section 2.3.3.3 (discussing the thermal seepage model, its abstraction, and supporting information) and in SAR Section 2.3.5.2 (discussing additional basis information

for chemical coupling). Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention contains unsupported assertions of counsel; and (2) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (Adrian P. Butler and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. Furthermore, although Nevada cites five documents, as discussed below, three of the documents do not actually support the statement for which they are cited, and the other two documents are used to support statements that are not related to the subject of the contention.

As mentioned, Nevada cites five documents. As an initial matter, Nevada does not cite any particular paragraph or page of any of these references. The page ranges provided simply indicate the first and last page of the respective report. Such vague references to documents are not permissible. Rather, a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989).*

Three of the citations immediately follow the below statements from Paragraph 5 of the contention:

Furthermore, many of the laboratory findings and numerical modeling results obtained for small-scale flow processes at Yucca Mountain point to process interdependencies that are inconsistent with how these processes are abstracted in the most-recent TSPA models. Examples of such small-scale processes include vaporizing water flow [citing Pruess, K. (1997)...] [and] gravity-driven infiltration instabilities in the fractures [citing Nicholl, MJ et. al. (1994) ...] and film flow [citing Tokunaga, T.K. et. al. (2000)].

Petition at 299. The fair reading of this passage is that Nevada cites these three documents as examples of works describing “small-scale flow processes at Yucca Mountain.” Yet, none of these documents present or describe the experimental or research activities at Yucca Mountain, and only one of the references, “On Vaporizing Water Flow in Hot Sub-Vertical Rock Fractures,” *Transport in Porous Media* (Pruess, 1997), even mentions Yucca Mountain. Yet, the author of that document indicates that Yucca Mountain was not the subject of research. Rather, “[o]ur main focus is on water injection into vapor-dominated geothermal systems but we also present results for conditions applicable to the nuclear waste isolation problem.” *Id.* at 339. Indeed, the author acknowledges difficulties existed using their simulation for the nuclear repository case, stating that “the present series of simulations is more difficult than the geothermal injection problem.” *Id.* at 356. The author also notes the substantial physical differences between the geothermal case and a waste repository, indicating that “[i]n the geothermal injection problem, vaporizing flow of water down fractures occurs at relatively high rates, typically 10-100 kg/s, and at temperature and pressure conditions in the range of (T, P) ~ (240°C, 10 bar),” while “[i]n the nuclear waste problem, flow rates in individual water seeps are expected to be orders of magnitude smaller than for geothermal injection, and relevant

temperature and pressure conditions are more modest, typically around (T, P) ~ (100°C, 1 bar).”  
*Id.* at 337.

Finally, the value the author used to simulate seepage is orders of magnitude beyond that which could realistically occur at Yucca Mountain. SAR Fig. 2.3.3-47 shows seepage rate per waste package 10, 30, 50 and 90 percent infiltration scenarios for the four time periods of interest (*i.e.*, present day, monsoon, glacial, and post-10,000 years). The highest value is the 90th percentile in the monsoon climate at 500 kg/yr ( $1.6 \times 10^{-5}$  kg/s) per waste package. At 356 of the cited paper, the author identifies the input for the simulation of a waste repository:

Water with an enthalpy of 100.4 kJ/kg, corresponding to a temperature of approximately 24°C, is then injected into the fracture at a constant rate of  $3.169 \times 10^{-3}$  kg/s (approximately 2741 per day). Although no field data are available to support this choice of seepage rate, it is believed to be reasonable and in fact quite modest, given the large rates at which vaporization and condensation would occur from the waste heat. For example, a single multi-purpose canister (MPC) with a thermal power of approximately 14 kW at emplacement (Saterlie et al., 1996) could vaporize water at a rate of approximately 461 kg per day. This vapor would be driven away towards cooler rock and subsequently condense at some distance from the heat source.

Using the author's assumption of 274 L/day of water into a vertical fracture of 20 m horizontal length, and assuming a fracture spacing of about 0.5 m and only one vertical fracture set, the injection rate compares to a downward flux of about 10,000 mm/year ( $274 \times 365 / (0.5 \times 20)$ ). This about *1,000 times higher than the approximate ambient percolation at Yucca Mountain*. The maximum downward fluxes for Yucca Mountain, as shown in Figures 6.3.2.1-5 and 6.3.2.1-7 of BSC, *Drift-Scale Coupled Processes (DST and TH Seepage) Models*, MDL-NBS-HS-000015 REV 02, at Fig. 6.3.3-3, p. 6-152 (LSN# DN2001895599) (2005), are only up to 12 or 13 times higher than the average ambient percolation, *much less than the assumed fluxes in the Pruess document*. Interestingly, running the author's simulation at a low injection rate, which is more

applicable to Yucca Mountain, supports the DOE's model (*i.e.*, vaporization of water flowing through the rock into the heated zone):

In an effort to gain a better understanding of the interplay of fluid flow and heat transfer processes in injection plumes, we now focus on the simpler problem of low-rate injection into homogeneous fractures. A series of numerical experiments was carried out in which water was injected at rates 3.2 - 25.4 gls into homogeneous anisotropic fractures of 20 m vertical and 14 m horizontal extent. ... At the low injection rates used here, most of the injected fluid is vaporized.”

*Id.* at 361.

Nevada does reference two additional documents in the contention. *See* Petition p. 300. However, these are cited simply to support its assertions that anthropogenic <sup>36</sup>Cl was discovered near a fault in the repository, and that DOE at times has re-examined its model. Neither of these statements relate to the subject of this contention and, therefore, are not material to whether or not Nevada's support is adequate.

Finally, the contention includes numerous conclusory statements that have no basis and, therefore, do not provide sufficient support for admissibility under NRC rules of practice. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). For example, Nevada states:

During the thermal phase of the repository, steam/moist air is *likely* to convect in the fractured rock mass surrounding the emplacement drifts, and where this steam condenses it can bring the seeping water to boiling, changing its path. Additionally, moisture from below the drifts *may become* entrained into this circulation, locally increasing the seepage flux. All such instabilities, which will increase in magnitude with time, and the resulting process interactions, are suppressed by DOE's sequential modeling approach and abstraction of the seepage flux which prescribes process linking as opposed to letting it evolve as an emergent coupled feature of the model.

Petition p. 299 (emphasis added). Nevada provides no references to support the above speculative statements. Indeed, contrary to Nevada's claim that such "instabilities" will increase in magnitude, thermally driven processes, such as unsteady flow in fractures, will in fact decrease with time as the heat output of the repository diminishes." SNL, "Multiscale Thermohydrologic Model," REV 03 AD 02, at Section 6.1.2, pp. 6-5 to 6-6 (LSN# DEN001575312)(2008).

Nevada also provides no reference to relevant scholarship or other basis for its claim that:

[i]n an appropriate fully coupled engineered barrier system and near-field model, the vigorous recirculation of liquid water and steam would strongly alter the composition and amount of water interacting with the engineered barriers. Corrosion would be enhanced and flows of water and steam into the degraded waste packages *could be* increased leading to increases in radionuclide releases and doses to the RMEI.

Petition p. 300 (emphasis added). Nevada does not explain this conclusory assertion. Even had this been provided by an expert, it is precisely the type of "expert opinion" that the Commission has repeatedly rejected as inadequate "because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion" as it is alleged to provide a basis for the contention. *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added) (quoting *Private Fuel Storage, L.L.C. (Independent Fuel Storage Installation)*, LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998)).

For the reasons set forth above, Nevada has not satisfied the requirements of Section 2.309(f)(1)(v), and the contention should be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's claim articulated in this contention is not material, and that Nevada has failed to proffer adequate factual support or expert opinion.

Accordingly, Nevada's claim of noncompliance with 10 C.F.R. § 63.114(a)-(b) and (f) also does not raise a genuine dispute of material fact or law. The contention's arguments also raise no genuine dispute of material fact or law for the reasons set forth below.

First, Nevada has not correctly characterized the Application. Nevada incorrectly claims that the DOE model suppresses "emergent behavior" and ignores coupled process effects on seepage occurrence and magnitude. That is not accurate. The thermal seepage model (SAR Section 2.3.3.3) consists of a family of process-level numerical simulations, and an abstraction that bounds the seepage responses from these simulations. The simulations combine spatially heterogeneous permeability and calibrated hydrologic properties from the ambient seepage model (SAR Section 2.3.3.2) with thermal loading. A wide range of percolation flux boundary conditions were simulated. Liquid water reflux associated with a boiling zone in the host rock above the drifts is a common feature of these simulations. BSC, "Drift-Scale Coupled Processes (DST and TH Seepage) Models", MDL-NBS-HS-000015 REV 02, at Fig. 6.3.3-3, p. 6-152 (LSN# DN2001895599) (2005). The process-level simulations also included convection of steam and air, condensation, and boiling. SAR Fig. 2.3.3-42, p. 2.3.3-140. Therefore, this bounding approach does *not* suppress process interactions.

As discussed in the previous section, not only was it erroneous for Nevada to allege that DOE's process-level simulations are inconsistent with the cited laboratory studies, but also DOE in fact addressed the potential for unsteady flow suggested by these physical model studies. To evaluate the effect of episodic flow on thermal seepage, thereby addressing the potential for unsteady flow, the thermal seepage model supporting information (SAR Section 2.3.3.3.3.2, pp. 2.3.3-65 to -67) includes comparison with an alternative conceptual model of episodic liquid water flow in fractures in superheated rock. Results from the alternative model confirm that

refluxing of condensate water above the drifts does not result in seepage when the drift crown is above 100°C because of the combined effects of vaporization and capillary diversion. *Id.* at p. 2.3.3-66.

The contention also incorrectly implies that DOE's thermal seepage model does not include reflux (or counterflow of steam and liquid water), and suggests that DOE has not appropriately evaluated the effects from reflux on the amount and composition of seepage. *See* Petition p. 300. However, SAR Section 2.3.5.2.3 (pp. 2.3.5-17 through -20) evaluates both of these behaviors. In fact, DOE's extensive analysis of thermally driven, thermal-hydrologic-chemical (THC) coupled processes has shown that: (1) the residual effects from plugging of porosity by mineral precipitation, on the occurrence frequency and magnitude of seepage, are insignificant, and (2) the composition of seepage when it can occur after the thermal period, is dilute. As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 39.

As discussed in Section V.A.3 above, contentions expressing only generalized "uncertainties" in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the seepage, thermal seepage, and seepage composition properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada's claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or

alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

**53. NEV-SAFETY-53 - Application Of The Fracture Matrix Dual Continuum Model To All Unsaturated Zone Flow Processes**

In SAR Subsection 2.3.2.3 and similar subsections, DOE states that fluid flow in the fractured rock at Yucca Mountain is modeled using the dual continuum idealization in conjunction with the Van Genuchten relative permeability/capillary pressure model for the fractures, but experimental studies show that multiphase fluid flow through larger aperture fractures cannot be described by this model and this calls into question all of DOE's conclusions regarding in-drift seepage and infiltration rates.

**RESPONSE**

Nevada argues that DOE's application of the dual continuum model to unsaturated zone flow processes in SAR Subsection 2.3.2.3 and similar subsections is inadequate because multiphase fluid flow through larger aperture fractures cannot be adequately described by the Van Genuchten (VG) relative permeability/capillary pressure model for fractures, calling into question DOE's conclusions regarding in-drift seepage and infiltration rates.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that the application of the dual continuum model to unsaturated zone processes is inadequate because the model is deficient in capturing multiphase fluid flow through fractures, and that the VG model is unable to “deal with” fingering in fracture planes. Petition at 303. Nevada claims that accordingly, DOE's analysis of in-drift seepage and infiltration may be inadequate. But Nevada is silent as to how such purported underestimation would result in DOE failing to comply with 10 C.F.R. Part 63. Therefore, Nevada has not demonstrated why this proposed contention -- even if true -- would be material to the findings the NRC must make in this proceeding.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), C.F.R. §63.102(h), 10 C.F.R. §63.113. and 10 C.F.R. §63.114(g)). *See* Petition at 302. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328, 333 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing water flow through the unsaturated zone is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or

cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that DOE’s application of the dual continuum model to unsaturated zone flow processes and use of the VG model are inadequate to show multiphase flow through fractures and to assess fingering in fractures, and that infiltration and in-drift seepage rates provided by DOE may be incorrect. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach two affidavits (by Adrian P. Butler and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As previously discussed in Section d, Nevada argues that the use of the dual continuum model to the unsaturated zone process in conjunction with the VG relative permeability/capillary pressure model is inadequate in analyzing multiphase fluid flow, and that the VG-based Yucca Mountain model inadequately assesses fingering in fracture planes. Nevada alleges that accordingly, the in-drift seepage and infiltration rates predicted by DOE may be too low. This contention fails to raise a genuine dispute of material fact or law. As shown below, the LA explains that these models adequately analyze water flow through the unsaturated zone.

Nevada argues that the dual continuum approach for modeling flow in the unsaturated zone is inadequate because "multiphase fluid flow through larger aperture fractures cannot be described by this model," therefore calling "into question all of DOE's conclusions regarding in-drift seepage and infiltration rates." Petition at 301. This assertion fails to raise a genuine dispute of material fact.

The dual-continuum approach, as explained in SAR § 2.3.2.4.1.1.2, was selected as the method "most consistent with available data and suitable for modeling unsaturated flow through

fractured rocks at Yucca Mountain.” SAR § 2.3.2.4.1.1.2 at 2.3.2-42. In this approach, “fractures are ubiquitous and distributed in such a manner that they can be meaningfully described statistically for the large unsaturated zone at Yucca Mountain. *Id.* In selecting this model, the most significant criteria, among others, were “the ability to handle fracture and matrix flow and interaction under multiphase, multicomponent, and isothermal or nonisothermal conditions.” *Id.* Prior to selecting this model, DOE explored alternative modeling methods, but none were found suitable for modeling large-scale fractured systems. *Id.*

Nevada’s contention makes bare and unsupported allegations that the dual continuum model is inadequate, stating that it “calls into question” DOE’s analysis (Petition at 301) and that DOE’s results “may be orders of magnitude too low.” Petition at 303. Nevada does not assert, however, much less demonstrate, how the model is inadequate or that such inadequacies will have any effect on repository design or performance. Nevada also fails to identify alternative models that it believes would more accurately characterize multiphase flow through large aperture fractures in the unsaturated zone. Accordingly, it is impossible to assess what effect, if at all, this would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such allege deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Even if Nevada’s claim were to be accepted, the contention provides no basis for believing that it would have any material effect on infiltration or in-drift seepage as calculated by DOE. In particular, the contention does not allege, even qualitatively, that use of a different method would result in an increase in infiltration.

Nevada does not allege that DOE's modeling is not consistent with the reasonable expectation standard discussed in section V.A.3.C. If Nevada believes that quantification would show that DOE's modeling is not consistent with that standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Nevada has only alleged, and without support, that multiphase fluid flow through larger aperture fractures cannot be described by this model, and has failed to allege or demonstrate that the model is inconsistent with the reasonable expectation standard. Indeed, SAR § 2.3.2.6 explains that the dual-permeability modeling approach is conservative because "the grid size employed in the dual-permeability grid permits relatively limited fracture-matrix interaction. This simulation approach leads to increased flow and transport in the fractures, and shorter radionuclide transport times to the water table." SAR at 2.3.2-97. Accordingly, Nevada fails to raise a genuine dispute of material fact or law.

Nevada also alleges that the VG-based Yucca Mountain model is unable to "deal with fingering in the fracture planes," and that accordingly, "infiltration rates predicated by DOE may

be orders of magnitude too low.” Petition at 303. Nevada’s assertions about the VG model, however, are incorrect, and fail to raise a genuine dispute of material fact.

The LA uses an active-fracture model (AFM) in simulating water flow in the unsaturated zone to consider large-scale fingering flow. The AFM is described in SAR § 2.3.2.4.1.1.3. Based on this model, only active fractures, which comprise only a fraction of all fractures in the unsaturated zone, actually conduct water flow in the unsaturated zone. The VG model is not used to describe water flow through the whole fracture continuum, but is instead used only to describe water flow in the active fracture continuum. The validation of the AFM model is documented in *Conceptual Model and Numerical Approaches for Unsaturated Zone Flow and Transport* (BSC 2004, DN2000416468), Section 7.2 of which demonstrates that the AFM is consistent with fractal-distribution behavior, supported by field observations, and is used for assessing fingering flow in the unsaturated zone of Yucca Mountain.

Nevada’s unsupported assertions are insufficient bases for rejecting the VG-based model. In particular, the contention does not allege or demonstrate that the use of an alternative method would result in more accurate modeling, or would lead to different results. As stated above, a contention that alleges an inaccuracy or an omission without stating the ramifications or results of such allege deficiencies, fails to raise a genuine dispute with the LA. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Nevada has not adequately demonstrated that DOE’s VG-based Yucca Mountain model is inaccurate, nor has Nevada demonstrated that the model is inconsistent with the reasonable expectation standard. Accordingly, this contention fails to raise a genuine dispute of material fact or law, and must be dismissed.

**54. NEV-SAFETY-54 - Constitutive Relationships In The Yucca Mountain Infiltration, Thermo-Hydrologic, And Tspa Models**

Whereas DOE's infiltration-, seepage- (see SAR Subsection 2.3.3 and related subsections), thermohydrologic- (see SAR Subsection 2.3.3.3 and related subsections), and TSPA models (SAR Subsection 2.3.3.4 and related subsections) are designed for steady-state conditions, infiltration, thermally driven flow, and fracture seepage have all been documented to be episodic and this means that conditions at Yucca Mountain lie outside the range of applicability of DOE's models.

**RESPONSE**

This contention essentially makes two claims against the use of constitutive relationships in the Yucca Mountain infiltration, seepage, thermo-hydrologic and TSPA models: (1) these models, as described in SAR Section 2.3.3, are designed for steady-steady-state conditions, whereas infiltration, thermally driven flow, and fracture seepage have all been documented to be episodic, and (2) DOE ignores hysteretic behavior by using a single set of relative permeability and capillary pressure curves to model water flow through fractures. As a result of these alleged flaws in DOE's models, Nevada asserts that "the conditions at Yucca Mountain lie outside the range of applicability of DOE's models." Petition, p. 306. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

To the extent that Nevada argues that DOE must “use separate pairs of experimentally determined relative permeability and capillary pressure curves for imbibition and drainage, respectively,” Petition at page 308, this contention presents an issue that is outside the scope of this proceeding. No NRC regulation applicable to DOE in this proceeding requires DOE to separate pairs of relative permeability and capillary pressure curves. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the

outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method DOE used in addressing the Yucca Mountain infiltration, seepage, thermo-hydrologic and TSPA models is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from

assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not

reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (Adrian P. Butler and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. Nevada does cite two studies to support its claim that there are "[u]nstable regimes of fracture flow which cannot be modeled with the relative permeability approach." Petition p. 306. Yet, Nevada does not cite any particular paragraph or page of any of these references as support. Such vague references to documents are not permissible. Rather, a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989)*. Furthermore, neither of the two studies referenced by Nevada indicates that the conditions at Yucca Mountain cannot be modeled with the relative permeability approach. Indeed, one of the studies states that "we can discard the relative permeability approach, because it cannot account for the inertia forces, *which are dominate in our experiment. However this approach could be useful* for flows at smaller Reynolds numbers." Fourar, M., Bories, S., Lenormand, R., and Persoff, P., *Water Resources Research*, Vol. 29, No. 11 at 3706 (1993) "Two-Phase Flow in Smooth and Rough Fractures: Measurement and Correlation by Porous-Medium and Pipe Flow Models," at 3706 (emphasis added). Therefore, this statement provides no support for the contention that the conditions at Yucca Mountain lie outside of the range of applicability of DOE's models because, unlike the experiments in the reference, which had

Reynolds numbers larger than 100, most groundwater flows occur well within the laminar flow range (at a Reynolds numbers which do not exceed a value between 1 and 10) in which Darcy's law is applicable. See Bear, J. (1979) "Hydraulics of Groundwater," at 65-66, McCGRAW-HILL, New York, NY. The flow at Yucca Mountain is within the laminar flow range because the matrix pores in the host rock at Yucca Mountain are small (on the order of a few microns) (Price, R.H., Martin, R.J., and Boyd, P.J., "Characterization of Porosity in Support of Mechanical Property Analysis," LSN# DEN000100013, at p. 3 (1993)) and the fractures have apertures on the order of hundreds of microns (see hydraulic apertures in DTN: "Fracture Properties for UZ Model Layers Developed from Field," LB0205REVUZPRP.001, LSN# DEN000244794 (2002), output from BSC, *Analysis of Hydrologic Properties Data*, ANL-NBS-HS-000042 REV 00, at Section 7.1, p. 7-1, LSN# DN2002407542 (2004)), which is still small enough to ensure low Reynolds number and laminar flow. Freeze, R. A. and Cherry, J. A. (1979) "Groundwater," at 73-74, Prentice Hall, Inc., Englewood Cliffs, NJ (identifying high Reynolds numbers, non-Darcy flow only for wide-aperture fractures with high specific discharge (conditions which do not occur at Yucca Mountain)). Larger voids in the host rock (lithophysae faults) are not liquid saturated (LSN# DEN001572665, at Section 6.1.5, p. 6-22) so only the water film thickness is appropriate for analyzing flow behavior, and the film thickness is on the order of hundreds of microns or less. Thus, the groundwater flows at Yucca Mountain are in the laminar flow regime for both for ambient and thermal responses and, therefore, the relative permeability approach is appropriate for the conditions at Yucca Mountain. Clearly, these studies cited by Nevada do not support this contention.

Nevada provides one additional reference in this contention to support its statement that "it is standard practice in groundwater hydrology or reservoir engineering to use separate pairs of

experimentally determined relative permeability and capillary pressure curves for imbibition and drainage, respectively.” Petition p. 308. This document, “Porous Media: Fluid Transport and Pore Structure,” is 574 pages long; yet, Nevada does not cite to any particular paragraph or page. As discussed, such vague references to documents are not permissible. Moreover, the mere incorporation of massive documents, such as Nevada has done, is unacceptable. *See Tenn. Valley Auth.* (Browns Ferry Nuclear Plant, Units 1 and 2), LBP-76-10, 3 NRC 209, 216 (1976).

Additionally, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998). In this case, the above document referenced by Nevada does not support the statements made in the contention. Even if using separate pairs of experimentally determined relative permeability and capillary pressure curves is “standard practice,” it does not provide any support to the contention that the conditions at Yucca Mountain lie outside of the range of applicability of DOE’s models. Therefore, the reference to this document is not sufficient to satisfy Section 2.309(f)(1)(v).

Finally, this contention has numerous other conclusory statements, which do not provide sufficient support for admissibility under NRC rules of practice. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). For example, Nevada does not further explain the above wholly-conclusory assertion that using separate pairs of experimentally determined relative permeability and capillary pressure curves is “standard practice.” Petition at 308. Nevada also states, without any support or basis for its claim, that hysteresis of the relative permeability curves is a “well documented process observed in field and in laboratory studies.” *Id.* And, again, Nevada fails to further explain this wholly-conclusory statement. This is

precisely the type of “expert opinion” that the Commission has repeatedly rejected as inadequate “because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion” as it is alleged to provide a basis for the contention. *USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added) (quoting *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26 (1998)). Because the contention provides no reasoned basis or explanation for such conclusions, the contention is not properly supported and should be rejected pursuant to 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s claim articulated in this contention is not material. DOE has also demonstrated that Nevada has failed to proffer adequate factual support or expert opinion. Accordingly, Nevada’s claim of noncompliance with this regulation also does not raise a genuine dispute of material fact or law. The contention’s arguments also raise no genuine dispute of material fact or law for the reasons set forth below.

First, Nevada incorrectly claims that infiltration, seepage, thermo-hydrologic and TSPA models are designed only for steady-state conditions. To the contrary:

- The Yucca Mountain infiltration model, as discussed in SAR Subsection 2.3.1, considers the high temporal variability of water flow near ground surface resulting from precipitation processes.
- The ambient seepage model was calibrated against field data collected from water-release tests that were performed within unsaturated zone of Yucca Mountain and involved transient water flow process. SAR Section 2.3.3.2.3.2.

- The thermal-hydrologic seepage model also considers transient water flow and heat transfer processes owing to temperature variations. SAR Section 2.3.3.5.
- The TSPA model (seepage abstraction model) is based on the above process models and therefore, also is not designed only for steady-state conditions. SAR Sections 2.3.3.4.4 and 2.3.3.5.4.

As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plant Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 39.

Nevada also erroneously claims that fracture seepage has been documented to be episodic. Petition p. 306. As indicated in SAR Section 2.3.2.2.2.5 and Section 6.1.6 of BSC, *Conceptual Model and Numerical Approaches for Unsaturated Zone Flow and Transport*, MDL-NBS-HS-000005 REV 01, LSN# DN2000416468 (2004), water flow in the deep unsaturated zone is largely at steady state under ambient conditions. Temporal variation in the surface infiltration rate drives the time-dependent or transient nature of water flow in the upper portion of the unsaturated zone. Studies show that PTn greatly attenuates episodic infiltration pulse (as a result of dominant matrix flow and relatively low water saturation in the PTn) so that water flow below the PTn is approximately at steady state under ambient conditions. BSC (2004) LSN# DN2000416468, at Section 6.1.6. This steady-state flow behavior is further supported by 14C data collected within bedded tuffs of the PTn unit, results of a water release test at Alcove 4, and results of line surveys of fracture minerals in the ESF and ECRB Cross-Drift. SAR Section 2.3.2.2.2.5. Consequently, fracture seepage is also at steady state under the ambient conditions. See SAR Sections 2.3.3.4.1.4 and 2.3.3.4.3.3.

Moreover, the NRC has explicitly recognized the appropriateness for postclosure models to utilize simplified assumptions, and therefore, that in and of itself, is not a basis for criticizing DOE's use of a single set of relative permeability and capillary pressure curves. As stated in the Yucca Mountain Review Plan:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use conservative assumptions to simplify its approaches and data collection needs.

Thus, simplified assumptions, such as any that result from using a single set of relative permeability and capillary pressure curves, are appropriate provided they are conservative.

Indeed, DOE has shown that its use of a single set of relative permeability and capillary pressure curves to model water flow through fractures is adequate and justified because (1) water flow in the deep unsaturated zone are mainly at steady state under ambient conditions (as discussed above), and (2) effects of hysteretic behavior are not significant. The latter is demonstrated in the study by Liu et al., "Modeling Flow and Transport in Unsaturated Fractures Rock: An Evaluation of the Continuum Approach," *JOURNAL OF CONTAMINANT HYDROLOGY*, at 62-63, 173-188 (2003). This study provides a model analysis of infiltration-seepage tests conducted in the unsaturated zone of Yucca Mountain. The test site is located near the North Portal of the Exploratory Studies Facility (ESF). An alcove of the ESF, about 30 m

below the ground surface, was used for collecting seepage water originating from the infiltration plot located at the ground surface. Both infiltration-rate and seepage-rate data exhibit significant degrees of temporal variability. Liu et al. (2003), at Figures 1 and 3. However, the study successfully matched the observed data using a model without considering the hysteretic behavior, indicating that the effects of the hysteretic behavior are not significant for unsaturated flow in fractures within Yucca Mountain. *Id.* at Figure 4, p. 182.

Additionally, unsaturated zone flow is subject to both parameter and boundary condition uncertainty. The main boundary condition uncertainty is the uncertainty in the net infiltration rates at the ground surface. The results of sensitivity studies concerning hydrological parameter uncertainty (BSC, *Parameter Sensitivity Analysis for Unsaturated Zone Flow*, MDL-NBS-HS-000049 REV 00, at p. 7-3, LSN# DN2002170268 (2005)) show that parameter uncertainties have much less effect on unsaturated zone flow than infiltration uncertainty. SNL, *UZ Flow Models and Submodels*, MDL-NBS-HS-000006 REV03 AD01, at p. 6-131, LSN# DEN001572665 (2007). Therefore, hysteresis in hydrological parameters would also be expected to have a small effect in comparison with the effect of infiltration uncertainty. Infiltration uncertainty effects on unsaturated zone flow are computed and included in the TSPA. Accordingly, there is no legal or factual basis for Nevada's contention that DOE's "conditions at Yucca Mountain lie outside the range of applicability of DOE's models." Petition p. 306.

Nevada does not allege that DOE's modeling is not consistent with the reasonable expectation standard discussed in section V.A.3.C. If Nevada believes that quantification would show that DOE's modeling is not consistent with that standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication

Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model.

*Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties” in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the Yucca Mountain infiltration, seepage, thermo-hydrologic and TSPA model properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,

Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**55. NEV-SAFETY-55 - Data For The Chemistry Of Pore Waters In The Topopah Springs (Tsw) Formation**

Data for the chemical compositions (pH, alkalinity, nitrate) of pore waters in the Topopah Springs (Tsw) rock formation, as used in SAR Subsection 2.3.5.3.2 and related subsections, are inadequate, because the data are incomplete and/or lack sufficient reliability.

**RESPONSE**

This contention alleges that in SAR Subsection 2.3.5.3.2 and “related” (though unspecified) subsections, DOE relied on incomplete and/or insufficiently reliable data regarding the chemical composition (*e.g.*, pH, alkalinity, and nitrate) of the pore waters in the Topopah Spring (Tsw) rock formation. Specifically, according to the contention, 34 pore water samples is an inadequate number of samples, and these 34 samples are unreliable. Petition at 313.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations in paragraph 4 of this

contention. *See* Petition at 311-12. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . .,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that DOE relied on incomplete and/or insufficiently reliable data regarding the chemical composition of the pore waters in the TSw rock formation. Petition at 311. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and as explained in the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Adrian H. Bath, Maurice E. Morgenstein, and Don L. Shettel, Jr.), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada is obligated to provide "a concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials." Petition at 312. Yet, other than citing the license application, Nevada references only one document, the "Engineered Barrier System: Physical and Chemical Environment," Sandia Nat'l Labs. (Aug. 31, 2007), (LSN# DN2002452948). Nevada cites this document, however, only to reference the source of the DOE conclusions that Nevada is challenging. *Id.* at 312-13. Furthermore, in some instances, Nevada provides an overly broad cite to an entire

section of this document. *See* Petition at 313 (e.g., §§ 6.6.1, 6.6.3 and 6.6.5). Vague references, such as these, are not permissible because a petitioner is required to identify specific portions of the documents on which it relies. *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 & 2), CLI-89-03, 29 N.R.C. at 240-41.

Although not referenced in the contention, three expert affidavits filed electronically with the Petition “adopt” this contention. *See* Petition Attachment Nos. 4, 10, & 17. But, these one-page affidavits contain no reasoning or substantive discussion whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, Inc.* (American Centrifuge Plant) CLI-06-10, 63 NRC 451, 472 (2006). Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

Not having cited any scientific or factual materials or any expert opinions to support its factual assertions, all of the Nevada assertions in this contention are necessarily unsupported and thus inadmissible.

First, Nevada complains that DOE used too few water pore samples. Petition at 313 (“Thirty-four analyses is an insufficient number on which to understand the present-day variability and geochemical controls of pore water compositions . . .”). By way of background, as explained in detail in “Engineered Barrier System: Physical and Chemical Environment,” DOE compiled 125 pore-water analyses. LSN# DN2002452948 at 6-86. Thirty-five of these

analyses were excluded from further consideration because they either were incomplete or not representative of the current ambient conditions. *Id.* at 6-87. Screening the remaining ninety samples revealed that many had relatively poor charge balances and exhibited a consistent anion deficiency. SAR at 2.3.5-27. DOE concluded that this likely was due to microbial activity in the samples after collection, when the samples were wrapped tightly in plastic and sealed in core tubes, which in turn were wrapped in plastic. SAR at 2.3.5-28. DOE performed screening to evaluate the sample quality and the degree of modification by microbial process. *Id.* Fifty-six of the ninety samples were eliminated through this screening process. *Id.*

Thus, of the original 125 samples compiled, thirty-four were further examined for use in the near-field chemistry model. Although Nevada claims that using thirty-four samples is insufficient, Nevada does not provide any basis for that position. More importantly, Nevada cites no technical or scientific authority (or any authority at all) for its position. Thus, Nevada is merely stating counsel's opinion about what is not a sufficient number of pore water samples.

Second, Nevada asserts that because the screen for microbial activity revealed that fifty-six samples were affected, “[t]here must be doubt about the reliability of the chemical data for the selected 34 samples.” Petition at 313. This is pure conjecture and Nevada cites nothing to show that the thirty-four selected samples were unreliable.

Third, according to Nevada, the pH values of the thirty-four selected samples have additional uncertainties due to the screening criteria. Nevada’s position that there are “uncertainties” in the pH value is based on its view that DOE should not have assumed a fixed value of  $10^{-3}$  bars for  $P(\text{CO}_2)$  because doing so, according to Nevada, means that the “pH calculated using  $P(\text{CO}_2) = 10^{-3}$  bars is always too low, or the measured pH values are too high.” Petition at 313. The “Engineered Barrier System: Physical and Chemical Environment”

document states that “[p]ore waters were equilibrated at P(CO<sub>2</sub>) of 10<sup>-3</sup> bars *because that is the accepted value in the repository units under ambient conditions.*” LSN# DN2002452948 at 6-96 (emphasis added). What scientific reference or expert opinion does Nevada cite as the basis for Nevada’s disagreement with the use of this fixed value? None; Nevada states a wholly unsupported position.

Fourth, Nevada makes an equally unsupported statement when it speculates that the “data for nitrate in pore waters *probably* have also been biased to low values by microbial degradation during core storage.” Petition at 313 (emphasis added). From this assertion, Nevada further hypothesizes that the chloride/nitrite ratios “are likely to be too high.” *Id.* But once again, Nevada makes these assertions without citing any technical references, documents, or expert affidavits. Thus, these assertions are nothing more than attorney argument.

In summary, because the contention does not identify any documents or expert opinion to support its contention issues, the contention is inadmissible. A contention is “inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed above in Section V.A.3, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw. For as many times as Nevada asserts that there are “uncertainties” in the selected pore water samples, Nevada never once presents the essential element of its claim: how these uncertainties adversely affect DOE’s results such that

the TSPA is deemed unacceptable to support licensing of the Yucca Mountain repository. Merely claiming that uncertainties exist does not establish a genuine issue of material fact or law because, as discussed in the applicable Legal Standards section, Part 63 recognizes that uncertainties exist and cannot be eliminated. *See* Final Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, NV, 66 Fed. Reg. at 55,747-748. For that reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but that DOE “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.”

In particular, with respect to Nevada’s position that thirty-four samples is too few to produce reliable data, Nevada never claims that this caused a material difference in the near field chemistry model, and Nevada certainly does not provide any expert or documentary support for such a claim. Indeed, DOE’s “Engineered Barrier System: Physical and Chemical Environment” report demonstrates that just the opposite is true. This document reports that:

[t]he repository horizon within the Topopah Spring Tuff . . . is relatively uniform in composition. Peterman and Cloke . . . analyzed twenty core samples, in duplicate, from the cross drift within the four lithologic units constituting the repository level. *All samples were compositionally similar with respect to major oxides and trace elements . . . and normative mineral compositions...*

LSN# DN2002452948 at 5-3 (emphasis added). The SAR also observed that the “chemical similarity of the host-rock units makes large variations in concentrations of non-conservative aqueous species unlikely (SNL 2007b, Section 5.2.1).” SAR at 2.3.5-37. Based on the homogeneity of the host-rock units, additional samples would be unnecessary. *See, e.g., id.* (explanation of assumption that the measured pore-water compositions adequately represent the

actual range of initial water compositions in the natural system). Nevada alleges no facts to show otherwise.

Similarly, although Nevada questions the screening criteria that were used to arrive at the thirty-four water pore samples and whether there are uncertainties in the thirty-four retained samples because DOE assumed a fixed  $P(\text{CO}_2)$ , Petition at 313, Nevada's arguments do not create a genuine dispute of material fact for a number of reasons. First, Nevada never alleges that the supposedly flawed criteria or resulting uncertainties had a material effect on the near field chemistry model. As the "Engineered Barrier System: Physical and Chemical Environment" report explains, "Pore waters were equilibrated at  $P(\text{CO}_2)$  of  $10^{-3}$  bars *because that is the accepted value in the repository units under ambient conditions.*" DN2002452948 at 6-96 (emphasis added). And, according to that same document, the cutoff value implemented,  $\text{pH}_{\text{calc}} = +8.35$ , was *conservative*. *Id.* at 6-100. Second, if any of the thirty-four samples were affected by microbial activity, they would be nitrate-poor and Ca-rich. *See* LSN# DN2002452948, Section 6.6, at 6-93. In turn, a lower nitrate concentration would *increase* localized corrosion in Alloy 22. *See* SAR at 2.3.6-36. Accordingly, even if some of the samples were affected by microbial activity, it was conservative to use them in the model. Third, the SAR shows that trace element data for the pore waters provided confidence in the screening criteria. SAR at 2.3.5-28; *see also* LSN# DN2002452948 at 6-105. Nevada does not dispute any of these facts and, therefore, the challenge to the screening criteria does not establish a genuine dispute of material fact.

Nor does Nevada's challenge to the chloride/nitrate ratios in the retained samples create a genuine dispute of material fact. Though Nevada claims that the chloride/nitrate ratios "are likely to be too high," Nevada does not argue that the allegedly correct, lower ratios would have

a material impact on the near field chemistry model, particularly in light of the Localized Corrosion Initiation model. *See* SAR Section 2.3.6.4.4.1.

Finally, the “Engineered Barrier Systems” report explains that after the thirty-four samples were selected, DOE used a mathematical technique—“principal component analysis” or “PCA”—to determine how many chemically distinct groups, or clusters, are present in the samples. LSN# DN2002452948 at 6-10. The PCA revealed that the water samples cluster into four groups. *Id.* All four groups were equally weighted in TSPA (occurring 25% of the time). Most of the waters exhibited properties that were less conducive to corrosion. By weighting each group equally even though most of the waters fall within the benign group, DOE took a conservative approach because as the SAR explained, “[t]his approach conservatively over-represents the potentially corrosive . . . waters . . . .” SAR at 2.3.5-29.

As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties” in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. Although Nevada claims that DOE should have considered additional uncertainties in determining the chemical composition of the water in the vicinity of the disposal drifts, Nevada fails to point out any impact that these additional uncertainties would have on the rates at which the disposal system components would degrade.

In summary, the contention fails to raise a genuine dispute of a material issue of fact or law and must be dismissed.

**56. NEV-SAFETY-56 - Geochemical Interactions And Evolution In The Unsaturated Zone, Including Thermo-Chemical Alteration Of Tsw Host Rock**

Screening of FEPs (Features/Events/Processes) 2.2.08.03.0B and 2.2.10.09.0A

“Geochemical interactions and evolution in the UZ” and “Thermo-chemical alteration of the TSw basal vitrophyre” from performance assessments in SAR Subsection 2.2.1.2 and related subsections and as specifically stated at SAR Table 2.2-1 at 2.2-143 and 2.2-145 is not justified.

**RESPONSE**

This contention alleges that DOE’s exclusion of FEPs related to the geochemical alteration of rocks in the unsaturated zone, including Thermo-Chemical Alterations of TSW host rock, “is not justified.” Petition at 315. Nevada’s basis for that assertion is the alleged “uncertainty and controversy” regarding the duration of this past period of hydrothermal heating and also over the mechanism of heating. Petition at 317.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

The basis of this contention is Nevada’s concern over possible uncertainties regarding past hydrothermal heating and alteration of the TSw unit, history upon which DOE relies for its screening justification for FEP 2.2.10.09.0A, “Thermo-chemical alteration of the Topopah Spring basal vitrophyre.” *See* Petition at 316; Features, Events, and Processes for the Total

System Performance Assessment: Analyses, LSN#DEN001584824, 6-1083 (Mar. 6, 2008). As discussed in the applicable Legal Standards section above, contentions expressing only generalized “uncertainties” in DOE models or analyses represent an improper challenge to Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from that deficiency, and accordingly must be rejected as outside the scope of the proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 315-316.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 316. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada asserts that DOE did not comply with regulations regarding postclosure performance assessments and FEP screening. *See* Petition at 315-316. Essentially, it alleges that

possible uncertainties regarding past hydrothermal heating and alteration of the TSw unit undermine DOE's FEP screening bases. *Id.* at 317. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Nor does Nevada even claim that geochemical interactions and evolution in the UZ, or thermo-chemical alteration of the TSw basal vitrophere would significantly affect radionuclide transport. A petitioner must allege not only that "more accurate input data could be used in applicant's model, but the use of it "could materially impact the computed outcome." *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006).

Nevada also neglects to establish how exclusion of the subject FEP could produce any alternative TSPA results. The simple conclusion presented in Paragraph 5 that "DOE's [exclusion] justification is questionable and may not be valid" does not suffice to present a litigable issue. Petition at 317. Therefore, this contention does not make the requisite showing that the issues raised are material to a finding that the NRC must make, and should be dismissed.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing geochemical alteration of rock is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. To the extent this contention relies upon expert opinion, this contention fails to meet those standards. Nevada’s Petition attaches several affidavits (by Maurice E. Morgenstein, Don L. Shettel, Jr., Adrian H. Bath, and Michael C. Thorne) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

This contention provides, as its bases, only conclusory statements and unsupported arguments of counsel. For the most part, Nevada provides a laundry list of “facts” to support its contention, but fails to provide any corresponding reference or supporting documentation. *See* Petition at 316-317. Nevada then provides one conclusory statement, that there is “uncertainty and controversy” regarding some of the supporting data for the exclusion of FEP 2.2.10.09.0A, “Thermo-Chemical Alteration of the Topopah Spring Basal Vitrophere.” *See* Petition at 317. For that statement, Nevada provides two references, but fails to provide any explanation for its statement or the supporting material. *See* Petition at 317. Nevada then concludes that, because of this unexplained “uncertainty and controversy,” DOE’s FEP exclusion justification is “questionable.” Petition at 317. In sum, this contention offers little more than “bare assertions and speculation.” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *Gen. Pub. Utils. Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Moreover, Nevada simply cites to the two reference documents noted above in their entirety. Vague references to documents are not permissible. Rather, a petitioner has the obligation to identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Therefore, the reference to these documents is not sufficient to satisfy Section 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This is exactly what is done in this contention and, therefore, it must be dismissed for failure to establish a genuine dispute of material fact.

This contention does not include any information to refute DOE's screening justification for the subject FEPs. For its challenge to FEP 2.2.08.03.0B, "Geochemical interactions and evolution in the UZ," Nevada fails to provide *any* information to controvert DOE's "low consequence" exclusion justification. *See* Petition at 316. Rather, it uses the subject of FEP 2.2.10.09.0A, "Thermo-chemical alteration of the Topopah Spring basal vitrophyre," as an illustration and – based on a string of unsupported "facts" and one mention of uncertainties – gingerly opines that DOE's exclusion justification is "*questionable* and *may* not be valid." *See* Petition at 316-317. Such assertions – if one can consider such innocuous terms to be "assertions" – do not directly challenge a position taken in the LA (*i.e.*, DOE's "low consequence" screening justification), and therefore do not give rise to a genuine dispute.

Indeed, the NRC has recognized that a substantial amount of uncertainty will exist in any model attempting to predict the future of complex systems. *See* 66 Fed. Reg. 55,732, 55,747 (Nov. 2, 2001) ("The first-of-a-kind nature of the repository and the evaluation over a very long time period result in significant uncertainty being included in the performance assessment.") As discussed in the applicable Legal Standards section above, contentions such as this that express only generalized "uncertainties" in DOE models or analyses, represent an improper challenge to Part 63, which recognizes that uncertainties exist and cannot be eliminated and must be dismissed.

To the extent that Nevada does challenge the exclusion of FEP 2.2.08.03.0B, "Geochemical Interactions and Evolution in the UZ," and FEP 2.2.10.09.0A, "Thermo-Chemical Alteration of the Topopah Spring Basal Vitrophyre," it fails to establish a genuine dispute with the LA. Nevada claims that geochemical alteration of rock in the UZ will occur, creating alteration products that could sorb or co-precipitate with radionuclides. *See* Petition at 316. This

is consistent with DOE's analysis in the subject FEPs. *See* LSN# DEN001584824, at 6-990 and 6-1083. Both FEPs concluded, however, that the resulting release of radionuclides would “not result in a significant adverse change in the magnitude or timing of either radionuclide exposure to the RMEI or radionuclide release to the accessible environment.” *Id.* at 6-993 and 6-1085. Accordingly, these FEPs were excluded from the performance assessment on the basis of low consequence, consistent with the FEP screening requirements of proposed 10 C.F.R. § 63.342(a). 70 Fed. Reg. 53,313, 53,319. Because this contention fails to establish that the result would produce a *significant* adverse change, it likewise fails to establish a genuine dispute.

Finally, 10 C.F.R. § 63.114(e) – which Nevada cites in its contention – requires DOE to provide the technical basis for inclusion or exclusion of a FEP if the dose to the RMEI or release to the accessible environment would be “*significantly* changed” by its omission. *See* 10 C.F.R. § 63.114(e) (emphasis added). Nevada has merely alleged that there exist questions regarding the exclusion justification of these FEPs. This speculation is a far cry from what is required to satisfy its burden to establish a genuine dispute of material fact. Indeed, Nevada does not even suggest, let alone demonstrate, that the inclusion of the subject FEPs would change the calculated dose to the RMEI in any way. Therefore, there is no genuine dispute of a material issue.

In the same vein, Paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material, and attempts to shift the burden to DOE to demonstrate that its contention is *not* material. This is contrary to the requirements of 10 C.F.R. § 2.309(f)(1)(vi). *See* Petition at 317-318; *see also* *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). For this

and the aforementioned reasons, this contention does not establish a genuine dispute of a material issue and therefore must be dismissed.

**57. NEV-SAFETY-57 - Data For Near-Field Chemistry Models**

SAR Subsection 2.3.5.3, and similar and related subsections, which state or assume that a limited number of pore water analyses are sufficient for the near-field chemistry model, is not justifiable and therefore fails to appropriately define the range of conditions in which corrosion can occur.

**RESPONSE**

In this contention, Nevada challenges the near-field chemistry model in SAR Subsection 2.3.5.3 and “similar and related” (through unspecified subsections), claiming that DOE relied on “only” 34 pore water analysis from three of the four members of the Topopah Spring Tuff (TSw), and objecting that DOE did not identify or sample fracture flow water. Petition at 319.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and as explained in the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits of Michael C. Thorne, Adrian H. Bath, Don. L. Shettel, Jr., and Maurice E. Morgenstein, which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada is obligated to provide "[a] concise statement of the facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials." Petition at 320. Yet other than the license application, Nevada cites three documents (i.e., the documents that contain the chemical analyses of pore waters) only for the purpose of providing background information. *Id.* at 321 (citing LSN# DN2000202392; LSN# DEN000702996; and LSN# DEN000687467, with corrections at LSN# DEN000374732).

Nevada argues that thirty-four water pore analyses from three of the four members of the Topopah Spring Tuff (TSw) is an adequate number of samples to represent the entire TSw for the near-chemistry model. Petition at 320. The SAR reflects that water samples were available from all of the host-rock units. SAR 2.3.5.3.3.2.1 at 2.3.5-37. In any event, however, Nevada fails to provide any explanation for its belief that DOE used an inadequate number of insufficiently characterized water samples. More importantly, Nevada cites no scientific or factual materials that demonstrate that there is any merit to Nevada's challenge. A contention is "inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits', but instead only 'bare assertions and speculation.'" *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc. (Oyster Creek Nuclear Generating Station)*, CLI-00-06, 51 NRC 193, 208 (2000)).

The four boilerplate expert affidavits that "adopt" the contention are wholly inadequate support for Nevada's challenge to DOE's decision to use only thirty-four water pore samples from three of the four members of the TSw. See Petition Attachment Nos. 3, 4, 10, & 17. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, Inc., (American Centrifuge Plant)* CLI-06-10, 63 NRC 452, 472 (2006). Absent any tangible information or substance—let alone a "reasoned basis or explanation"—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada's failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these affidavits. See *USEC*, CLI-06-10, 63 NRC at 472.

In this contention, Nevada also makes the equally unsupported assertion that DOE erred by not identifying or sampling “any natural fracture flow waters with which to validate [DOE’s] assumption that there is an equilibrium between fracture flow and matrix waters”. Petition at 320. As with the assertions regarding the number of water pore analysis, Nevada does not even explain why it believes it is necessary for DOE to identify or sample the natural fracture flow waters. If there is any scientific or factual basis for this, Nevada chose not to reference it in the contention. And as stated above, the four affidavits that “adopt” the contention simply do not save it from dismissal.

In summary, the contention fails to explain the basis for its challenges, much less identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention urges that the range of conditions in which corrosion can occur is not appropriately defined in the SAR because, according to the contention, DOE included only thirty-four water pore analysis from three of the four members of the TSw and additionally, because DOE did not identify or sample the natural fracture flow waters. The contention must be dismissed because these assertions do not establish that a genuine dispute exists with DOE on a material issue of law or fact.

There is a glaring omission in this contention: It never once states that the results of the near-field chemistry model would be materially different if more water pore samples were used, if water pore samples from all four members of the TSw were used, or if natural fracture flow waters had been identified or sampled. In fact, there would be no material difference in the outcome for a number of reasons.

First, regarding the challenge to the inclusion of “only” thirty-four water pore samples, the SAR states:

Near-field chemistry model results are calculated assuming the repository is located in the Tptpl unit but are assumed to apply across the entire repository. This assumption is supported by the use of a range of thermal conductivity values that spans much of the range for the other host rock units, and by the compositional uniformity of the host rock units (Peterman and Cloke 2002). In addition, the four starting waters represent the observed range of matrix pore-water compositions, including analyses of samples from three of the four host-rock units (Ttpmn, Tptpl, and Ttpul).

SAR Subsection 2.3.5.3.3.2.1 at 2.3.5-37. Nevada’s contention fails to acknowledge and certainly does not refute this reasoning or these conclusions that use of the four starting waters is adequate. As other licensing boards have previously held, a contention that does not directly controvert a position taken by the applicant in the application is subject to dismissal. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plant Units 3 and 4), LBP-08-16, 68 NRC, (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

In addition, the SAR reflects that “[m]easured pore-water compositions from pore-water samples are used to determine the four initial water compositions for the near-field chemistry model . . . [W]hile pore-water samples are not available from all possible *locations in the repository*, samples are available from *all of the host-rock units*.” SAR Subsection 2.3.5.3.3.2.1 at 2.35-37 (emphasis added). DOE used the statistical method of principal component analysis to group the thirty-four water analyses on the basis of similar chemistry. *Id.* at 2.3.5-29. The representative waters from the four groups came from only three of the four units. *Id.* at 2.3.5-37.

As to whether it is appropriate to use water pore analyses from only three of the members of the TSw as starting waters, the SAR states that:

**Measured Pore-Water Compositions Adequately Represent the Actual Range of Initial Water Compositions in the Natural System**—Measured pore-water compositions from pore-water samples are used to determine the four initial water compositions for the near-field chemistry model. The measured pore-water compositions are assumed to adequately represent the actual range of pore-water compositions in the natural system. There are two bases for this assumption. First, while pore-water samples are not available from all possible locations in the repository, samples are available from all of the host-rock units. Second, the chemical similarity of the host-rock units makes large variations in concentrations of non-conservative aqueous species unlikely (SNL 2007b, Section 5.2.1).

SAR Subsection 2.3.5.3.3.2.1 at 2.35-37. Therefore, including water pore analysis from all four of the members would have no material effect on the model. The contention does not address or dispute this section of the SAR.

As to whether DOE should have identified or sampled the natural fracture flow in order to validate the assumption that there is an equilibrium between the fracture flow and the matrix waters, Nevada cites no scholarly authority that indicates DOE should have done so. And, the SAR specifically justifies why it was unnecessary to do so. The SAR explains that “[u]sing multiple lines of evidence, fracture water chemistries are shown to be similar to the matrix pore waters, although no fracture water compositions have been measured directly.” SAR 2.3.5-30. Next, the SAR discusses the “multiple lines of evidence.” These lines of evidence include, first, that “flow and transport modeling of the TSw unit above the repository also suggests that equilibration of matrix and fracture waters is rapid relative to downward transport throughout much of the host rock mass.” *Id.* The second line of evidence is that “[t]he strontium isotopic composition of fracture-lining calcite from the TSw unit also supports rapid matrix-fracture

equilibration.” *Id.* The SAR cites yet another basis, namely that “[u]ranium-series isotopic data also indicate fracture-matrix water equilibrium.” *Id.* at 2.3.5-31. Finally, the SAR relied on “[u]ranium isotopic data from fracture minerals [that] also show[ed] evidence of extensive matrix-fracture interactions.” *Id.* All of these assertions are explained in detail in the SAR and are supported by several scientific references that are cited in the SAR, including, Engineered Barrier System: Physical and Chemical Environment, Aug. 2007. *See* SAR 2.3.5-30 to -31; LSN# DN2002452948 at 6.3.2.3.

DOE also corroborated the results of the near-field chemistry model (which incorporates strong fracture-matrix interaction) by comparing them to the thermal-hydrologic-chemical seepage (THC) model, *see* SAR Subsection 2.3.5.2.3 at 2.3.5-17 to -20, with an adjustment of the feldspar dissolution rate equation in the near-field chemistry model to be the same one used by the THC model, *see* SAR 2.3.5.3.3.5.3 at 2.3.5-58 to -62. The THC seepage model implements a reactive transport code incorporating dual-permeability flow and transport. *Id.* at 2.3.5-59. Time-concentration curves for sodium and potassium are nearly identical for the two approaches, indicating that the two modeling approaches predict closely similar degrees of water-rock interaction, and hence pore water residence times. SAR at 2.3.5-60 to -61; SAR Figure 2.3.5-23 at 2.3.5-205.

Nevada does not reference these conclusions, and it certainly does not present any scientific authority to contradict them. Because Nevada fails to address any of these SAR sections, the contention fails to establish a genuine dispute of material issue of fact or law and should be dismissed.

In addition, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or

results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw. Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have on the results of the near field chemistry model or potential corrosion of the engineered barrier system. Nor has Nevada shown how the contention's resolution would make a difference in the outcome of the proceeding.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, the contention must be dismissed for failure to establish a genuine dispute of a material issue of fact or law.

**58. NEV-SAFETY-58 - Groundwater Samples In The Unsaturated Zone Sorption Tests**

SAR Subsection 2.3.8.3.1, and similar and related subsections, assume without validation that two groundwater compositions (from the saturated zone) are representative and useful for experimentation to describe radionuclide sorption in the unsaturated zone.

**RESPONSE**

This contention alleges that DOE used the two groundwater samples in SAR Subsection 2.3.8.3.1 erroneously and without justification. It states that DOE should not have “assume[d] without proof” that these samples are “representative of [UZ] waters” “for the purposes of determining the ranges of radionuclide sorption coefficients.” Petition at 323.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 324.

10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the

contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing determining sorption coefficients for modeling UZ transport is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than

absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada concludes that “[SAR Subsection 2.3.8.3.1 and related subsections] do not comply with 10 C.F.R. § 63.21(c)(1)(ii), which requires the SAR to describe the hydrology of the site and its effect on the safety and performance of the repository.” Petition at 325. However, the remainder of Nevada’s contention merely asserts that DOE “assumes without proof that [two groundwater compositions] are representative and applicable to sorption and retardation in the [UZ],” *Id.* at 324, which bears no connection to the question of whether DOE complied with 10 C.F.R. § 63.21(c)(1)(ii). Accordingly, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Moreover, Nevada fails to provide qualitative – let alone *quantitative* – results of this alleged deficiency. The vague and unsupported allegation that “[w]ithout any proof of the relevance of the groundwater samples to any groundwater present in the unsaturated zone, the DOE assumption is not justified,” Petition at 324, does not suffice to present a litigable issue. A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006).

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Don L. Shettel, Jr., Adrian H. Bath, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

The crux of Nevada's argument is its statement that "[i]t is unreasonable and unjustified for DOE to say that these two groundwater samples are representative of all unsaturated zone waters." Petition at 324. However, here and elsewhere in its contention, Nevada fails to provide any support for that assertion. Without support, this amounts to little more than an unsubstantiated argument of counsel, and fails the requirement of 10 C.F.R. § 2.309(f)(1)(v). *See also Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (in referencing 10 C.F.R. § 2.714,

the predecessor to 10 C.F.R. § 2.309, the Commission stated that petitioners must present “claims rooted in fact, documents, or expert opinion”).

Nevada cites to only one reference document, and then only for the limited principle that “radionuclide retardation coefficients for the various radionuclides of interest are functions not only of the solids (rock samples) used in the sorption experiments, but also of the chemistry of the water samples.” Petition at 324. Yet, neither the referenced document nor the contention identifies the “radionuclides of interest,” or otherwise supports a challenge to the groundwater samples used for sorption measurements in the LA. Accordingly, this reference does little to bolster Nevada’s contention, which remains rooted in bare assertions and speculation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s contention, regarding DOE’s use of two bounding groundwater samples for analyses of radionuclide sorption in the UZ, presents an issue that is not material and not adequately supported. For this reason, and because it imposes unjustified requirements upon DOE, mischaracterizes DOE’s analysis, and does not specify the ramifications of its alleged errors, this contention does not establish a genuine dispute of material fact.

First, this contention fails to raise a genuine dispute because it mischaracterizes DOE’s use of the groundwater samples at issue. Nevada claims that DOE’s position is that “these two groundwater samples are representative of all unsaturated zone waters.” Petition at 324. However, DOE explains, “[t]he intent of this approach was to examine the potential dependence of water chemistry on sorption, rather than to represent the exact geochemical conditions in the fracture, perched, or pore water.” SAR Section 2.3.8.3.1, at 2.3.8-19. Petitioner’s imprecise readings cannot form the basis for a litigable contention. *See Ga. Inst. of Tech.*

(Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995).

This contention also incorrectly states that DOE “assumes without proof” that the two groundwater samples are representative of all UZ compositions. Petition at 324. To the contrary, DOE’s use of the subject groundwater samples is rooted in extensive analysis. SAR Section 2.3.8.3.1 describes the measurement of sorption coefficients for use in the UZ transport calculations, and references Appendix A of SNL 2007. *See* SNL 2007, “Radionuclide Transport Models Under Ambient Conditions,” LSN# DN2002466365. A summary of composition of perched and pore waters in the UZ is given in Appendix A, Section A4 of SNL 2007. *Id.* Appendix A, Table A-2 gives ranges of concentrations of elements in perched and pore waters, together with J-13 and UE-25 p#1-c well water concentrations. *See id.* The J-13 and UE-25 p#1-c waters were used in sorption experiments as end-member compositions intended to conservatively represent the impact of water composition on sorption coefficients. *See* SAR Section 2.3.8.3.1 at 2.3.8-19.

These two waters adequately bracket the influence of water chemistry on potential radionuclide sorption coefficients because they adequately account for the most important and dominant impacts on sorption relevant to radionuclide transport away from the repository, that is, competition for sorption sites and solution complexation. *See* BSC 2004, Section 5.2.2.7.3 and 5.3.3.2.1, LSN# DN2992066045; SNL 2007, Appendix A, Table A-2, LSN# DN2002455365.

DOE also accounted for uncertainties in these parameters. Appendix A of SNL 2007 provides probability distributions for the sorption coefficient of each element of interest, on the three major rock types (devitrified, zeolitic, and vitric) found in the UZ. *See* SNL 2007, Appendix A, Section A1, LSN# DN2002455365. The influence of expected variations in water chemistry, radionuclide concentrations, and variations in rock surface properties within one of

the major rock types are incorporated into these probability distributions. *Id.* at Appendix A, Section A1. In addition, surface complexation modeling is used to further evaluate the impact of variations in water chemistry and surface area on sorption coefficients. *Id.* at Appendix A, Section A6. Thus, the sorption models used and the resulting probability distributions account for uncertainties in the input variables, including water chemistry.

Second, this contention also fails to raise a genuine dispute because it erroneously opposes DOE's use of two groundwater samples on the basis that it oversimplifies actual conditions. Nevada contends that it is "unreasonable and unjustified for DOE to say that these two groundwater samples are representative of all [UZ] waters." Petition at 324. However, the fact that DOE used only two samples is not an adequate basis for discarding the model. Indeed, the NRC has recognized the appropriateness of simplified assumptions in models used to estimate postclosure performance of the Yucca Mountain Repository, and therefore, simplifications in and of themselves, are not an adequate basis for criticizing the model. As stated in NUREG-1804, "Yucca Mountain Review Plan," pg. 2.2-2:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use conservative assumptions to simplify its approaches and data collection needs.

The Commission has also noted this in the context of simplified dose calculations:

Mathematical models describing the various sequences of natural phenomena which relate releases of radioactive material to radiation dose vary in detail and complexity. This was frequently observed in the hearing. Through circumstances peculiar to his case, one applicant may be able to present to the Regulatory Staff adequate support for his proposal through the use of simple models and conservative parameter values, while another applicant cannot prove his case so easily. There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements. The use of the simpler procedure may, however, introduce a wider range of uncertainty in estimated doses than a more complicated analysis. Hence the proper choice of parameter values for a simple calculation might be more conservative than values appropriate for a more precise calculation.

*In the Matter of Rulemaking Hearing Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as Practicable" for radioactive material in Light-Water-Cooled Nuclear Power Reactor Effluents, CLI-75-5, 1 NRC 277, 339 (1975).* Nevada alleges only that "[w]ithout any proof of the relevance of the groundwater samples to any groundwater present in the [UZ], the DOE assumption is unjustified." Petition at 324. Nevada has not contended, much less shown, however, that the two groundwater samples used by DOE are not conservative or do not provide reliable results.

Third, Nevada fails to provide a genuine dispute because it neglects to establish that DOE has any obligation to give additional detail on its selection of these two bounding groundwater samples. Nevada cites no regulatory requirement or even guidance document that would have DOE provide more discussion of its groundwater analysis. An allegation that some aspect of a license application is "inadequate" or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some

material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, n.12 (1990).

Fourth, this contention does not raise a genuine dispute of a material issue because Nevada does not show that DOE violated applicable regulations or that the contention, if correct, would affect the NRC's findings in this proceeding. For example, although Nevada cites the requirements of 10 C.F.R. § 63.31(a)(2), Nevada does not establish or even allege that DOE's use of the subject groundwater samples will preclude a "reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public." 10 C.F.R. § 63.31(a)(2). In fact, as shown above, DOE's development of the two groundwater samples and related uncertainty parameters, demonstrate that DOE has satisfied these requirements.

Similarly, the contention also fails to show that DOE violated the requirements of 10 C.F.R. § 63.305(c), which states that DOE must vary factors related to hydrology based upon "cautious, but *reasonable* assumptions" (emphasis added). DOE demonstrated regulatory compliance in SAR Section 2.3.8, which provides a detailed summary of the extensive work on radionuclide transport in UZ of Yucca Mountain. Specifically, SAR Subsection 2.3.8.3 details data collection from the Yucca Mountain site and surrounding area, and uncertainties and variabilities in parameter values, and SAR Subsection 2.3.8.3.1 describes laboratory sorption measurements for the UZ and uncertainty in parameter data. Nevada thus has an affirmative burden to show that DOE's assumptions were *unreasonable*, but made no attempt to do so.

Lastly, as discussed in the applicable Legal Standards section and section (d) above, this contention alleges potential errors, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies. Here, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Accordingly,

Nevada has failed to raise a genuine dispute of material fact or law and, therefore, this contention is inadmissible. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises genuine dispute on a material issue of fact or law in this proceeding. Not only does Nevada fail to do so, but Paragraph 6 essentially attempts to shift this burden to DOE and should be rejected.

**59. NEV-SAFETY-59 - Groundwater Compositions Assumed**

SAR Subsection 2.3.8.3.1 and similar subsections, which state that only two natural water compositions bound the range of water compositions expected in the unsaturated zone for the purposes of sorption and radionuclide transport, is illogical and impossible for a multicomponent aqueous system and means that the sorption and radionuclide transport calculations cannot be relied upon.

**RESPONSE**

This contention alleges that “SAR Subsection 2.3.8.3.1 and similar subsections,” which identify DOE’s use of only two groundwater samples to bound the range of water compositions in the UZ, is “illogical and impossible for a multi component aqueous system.” Petition at 326. Nevada concludes that, because of the use of these two samples, “the sorption and radionuclide transport calculations cannot be relied upon.” *Id.*

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 326-27. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 327. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in modeling UZ transport is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that DOE did not comply with regulations regarding evaluation of the hydrology at the site and appropriate parameters for the postclosure performance assessments. Petition at 326-27. Essentially, it alleges that DOE improperly used only two groundwater compositions to bound the range expected in the UZ. *Id.* at 326. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Moreover, Nevada neglects to establish how consideration of additional or different groundwater compositions could produce any alternative TSPA results. The simple allegation that “the water compositions adopted do not provide an appropriate basis for the evaluation of parameters characterizing radionuclide sorption and transport in the [UZ], with significant implications for the fluxes of radionuclides released and doses to the [RMEI],” does not suffice to present a litigable issue. Petition at 328. Beyond its passing reference to “significant

implications,” Nevada fails to provide any quantitative support for this alleged deficiency. Petition at 328. A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006).

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition attaches several affidavits (by Maurice E. Morgenstein, Don L. Shettel, Jr., and Adrian H. Bath) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

The crux of Nevada’s argument is its statement that “the water compositions adopted [by DOE] do not provide an appropriate basis for the evaluation of parameters characterizing radionuclide sorption and transport in the [UZ].” Petition at 328. However, here and elsewhere

in its contention, Nevada fails to provide any factual support or expert opinion for that assertion. Without support, this amounts to little more than an unsubstantiated argument of counsel, and certainly fails the requirement of 10 C.F.R. § 2.309(f)(1)(v). *See also Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (in referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309, the Commission stated that petitioners must present “claims rooted in fact, documents, or expert opinions”).

In fact, entire passages from this contention, such as the example that follows, lack any reference or support whatsoever:

In analytical chemistry, when one is attempting to determine the concentration of one species or component (such as a cation or metal), a calibration line (or curve) is constructed first by measuring the concentration of (at least) two solutions with known concentrations of the species of interest and generally with one concentration that is lower and the other that is higher than that of the unknown solution, thereby bracketing, or “bounding,” the unknown solution. This technique assumes that all other variables (the matrix) in the two known solutions are equal and similar to that of the unknown solution. When extrapolating this type of technique to multiple variables (major cationic and anionic species or components) one might assume that two solutions are necessary for each variable. The DOE sorption experiments are more complex than this slightly simpler analogy, because the sorption of a number of individual radionuclides is being determined on the same rock type. However, DOE assumes that only two solutions in total are required, perhaps because otherwise the matrix of necessary experiments becomes incredibly large. In addition, the two natural water compositions chosen are not specific for transport and sorption in the UZ as they are groundwater compositions from the saturated zone.

Petition at 327-28. The same is true of the following unsupported statement by Nevada, which is entirely speculative: “DOE assumes that only two solutions in total are required, perhaps because otherwise the matrix of necessary experiments becomes incredibly large.” Petition at 328.

Licensing boards have found that “[m]ere assertions without appropriate explanation and support

do not satisfy the requirements of the contention rule.” *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), LBP-03-17, 58 NRC 221, 229 (2003), *aff’d on other grounds*, CLI-03-17, 58 NRC 419 (2003). Accordingly, the Board should not accept Nevada’s hypothetical, unsupported assertions.

Nevada cites to only one reference document, which supports a limited statement in this contention that “[b]efore 1990, when sorption experiments began, there were no site-specific analyses of fracture or pore waters from the [UZ].” Petition at 328. However, Nevada fails to provide any explanation for this statement or how it contributes to its contention. This is inconsistent with a petitioner’s obligation to explain the significance of any factual information upon which it relies. *See Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 204-05 (2003).

Accordingly, for the aforementioned reasons, Nevada fails to adequately support its contention, in violation of 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s contention, regarding DOE’s use of two bounding groundwater samples for analyses of transport and sorption in the UZ, presents an issue that is not material. For this reason, and for the reasons set forth below, this contention does not establish a genuine dispute of material fact.

This contention does not raise a genuine dispute because it mischaracterizes some of DOE's relevant analyses and neglects to account for the remainder. This contention alleges, in part, that SAR Subsection 2.3.8.3.1 and similar subsections “state that only two natural water compositions are used to bound the range of water compositions expected in the unsaturated zone for the purposes of sorption and radionuclide transport.” Petition at 326. Nevada alleges

that, as a result, sorption and transport calculations used in the LA are unreliable. The contention further claims that “DOE assumes that it is possible to bound a multi-component aqueous system ... with only two natural water samples.” *Id.* This misstates the intended use of these two sample waters. As explained in SNL (2007) LSN# 2002466365, a supporting document to SAR Section 2.3.8.3.1, use of the two natural waters was “intended to bracket the impact of water composition on sorption coefficients” (*i.e.*, K<sub>d</sub> values). SNL 2007 *Radionuclide Transport Models Under Ambient Conditions*. MDL-NBS-HS-000008 REV 02 ADD 01, LSN# DN2002466365 at A-6. That is, natural water samples used for sorption experiments were not intended to bound the range of potential water compositions, but rather to bound the *impact* of all possible water compositions on potential K<sub>d</sub> values. Because these impacts are adequately addressed by using these two natural groundwaters, as explained below, radionuclide sorption and transport calculations used in the DOE's performance assessment (TSPA) are reliable.

Two of the most important processes by which major ions in solution can affect radionuclide sorption are (1) competition for sorption sites by similarly charged ions, which is essentially equivalent to ion exchange (Stumm and Morgan, 1996, “Aquatic Chemistry” 3rd Edition, Wiley & Sons, TIC: 246296, Section 9.8, at 586-93) and (2) complexation of radionuclides by oxyanions in solution (Langmuir 1997. “Aqueous Environmental Chemistry” Prentice Hall, TIC: 237107, at 509 and 521-31). As explained by Langmuir, the actinide cations (Th, U, Np, Pu, Am) are hard acids and so form their strongest solution complexes with ligands that are hard bases, the strongest of which are carbonate and hydroxide complexes. *See* Langmuir at 522, and Table A13.5 – A13.8.

Measuring sorption of radionuclides onto solids from an aqueous solution that is carbonate-rich (*e.g.*, UE-25 p#1) will therefore tend to result in lower measured sorption

coefficients (Kds) compared with waters containing less dissolved carbonate (*e.g.*, J-13) due to formation of stable solution species for those radionuclides that form strong carbonate complexes. Similarly, measuring sorption in an aqueous solution containing relatively high concentrations of divalent cations (*e.g.*, UE-25 p#1) compared with a more dilute water (*e.g.*, J-13) will account for relatively strong competition for sorption sites (ion exchange),

Compositions of pore waters tend towards those of perched and ground waters with increasing depth. BSC 2004, *Yucca Mountain Site Description*, LSN# DN2002066045 at F5-13 – F5-17. Specifically, pore waters from the Paintbrush Tuff Nonwelded Hydrogeologic Unit, *see id.* at F5-14, and those from the Tiva Canyon Welded and Topopah Spring Welded Hydrogeologic Units, *see id.* at F5-15, are richer in sulfate plus chloride and in divalent ions (Ca+Mg) than perched waters and ground waters; whereas deeper pore waters, such as those from below the top 200 feet of the Calico Hills Nonwelded Hydrogeologic Unit and above the Prow Pass Lithostratigraphic Unit, are compositionally similar to perched waters and groundwaters (which are compositionally similar to each other). *See id.* at F5-13, F5-17 and F5-16.

Thus, the use of J-13 (a relatively dilute groundwater) and UE 25p#1 (a Ca<sup>2+</sup>-Mg<sup>2+</sup> and carbonate-rich groundwater) bracket the influence of water chemistry on potential radionuclide sorption coefficients because these two waters account for the most important and dominant impacts on sorption relevant to radionuclide transport away from the repository, that is, competition for sorption sites and solution complexation.

Nevada also erroneously alleges that DOE did not undertake extensive analysis to evaluate parameters characterizing radionuclide sorption and transport in the UZ. In doing so, Nevada apparently neglects the analyses presented in the SAR and supporting documents. For

instance, a number of processes relevant to sorption are specifically addressed in FEPs that are part of the analysis and modeling report, “Radionuclide Transport Models Under Ambient Conditions” (SNL 2007; Table 6-2) LSN# DN2002466365, including FEP 2.2.08.01.0B, “Chemical Characteristics of Groundwater in the UZ”; FEP 2.2.08.06.0B, “Complexation in the UZ”; FEP 2.2.08.09.0B, “Sorption in the UZ”; and FEP 2.2.09.01.0B, “Microbial Activity in the UZ.” *See* LSN#DEN001584824 at Table 6-2.

In addition, the potential range of compositions entering the repository are addressed by the near-field chemistry process model in “Engineered Barrier System: Physical and Chemical Environment,” which predicts potential seepage water compositions at the drift wall. *See* SNL 2007 LSN# DN2002452948, Section 6.3.2. This model was designed specifically to investigate the effects of thermal-hydrologic-chemical processes in the host rock, including the effects of initial water chemistry, and mineral and gas compositions in the rock. *Id.* at Sections 6.3.2 and 6.6. The near-field chemistry process model incorporates the effects of water–rock interactions and thermal-hydrologic-chemical processes. Uncertainty in the initial water chemistry is incorporated by using four starting waters in the P&CE models, representing the four chemically distinct groups of TSw pore-water compositions. *See also* FEP 2.2.08.12.0A “Chemistry of Water Flowing into the Drift,” LSN#DEN001584824 at 6-1033.

Nevada's assertion that “DOE has given *no* consideration to the compositions of seepage waters that may develop over time as the thermal history of the repository evolves,” Petition at 328 (citations omitted, emphasis added), is not correct. To the contrary, DOE conducted extensive analyses and, as a result, excluded some FEPs from TSPA models based on their low consequence. The relevant excluded FEPs include FEP 2.2.08.03.0B, “Geochemical Interactions and Evolution in the UZ,” (LSN# DEN001584824, at 6-990), which examined thermo-chemical

effects on the seepage water entering the waste emplacement drifts by using the Drift-scale THC Seepage Model (SNL 2007, LSN# DN2002490523). It found that the evolutionary pathways of the PTn pore-water chemistries closely progress towards those of the TSw hydrogeologic unit. *See* LSN# DEN001584824 at 6-991. Therefore, it is not expected that mixing of PTn and TSw pore waters would generate water chemistries that are different from those defined by the compositional range of the TSw pore waters. *Id.* This FEP and the supporting documents explain that the resulting effects on sorption and transport from seepage waters will not significantly affect the magnitude or timing of the dose to the RMEI or release to the accessible environment. *See* LSN# DEN001584824, at 6-990 to -994. Similar conclusions apply to analyses conducted for excluded FEP 2.2.01.05.0A, “Radionuclide Transport in the Excavation Disturbed Zone,” (LSN# DEN001584824 at 6-884); FEP 2.2.08.03.0B, “Geochemical Interactions and Evolution in the UZ,” (LSN# DEN001584824 at 6-990); and FEP 2.2.10.06.0A, “Thermo-Chemical Alteration in the UZ (Solubility, Speciation, Phase Changes, Precipitation/Dissolution,” (LSN#DEN001584824 at 6-1069 to 1070) (finding “overall weak dependency of sorption [coefficients] on temperature”). Accordingly, Nevada’s allegedly missing information is, in fact, provided by DOE.

As discussed in the Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts that the Application fails to address an issue that the Application does address, is defective. As established here, Nevada’s contention suffers from this flaw. Nevada completely ignores the relevant portions of the Application and fails to explain how the alleged defects in the Application will significantly affect the performance assessments. In short, this contention is inadmissible because “the Petitioner’s assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful

analysis of the application[.]” *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff’d*, CLI-04-6, 60 NRC 631 (2004).

Second, this contention also erroneously opposes DOE’s analyses on the basis that they oversimplify actual conditions. Nevada contends that the two groundwater samples used by DOE do not provide an adequate basis for evaluation of transport and sorption in the UZ, because it is not possible “to ‘bound’ multi-component aqueous solution compositions expected in the unsaturated zone with only two natural groundwater compositions.” Petition at 328. Nevada states (without any explanation or specific reference) that “DOE assumes that only two solutions in total are required” and “[t]hus, the water compositions adopted do not provide an appropriate basis for the evaluation of parameters characterizing radionuclide sorption and transport in the [UZ].” Petition at 328. However, the fact that DOE used only two samples is not an adequate basis for discarding the model. Indeed, the NRC has recognized the appropriateness of simplified assumptions in models used to estimate postclosure performance of the Yucca Mountain Repository, and therefore, simplifications in and of themselves, are not an adequate basis for criticizing the model. As stated in NUREG-1804, “Yucca Mountain Review Plan,” pg. 2.2-2:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use

conservative assumptions to simplify its approaches and data collection needs.

The Commission has also noted this in the context of simplified dose calculations:

Mathematical models describing the various sequences of natural phenomena which relate releases of radioactive material to radiation dose vary in detail and complexity. This was frequently observed in the hearing. Through circumstances peculiar to his case, one applicant may be able to present to the Regulatory Staff adequate support for his proposal through the use of simple models and conservative parameter values, while another applicant cannot prove his case so easily. There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements. The use of the simpler procedure may, however, introduce a wider range of uncertainty in estimated doses than a more complicated analysis. Hence the proper choice of parameter values for a simple calculation might be more conservative than values appropriate for a more precise calculation.

*In the Matter of Rulemaking Hearing Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as Practicable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents*, CLI-75-5, 1 NRC 277, 339 (1975). Nevada has not contended that the two groundwater samples used by DOE are not conservative or do not provide reliable results.

Third, this contention fails to raise a genuine dispute because it neglects to specify the ramifications of its alleged errors. Nevada makes no attempt to show that, if its allegations were correct, the resulting dose estimate would exceed regulatory requirements or significantly change the performance assessments.

For example, although Nevada cites the requirements of 10 C.F.R. § 63.114(a), Nevada does not establish that DOE's use of the subject groundwater samples does not satisfy the requirement to "include data related to the geology, hydrology, and geochemistry ... of the

Yucca Mountain site.” 10 C.F.R. § 63.114(a). Likewise, although this contention alleges that DOE failed to comply with the requirements of 10 C.F.R. § 63.114(b), it does not otherwise show that DOE did not “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” 10 C.F.R. § 63.114(b). Nevada’s unsupported assertions are especially bare in light of the extensive analysis of uncertainties and variabilities in parameter values conducted by DOE in SAR Section 2.3.8.3, as explained above.

In addition, the contention fails to show that DOE violated the requirements of proposed 10 C.F.R. § 63.305(c), which states that DOE must vary factors related to geology and hydrology based upon “cautious, but *reasonable* assumptions” that could affect Yucca Mountain during the period of geologic stability. 70 Fed. Reg. at 53319 (emphasis added). As outlined above, DOE has demonstrated the reasonableness of its assumptions in SAR Section 2.3.8 and the aforementioned supporting FEPs. Thus, Nevada bears an affirmative burden to show that DOE’s assumptions were *unreasonable*, which it fails to do here.

As discussed in the applicable Legal Standards section and section (d) above, this contention alleges potential errors, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies. Here, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Accordingly, Nevada has failed to raise a genuine dispute of material fact or law and, therefore, this contention is inadmissible. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is

Nevada's burden to show that its contention raises a genuine dispute on a material issue of fact or law in this proceeding, which it fails to do.

**60. NEV-SAFETY-60 - Empirical Site-Specific Data And The Near-Field Chemistry Model**

DOE's near-field chemistry model is not site specific and therefore not valid for Ti-7 and C-22 corrosion studies because the unsaturated zone hydrogeochemical characterization porewater data are not satisfactory for determining the environment in which in-drift geochemical reactions will occur.

**RESPONSE**

In this contention, Nevada challenges DOE's near-field chemistry model as not site-specific, and claims that the unsaturated zone hydrogeochemical characterization pore waters cannot be used to determine the environment in which in-drift geochemical reactions will occur, and that the model therefore is not valid for Ti-7 and C-22 corrosion studies. Petition at 332.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations in paragraph 4 of the

contention. Petition at 331-32. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding. . .,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate more than that DOE has not or cannot satisfy a specific performance objective

but, instead, must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and as explained in the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits of Adrian H. Bath, Don. L. Shettel, Jr., and Maurice E. Morgenstein, which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

The first issue raised in the contention is that "DOE treats unsaturated zone pore-waters as being geochemically equivalent to unsaturated zone fracture flow water." Petition at 332. Nevada disagrees with DOE's premises for treating these waters as equivalent, claiming that "unsaturated zone pore-waters cannot normally be equated with fracture flow waters." *Id.* Its disagreement, however, is based largely on equivocations such as, "DOE's observations *may* incorrectly distinguish matrix . . . from small and large fracture flow;" "it is *most doubtful* that

fracture flow water in fast path transport will come into equilibrium with the wall rock of the fractures in the welded tuffs;” and “it is *likely* that pore-water will be in a meta-stable equilibrium state with the matrix rock because of the long time of rock-water interaction . . . .” Petition at 333 (emphasis added). In fact, in arguing this first issue, Nevada cites no documents other than various SAR sections. And, no factual support or expert opinion is cited for these assertions. Such reliance on unsubstantiated statements do not satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v). *Fansteel*, 58 NRC at 203.

Apart from all the speculation, Nevada also makes numerous unsubstantiated assertions of fact regarding the properties and propensities of pore-water, matrix pore water, and fracture flow water with respect to the first issue raised in the contention. None of these assertions is supported by a reference to any scientific documents or expert opinions. For example, without any support at all, Nevada claims that there is “just not sufficient time” for “fracture flow water in fast path transport [to] come into equilibrium with the wall rock of the fractures in welded tuffs.” Petition at 333. Nevada also claims that “[i]n some instances, one might even expect that the matrix pore water is connate.” *Id.* As such, Nevada is suggesting that the existing TSw pore waters could represent the initial water released from the initial volcanic glass during devitrification. That statement is unsupported attorney argument, whereas the SAR notes, based on scholarly authority, that these waters are estimated to be 10,000 years, at the base of the TSw. SAR at 2.3.5-54 to -55.

The second issue that Nevada raises in this contention relates to the “[q]uality . . . of DOE unsaturated zone pore-water data and unjustifiable screening procedures.” Petition at 335-38. As with the first issue raised in the contention, this argument also relies on a series of statements that are not attributed to any scientific materials or expert opinions. For example, Nevada claims

that “[t]he quality of the DOE reported pore-water is below standard acceptable practices in hydrology and certainly below competent practices when these analysis are so important with respect to determining the lifetime of critical EBS materials such as C-22.” Petition at 337. But, Nevada cites absolutely no authority for this position.

Another example of Nevada’s disregard for the requirement to provide (in its own words) “appropriate citations to supporting scientific or factual materials,” Petition at 332, is Nevada’s statement that the “screening cut-offs *seem* to be arbitrary . . . .” Petition at 338 (emphasis added). Nevada cites no authority for its characterization of the screening cut-offs as “arbitrary.” Where, as here, the petitioner “” has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation,’” the contention must be dismissed. *Fansteel*, 58 NRC at 203.

Similarly, Nevada claims that “screening procedures used to obtain the 34 analyses are not without controversy.” The only citation that Nevada provides for the proposition that there was “controversy” over the screening procedures is the SAR at 2.3.5-28. But, the discussion at that SAR section says exactly the opposite, namely that the criteria “proved sufficient to screen out” waters affected by microbial activity.” *Id.* Accordingly, the SAR cite provides no basis for the contention's assertion that there was controversy over the screening procedures.

Nevada does cite to “Engineered Barrier System: Physical and Chemical Environment ANL-EBS-MD-000033 REV 06B” (08/31/2007), LSN# DN2002452948, in connection with the second issue raised in the contention. *See* Petition at 35. But Nevada cites this document only as the source for certain background facts, such as the number of pore-water samples obtained and DOE’s findings regarding these pore-water samples. *Id.* Nevada’s cite to “Thermal Testing Measurements Report, ANL-NBS-HS-000041 REV 00 (09/26/2002), LSN# DN2002296975,

(*see* Petition at 337) serves the same purpose; it is merely referenced as the source for background facts about the compositions of the unsaturated zone waters and the DST Borehole water samples. *Id.*

Finally, the affidavits of the three experts who merely “adopt” either paragraph 5 or paragraph 6 of this contention fall far short of the requirement to provide conclusions supported by reasoned bases or explanation. *See* Petition Attachment Nos. 4, 10, & 17. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC*, CLI-06-10, 63 NRC at 472. Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

Not having cited any scientific or factual materials to support its assertions about the alleged inadequacies in data for near-field chemistry models, every one of Nevada’s challenges is necessarily based on nothing more than unsubstantiated attorney argument. Accordingly, the contention must be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such

alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw.

As noted above, this contention raises two separate issues. The first relates to DOE’s treatment of unsaturated zone pore-water as geochemically equivalent to unsaturated zone fracture flow water, and in particular whether that conclusion is supported by DOE’s determination that properly concluded that there was an equilibrium. Petition at 332. In the second issue, Nevada challenges the quality of DOE’s unsaturated zone pore-water samples. *Id.* at 335.

**(1) Treatment of Unsaturated Zone Pore-Water as Geochemically Equivalent to Unsaturated Zone Fracture Flow Water**

Nevada questions two “concepts” that form the basis for DOE’s treatment of unsaturated zone pore-water as geochemically equivalent to the unsaturated zone fracture flow water. The first “concept” that Nevada challenges is DOE’s determination that “[e]quilibration of matrix and fracture waters is rapid relative to downward transport throughout much of the host rock.” SAR Subsection 2.3.5.3.2.2.1 at 2.3.5-30. In disputing this conclusion, Nevada claims that the conclusion is “based upon a DOE plug flow model with averaged rock properties, assuming ambient saturation” and that “does not consider different rock units or actual matrix and fracture saturations.” Petition at 332.

In fact, the plug flow model is based in part on the finite element heat and transfer code (FEHM) modeling results. In turn, the FEHM simulations utilized a more detailed representation of the process and “*included the four TSw repository host rock units, each with the hydraulic and capillary properties taken from the calibrated rock properties set developed by the unsaturated zone flow model . . .*” SAR at 2.3.5-30 (emphasis added). Thus, the contention raises no genuine dispute of material issue of fact or law because, as another Licensing Board has recently

ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (Sept. 12, 2008), slip op. at 39.

Nevada also claims that there are “no data presented to indicate that matrix as defined in FEHM equates to matrix as defined with respect to pore-water chemistry.” Petition at 333. But Nevada is again wrong. The basis can be found in the validation comparison with the THC seepage model, which uses the same dual continuum approach and matrix and fracture hydrologic property sets as the FEHM calculations used in developing the near field chemistry model, with the exception that the feldspar dissolution rate was modified in running the near-field chemistry model to equate to that in the THC model. *See* SAR 2.3.5.3.3.5.3 at 2.3.5-58 to -62; SAR Figure 2.3.5-23 at 2.3.5-205.

These and the other grounds that Nevada cites in challenging DOE’s conclusion about the fracture-matrix exchange are based on conclusory and theoretical assertions for which Nevada cites no factual or scientific support. Indeed, Nevada disproves some of its own assertions. For example, Nevada claims that “[t]he basic hydrogeochemical signal is therefore set upon infiltration and is only modified by dissolution and evaporation along the fracture flow transport pathways until it joins the mixing waters in the saturated zone.” Petition at 333. This unsupported statement is refuted by Nevada’s next assertion that “[i]f a portion of the downward transporting water diffuses into the matrix it can acquire a strong geochemical signal from the host rock matrix and this signal is certainly dependent on its residence time for rock-water interaction,” which suggests a mechanism by which fracture water *could be* modified by other processes.

The second “concept” that Nevada challenges is DOE’s conclusions regarding the similarity between the isotopic characteristics of fracture waters and matrix waters. Petition at 334. Based on an examination of the isotopic composition of fracture-lining minerals from the TSw unit and matrix pore waters, DOE concluded that they indicated rapid equilibration of matrix and fracture waters relative to downward transport. *See* SAR 2.3.5-30 to -31. The contention asserts--without any support--that the minerals cannot represent matrix pore waters because they are in the fracture continuum, and fracture and matrix waters cannot possibly have equilibrated. Petition at 334. That is merely a way of saying that Nevada disagrees with DOE. Yet, Nevada does not cite any particular problem with DOE’s quantitative modeling work and predictions showing that fracture-matrix compositional mixing occurs to a significant extent. SAR at 2.3.5-30 to -31. This argument therefore does not raise a genuine dispute on a material issue of fact or law regarding DOE’s conclusions regarding the isotopic characteristics of fracture waters and matrix waters.

## **(2) Quality and Screening of the Pore Waters**

This aspect of the contention raises a nearly-identical challenge as that presented in NEVADA-SAFETY-55. Nevada complains that too few samples were used and that some of the samples retained may have been microbially affected by bacterial action.

With respect to Nevada’s position that thirty-four samples are too few to produce reliable data, Nevada never claims that this caused a material difference in the outcome of the near field chemistry model, and Nevada does not provide any expert or documentary support for such a claim. Indeed, the “Engineered Barrier System: Physical and Chemical Environment” report demonstrates that just the opposite is true. This document reports that “[t]he repository horizon within the Topopah Spring Tuff . . . is relatively uniform in composition. Peterman and Cloke . .

. analyzed twenty core samples, in duplicate, from the cross drift within the four lithologic units constituting the repository level. *All samples were compositionally similar with respect to major oxides and trace elements . . . and normative mineral compositions . . .*” LSN# DN2002452948 at 5-3 (emphasis added). The SAR also observed that the “chemical similarity of the host-rock units makes large variations in concentrations of non-conservative aqueous species unlikely (SNL 2007b, Section 5.2.1).” SAR at 2.3.5-37. Based on the homogeneity of the host-rock units, additional samples would be unnecessary. *See, e.g., id.* (explanation of assumption that the measured pore-water compositions adequately represent the actual range of initial water compositions in the natural system).

As to Nevada’s claim that the water pore-samples were not adequate because only 50% had complete chemical analyses, Nevada notes that the SAR concluded that this most likely was due to microbial activity. Petition at 336. The contention then specifically points out that in the SAR, DOE explained that these missing values could be derived for these parameters when the samples are pre-equilibrated for use in the near field chemistry model. *Id.* (citing Subsection 2.3.5.3.2.2.1 at 2.3.5-27. Nevada does not dispute that the missing values could be derived in this manner.

In any event, if any of the thirty-four samples were affected by microbial activity, they would be nitrate-poor and Ca-rich. *See* Engineered Barrier System: Physical and Chemical Environment, LSN# DN2002452948, Section 6.6, at 6-93. In turn, however, a lower nitrate concentration would increase localized corrosion in Alloy 22. *See* SAR at 2.3.6-36. Accordingly, even if some of the samples were affected by microbial activity, it was conservative to retain them as samples, and so no genuine dispute of material issue of fact or law is raised by this complaint. *Id.*

Finally, Nevada challenges DOE's screening by incorrectly claiming that "DOE use[d] trace elements strontium and manganese to discriminate between the screened-in and screened-out (elevated values) pore-water." Petition at 338. The two screening criteria were charge balance and calculated pH upon equilibration. The strontium and manganese data were used specifically as confirmatory data, and actually illustrated that there are systematic differences between the screened-in and screened-out waters. LSN# DN2002452948, Section 6.6.4.

As discussed in Section V.A.3 above, contentions expressing only generalized "uncertainties" in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. Although Nevada claims that DOE should have considered additional uncertainties in determining the chemical composition of the water in the vicinity of the disposal drifts, Nevada fails to point out any impact that these additional uncertainties would have on the rates at which the disposal system components would degrade.

Nevada bears the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed.

**61. NEV-SAFETY-61 - Ambient Seepage Into Emplacement Drifts**

SAR Section 2.1 and Subsection 2.3.3.2, and similar and related subsections, which state or assume that postclosure ambient seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because the analysis only considers drift-wall rock properties (e.g., flow characteristics in the unsaturated zone, permeability, and capillary strength of fractured rock) and geometry of the emplacement drifts, and thus completely fails to consider engineered ground support items (e.g., the Bernold-type perforated stainless steel liners) that are deemed necessary for the safety of preclosure operations.

**RESPONSE**

Nevada asserts that SAR Section 2.1 and Subsection 2.3.3.2, and “similar and related subsections,” Petition at 341, which state or assume that postclosure ambient seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because DOE only considers drift-wall rock properties in analyzing ambient seepage into emplacement drifts, thereby failing to consider the effect of engineered ground support items, which allegedly increase drift seepage by reducing capillary strength.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that stainless steel liners in contact with the upper surface of the emplacement drifts will reduce the capillary strength of the drifts, thereby “facilitat[ing] seepage flow onto the liners” and increasing the possibility of drips contacting the engineered barrier system (EBS). Petition at 343.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.21(a)(3), 10 C.F.R. §63.21(c)(1)(ii), 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. § 63.102(h) (part of Subpart E), 10 C.F.R. §63.113, and 10 C.F.R. §63.115). Petition at 341-42. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing seepage of water into emplacement drifts is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or

cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada alleges that the presence of perforated stainless steel liners against the upper surface of the emplacement drifts will reduce capillary strength and cause an increase in ambient drift seepage, Nevada has not alleged an increase in the mean dose above the regulatory limit. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that the installation of the Bernold-type perforated steel liners against the upper wall of the emplacement drift will reduce the capillary strength of the drift, resulting in increased drift seepage. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. §

2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Michael C. Thorne, Doug F. Hambley, Don L. Shettel, and Stephen K. Matthai), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

According to Nevada's contention, the LA's analyses of ambient seepage into emplacement drifts is somehow deficient because it omits consideration of the Bernold-type perforated stainless steel liners that will be installed against the upper surface of emplacement drifts. For the several reasons discussed below, the contention does not raise a genuine issue of material fact.

First, while Nevada claims that these liners will increase the possibility of seepage through the perforations onto the EBS (Petition at 343), Nevada does not even allege, much less demonstrate, how this alleged seepage will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or

results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Units Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Next, this contention ignores DOE’s extensive discussion of ambient drift seepage. As explained in SAR § 2.3.3.1, capillary strength is only one of several processes that define seepage barrier capability. Ambient drift seepage is influenced primarily by three processes: (1) the flow characteristics and magnitude of local percolation in the unsaturated zone above the emplacement drifts; (2) permeability and capillary strength of the fractured rock mass near the emplacement drifts; and (3) geometry of the emplacement drifts and drift-wall properties.” SAR § 2.3.3.1 at 2.3.3-5. The main features that influence these processes are “detailed flow patterns” (discussed in SAR § 2.3.3.2.1.2), the magnitude and variability of unsaturated flow in the unsaturated zone (discussed in SAR § 2.3.3.2.1.2), and capillarity and permeability of the host rock and other units.

This contention also ignores the LA discussion demonstrating that the stainless steel liners would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, “Waste Package and Drip Shield Corrosion”:

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.  
SAR at § 2.3.6-6.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early

failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion in the LA shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using failure rates that are higher than the most likely rates. As a result, even if the TSPA did not adequately account for the effects of stainless steel liners on seepage during the postclosure period, the effect on the TSPA results would likely be insignificant. Nevada does not dispute or even address the discussion in SAR § 2.3.6.

Nevada also fails to recognize DOE has considered the impact of the Bernold-type stainless steel liners on groundwater flow. FEP 2.1.06.04.0A, Flow Through Rock Reinforcement Materials in EBS, analyzes groundwater flow through ground support materials, and excludes it based on low consequence. FEP 2.1.06.04.0A, Flow Through Rock Reinforcement Materials in EBS, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824 at 6-512 (Mar. 6, 2008). FEPs excluded on the basis of low consequence are those whose omission would not result in significantly adverse changes in radiological exposures to the RMEI, or radionuclide releases to the accessible environment. This FEP demonstrates that Nevada’s claim that the liners have the effect of increasing seepage into emplacement drift is incorrect. Indeed, “Bernold-type sheets, which are bolted to the emplacement walls and roof . . . , may act to divert some seepage away from waste packages.” *Id.* at 6-513. In ignoring this statement and making unsupported claims to the contrary, Nevada fails to raise a genuine dispute.

Despite the fact that the liners may divert seepage away from waste packages, DOE has taken no credit for any prevention of seepage that the steel liner may provide. In doing so, DOE has accounted for any uncertainty that the presence of steel liners in the emplacement drifts may provide: “[g]roundwater flow into emplacement drifts (seepage) is modeled in the TSPA as being completely unhindered by any rock reinforcement models.” *Id.* Clearly, DOE has satisfied its obligation consistent with 10 C.F.R. Part 63. Significantly, Nevada has provided no analysis countering DOE’s exclusion of this FEP on the basis of low consequence and its conclusion that its treatment of steel liners is conservative. Consequently, Nevada fails to raise a genuine dispute of material fact or law. Indeed, rather than explain precisely how the engineered ground support items such as the Bernold-type perforated stainless steel liner allegedly lead to enhanced drift seepage, Nevada argues that this process can be analogized to that of an “old canvas tent in a rainstorm.” Petition at 343. Such an empty metaphor by no stretch constitutes the requisite analysis, required by regulation and precedent, to support this contention.

Finally, Nevada essentially admits that it does not know whether this contention raises a genuine dispute of a material issue: allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions” (Petition at 345), Nevada has not determined what effect the contention would have on the dose to the RMEI. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed by conceding that it does not know how the presence of stainless steel liners will cause the dose to exceed regulatory limits, the contention essentially argues that DOE must

show that Nevada's contention does not raise a genuine dispute of material issue of fact. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must be dismissed.

**62. NEV-SAFETY-62 - Thermal Seepage Into Emplacement Drifts**

SAR Section 2.1 and Subsection 2.3.3.1, and similar and related subsections, which state or assume that postclosure thermal seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because the analysis only considers drift-wall rock properties (e.g., flow characteristics in the unsaturated zone, permeability and porosity, capillary strength of fractured rock), temperature increases due to waste decay, and geometry of the emplacement drifts, and thus completely fails to consider engineered ground support items such as Bernold-type perforated stainless steel liners, which are deemed necessary for the safety of preclosure operations.

**RESPONSE**

Nevada argues that SAR Section 2.1 and Subsection 2.3.3.1, and “similar and related subsections,” which state or assume that thermal seepage into emplacement drifts will be reduced by capillary forces, are incorrect because DOE only considers drift-wall rock properties, temperature increases caused by waste decay, and geometry of the drifts, thereby failing to consider the effect of engineered ground support items, which allegedly increase drift seepage by reducing capillary strength.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that stainless steel liners in contact with the upper surface of the emplacement drifts will reduce the capillary strength of the drifts, thereby “facilitat[ing] seepage flow onto the liners” and increasing the possibility of drips contacting the engineered barrier system (EBS). Petition at 348.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. Part 63, including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.21(a)(3), 10 C.F.R. §63.21(c)(1)(ii), 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.113, and 10 C.F.R. §63.115). Petition at 347. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing seepage of water into emplacement drifts is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada alleges that the presence of perforated stainless steel liners against the upper surface of the emplacement drifts will reduce capillary strength and cause an increase in thermal drift seepage, Nevada has not alleged an increase in the mean dose above the regulatory limit. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that the installation of the Bernold-type perforated steel liners against the upper wall of the emplacement drift will reduce the capillary strength of the drift, resulting in increased drift seepage. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Michael C. Thorne, Doug F. Hambley, Don L. Shettel, and Stephen K. Matthai), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

According to Nevada's contention, the LA's analyses of thermal seepage into emplacement drifts is somehow deficient because it omits consideration of the Bernold-type perforated stainless steel liners that will be installed against the upper surface of emplacement drifts. For the several reasons discussed below, the contention does not raise a genuine issue of material fact.

First, while Nevada claims that these liners will increase the possibility of seepage through the perforations onto the EBS (Petition at 348), they do not even allege, much less demonstrate, how this alleged seepage will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are,

therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Units Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Next, this contention ignores the LA's extensive discussion of the features and process that affect drift seepage during the early postclosure stage, while rock temperature near the emplacement drifts are above the boiling point of water. As explained in SAR § 2.3.3.1 and 2.3.3.3, seepage during this period is influenced by vaporization from thermal perturbation from radioactive waste decay heat. These effects, in conjunction with the features that define ambient seepage barrier capability, reduce drift seepage.

Ambient drift seepage is influenced primarily by three processes: (1) the flow characteristics and magnitude of local percolation in the unsaturated zone above the emplacement drifts; (2) permeability and capillary strength of the fractured rock mass near the emplacement drifts; and (3) geometry of the emplacement drifts and drift-wall properties." SAR § 2.3.3.1 at 2.3.3-5. The main features that influence these processes are "detailed flow patterns" (discussed in SAR § 2.3.3.2.1.2), the magnitude and variability of unsaturated flow in the unsaturated zone (discussed in SAR § 2.3.3.2.1.2), and capillarity and permeability of the host rock and other units.

Further, during the early postclosure period, in addition to the factors that reduce ambient seepage, heat from waste decay further impedes seepage, as "thermal perturbation causes additional diversion of water around repository drifts." SAR § 2.3.3.1 at 2.3.3-6. As SAR § 2.3.3.1 explains, the thermal-hydrologic seepage model demonstrates that water is prevented from entering the emplacement drifts as long as the fractured rock near the drift wall is above boiling temperature. During this time, seepage is limited not by capillary barrier behavior, but by the vaporization barrier that prevents water from penetrating the drift wall. Accordingly,

seepage “is not expected to occur as long as boiling temperatures and dryout conditions prevail in the rock above the repository.” *Id.*

This contention also ignores the LA’s discussion demonstrating that the stainless steel liners would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, “Waste Package and Drip Shield Corrosion”:

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at § 2.3.6-6. Therefore, the durability of waste packages and drip shields is very long compared to the few thousands years relevant for thermal seepage.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using estimates of failure rates that are higher than the likely rates. As a result, even if the TSPA did not adequately account for the effects of stainless steel liners on seepage during the postclosure period, the effect on the TSPA results would likely be insignificant. Petitioner does not dispute or even address the discussion in SAR § 2.3.6.

In addition, FEP 2.1.06.04.0A analyzes groundwater flow through ground support materials, and excludes it based on low consequence. FEP 2.1.06.04.0A, Flow Through Rock Reinforcement Materials in EBS, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824 at 6-512 (Mar. 6, 2008). FEPs excluded on the basis of low consequence are those whose omission would not result in significantly adverse changes in radiological exposures to the RMEI, or radionuclide releases to the accessible environment. This analysis demonstrates that Nevada's claim that the liners have the effect of increasing seepage into emplacement drift is incorrect. Indeed, "Bernold-type sheets, which are bolted to the emplacement walls and roof, may act to divert some seepage away from waste packages." *Id.* at 6-513. In ignoring this statement and making unsupported claims to the contrary, Nevada fails to support its position that it has a genuine dispute.

Despite the fact that the liners may divert seepage away from waste packages, DOE has taken no credit for any prevention of seepage that the steel liner may provide. In doing so, DOE has accounted for any uncertainty that the presence of steel liners in the emplacement drifts may provide: "[g]roundwater flow into emplacement drifts (seepage) is modeled in the TSPA as being completely unhindered by any rock reinforcement models." *Id.* at 6-512. Significantly, Nevada has provided no analysis countering DOE's exclusion of this FEP on the basis of low consequence and its conclusion that its treatment of steel liners is conservative. Consequently, Nevada fails to raise a genuine dispute of material fact or law. Indeed, rather than explain precisely how the engineered ground support items such as the Bernold-type perforated stainless steel liner allegedly lead to enhanced drift seepage, Nevada argues that this process can be analogized to that of an "old canvas tent in a rainstorm." Petition at 348. Such an empty

metaphor by no stretch constitutes the requisite analysis, required by regulation and precedent, to support this contention.

Moreover, paragraph 6 of the contention essentially admits that it does not know whether this contention raises a genuine dispute of a material issue: allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions” (Petition at 350), Nevada has not determined what effect the contention would have on the dose to the RMEI. Nevada asserts that because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” it has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 349. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Instead, Nevada asserts that DOE must show that Nevada’s contention does not raise a genuine issue. Because it has not done so, the contention should be dismissed. Nevada’s position constitutes an improper attempt by Nevada to shift its burden to DOE, and as such, the contention should be rejected.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must be dismissed.

**63. NEV-SAFETY-63 - Effect Of Rock Bolts On Ambient Seepage**

SAR Section 2.1 and Subsection 2.3.3.2 of the SAR, and similar and related subsections, which state or assume that postclosure ambient seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because the analysis only considers drift-wall rock properties (e.g., flow characteristics in the unsaturated zone, permeability and porosity, capillary strength of fractured rock) and geometry of the emplacement drifts, and thus fails to adequately consider an engineered ground support item, i.e., the hundreds of thousands of un-grouted super Swellex-type stainless steel rock bolts, which is deemed necessary for the safety of preclosure operations.

**RESPONSE**

Nevada asserts that SAR Section 2.1 and Subsection 2.3.3.2, and “similar and related subsections,” which state or assume that postclosure ambient seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because DOE only consider drift-wall rock properties in analyzing ambient seepage, thereby failing to consider the effect of engineered support items, specifically the un-grouted super Swellex-type stainless steel rock bolts.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that the stainless steel rock bolts “may reduce capillary barriers to ambient water flow diversion” around emplacement drifts, thereby increasing the possibility of water entering drifts and contacting the engineered barrier system (EBS). Petition at 351.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.21(a)(3), 10 C.F.R. §63.21(c)(1)(ii), 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.113, and 10 C.F.R. §63.115). *See* Petition at 352. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing seepage of water into emplacement drifts is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada alleges that the presence of the un-grouted super Swellex-type stainless steel rock bolts in emplacement drift rock walls has not been adequately considered, Nevada has not alleged an increase in the mean dose above the regulatory limit. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that the installation of the super Swellex-type stainless steel rock bolts in the walls of the emplacement drift will reduce the capillary strength of the drift, “act as a channel or drain for ambient seepage to enter” the drift, and create a “larger capture volume for seepage waters,” all of which will allegedly result in increased seepage into the drift. Petition at 353. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Michael C. Thorne, Doug F. Hambley, Don L. Shettel, and Stephen K. Matthai), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

According to Nevada's contention, the LA's analysis of ambient seepage into emplacement drifts is somehow deficient because it omits consideration of the hundreds of thousands of stainless steel rock bolts in the walls of emplacement drifts. For the several reasons discussed below, the contention does not raise a genuine dispute issue of material fact.

First, while Nevada claims that because of presence of the rock bolts, "the rock wall [will] provide[] an opening that may act as a channel or drain for ambient seepage to enter the emplacement drift" and that the bolts will "facilitate liquid flow towards the emplacement drift," (Petition at 353) Nevada does not even allege, much less demonstrate, how any increase of ambient seepage into the emplacement drift will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such allege deficiencies – fail to raise a genuine dispute of material fact and are,

therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Units Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Next, this contention ignores DOE's extensive discussion of ambient drift seepage. As explained in SAR § 2.3.3.1, capillary strength is only one of several processes that define seepage barrier capability. Ambient drift seepage is influenced primarily by three processes: (1) the flow characteristics and magnitude of local percolation in the unsaturated zone above the emplacement drifts; (2) permeability and capillary strength of the fractured rock mass near the emplacement drifts; and (3) geometry of the emplacement drifts and drift-wall properties." SAR § 2.3.3.1 at 2.3.3-5. The main features that influence these processes are "detailed flow patterns" (discussed in SAR § 2.3.3.2.1.2), the magnitude and variability of unsaturated flow in the unsaturated zone (discussed in SAR § 2.3.3.2.1.2), and capillarity and permeability of the host rock and other units.

This contention also ignores the LA discussion demonstrating that the super Swellex rock bolts would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, "Waste Package and Drip Shield Corrosion":

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at § 2.3.6-6.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and

explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion in the LA shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using failure rates that are higher than the most likely rates. As a result, even if the TSPA did not adequately account for the effects of certain rock bolts on seepage during the postclosure period, the effect on the TSPA results would likely be insignificant. Nevada does not dispute or even address the discussion in SAR § 2.3.6.

Furthermore, SAR § 2.3.3 states that the “seepage model for performance assessment is also used to simulate the potential effect of rock bolts in the drift ceiling on seepage. Several rock bolts scenarios are examined in a sensitivity analysis, including cases representing both grouted and ungrouted boreholes. It is shown that these features have a minor effect on seepage, and can be excluded in the TSPA drift seepage submodel.” SAR 2.3.3.2.3.4.1 at 2.3.3-35.

In addition, FEP 2.1.06.04.0A analyzes groundwater flow through ground support materials, and excludes it based on low consequence. FEP 2.1.06.04.0A, Flow Through Rock Reinforcement Materials in EBS, Features, Events, and Processes for the Total System Performance Assessment: Analyses, (LSN#DEN001584824 at 6-512) (Mar. 6, 2008). FEPs excluded on the basis of low consequence are those whose omission would not result in significantly adverse changes in radiological exposures to the RMEI, or radionuclide releases to the accessible environment. This FEP demonstrates that Nevada’s claim that the rock bolts will have the effect of increasing seepage into emplacement drift is incorrect:

Groundwater flow into emplacement drifts (seepage) is modeled in the TSPA as being completely unhindered by any rock reinforcement materials. The impact of rock bolts on seepage was investigated using the predictive model for performance

assessment . . . . These results indicate that the presence of rock bolts does not lead to significant seepage enhancement. This is understandable, considering that an open borehole without grout acts as a capillary barrier to unsaturated flow; that the cross-sectional area of the rock bolt borehole, onto which flow may be incident, is small; and that water that may have seeped into the borehole can imbibe back into the rock along its length.

*Id.* at 6-512.

Moreover, FEP 1.1.01.01.0B analyzes the effect of holes “drilled through the drift walls or crown for a variety of reasons,” including “rock bolt and ground support,” and states that sensitivity analyses were performed in which capillarity and permeability were examined. These features were found to have a minor effect on seepage, and this FEP was excluded on the basis of low consequence. FEP 1.1.01.01.0B, Influx Through Holes Drilled in Drift Wall or Crown, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-24 (Mar. 6, 2008).

Despite the fact that DOE has examined the effect on repository performance of rock bolts in the emplacement drift and has excluded it on the basis of low consequence, Nevada ignores this analysis in making unsupported claims to the contrary. Clearly, DOE has satisfied its obligation consistent with 10 C.F.R. Part 63. Significantly, Nevada has provided no analysis countering DOE’s exclusion of this FEP on the basis of low consequence. Consequently, Nevada fails to raise a genuine dispute of material fact or law.

In fact, Paragraph 6 of the contention essentially admits that it does not know whether this contention raises a genuine dispute of a material issue: allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions” (Petition at 355), Nevada has not determined what effect the contention would have on the dose to the RMEI. Nevada asserts that because of the “burden and complexity of showing the dose effects of

acceptance of Nevada's contentions," it has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 355. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001), arguing instead that DOE must show that Nevada's contention does not raise a genuine issue. Because it has not done so, the contention should be dismissed. Nevada's position constitutes an improper attempt by Nevada to shift its burden to DOE, and as such, the contention should be rejected.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must be dismissed.

**64. NEV-SAFETY-64 - Effect Of Rock Bolts On Thermal Seepage**

SAR Section 2.1 and Subsection 2.3.3.2, and similar and related subsections, which state or assume that postclosure thermal seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because the analysis only considers drift-wall rock properties (e.g., flow characteristics in the unsaturated zone, permeability and porosity, capillary strength of fractured rock) and geometry of the emplacement drifts, and fails to adequately consider an engineered ground support item, i.e., the hundreds of thousands of ungrouted super Swellex-type stainless steel rock bolts, which is deemed necessary for the safety of preclosure operations.

**RESPONSE**

Nevada asserts that SAR Section 2.1 and Subsection 2.3.3.2, and similar and related subsections, which state or assume that postclosure thermal seepage of water into emplacement drifts will be reduced by capillary forces, is incorrect because DOE only considers drift-wall rock properties and geometry of the drifts, thereby failing to consider the effect of engineered support items, specifically the un-grouted super Swellex-type stainless steel rock bolts. Petition at 356.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that the stainless steel rock bolts “may reduce capillary barriers to ambient water flow diversion” around emplacement drifts, thereby increasing the possibility of water entering drifts and contacting the engineered barrier system (EBS). Petition at 356.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.21(a)(3), 10 C.F.R. §63.21(c)(1)(ii), 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.102(h), 10 C.F.R. §63.113, and 10 C.F.R. §63.115). Petition at 357. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing seepage of water into emplacement drifts is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada has alleged that DOE fails to consider the effect of the rock bolts on thermal seepage of water into emplacement drifts, Nevada has not alleged an increase in the mean dose above the regulatory limit. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that the installation of the super Swellex-type stainless steel rock bolts in the walls of the emplacement drift will reduce the capillary strength of the drift, “act as a channel or drain for ambient seepage to enter” the drift, and create a “larger capture volume for seepage waters,” all of which will allegedly result in increased seepage into the drift. Petition at 358. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Michael C. Thorne, Doug F. Hambley, Don L. Shettel, and Stephen K. Matthai), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

According to Nevada's contention, the LA's analysis of thermal seepage into emplacement drifts is somehow deficient because it omits consideration of the hundreds of thousands of stainless steel rock bolts in the walls of emplacement drifts. For the several reasons discussed below, the contention does not raise a genuine dispute issue of material fact.

First, while Nevada claims that because of presence of the bolts, "the rock wall [will] provide[] an opening that may act as a channel or drain for ambient seepage to enter the emplacement drift" and that the bolts will "facilitate liquid flow towards the emplacement drift," (Petition at 358) Nevada does not even allege, much less demonstrate, how any increase of seepage into the emplacement drift will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such allege deficiencies – fail to raise a genuine dispute of material fact and are,

therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Units Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Next, this contention ignores the LA's extensive discussion of the features and process that affect drift seepage during the early postclosure stage, while rock temperature near the emplacement drifts are above the boiling point of water. As explained in SAR § 2.3.3.1 and 2.3.3.3, seepage during this period is influenced by vaporization from thermal perturbation from radioactive waste decay heat. These effects, in conjunction with the features that define ambient seepage barrier capability, result in reduced drift seepage.

Ambient drift seepage is influenced primarily by three processes: (1) the flow characteristics and magnitude of local percolation in the unsaturated zone above the emplacement drifts; (2) permeability and capillary strength of the fractured rock mass near the emplacement drifts; and (3) geometry of the emplacement drifts and drift-wall properties." SAR § 2.3.3.1 at 2.3.3-5. The main features that influence these processes are "detailed flow patterns" (discussed in SAR § 2.3.3.2.1.2), the magnitude and variability of unsaturated flow in the unsaturated zone (discussed in SAR § 2.3.3.2.1.2), and capillarity and permeability of the host rock and other units.

During the early postclosure period, in addition to the factors that reduce ambient seepage, heat from waste decay further impedes seepage, as "thermal perturbation causes additional diversion of water around repository drifts." SAR § 2.3.3.1 at 2.3.3-6. As SAR § 2.3.3.1 explains, the thermal-hydrologic seepage model demonstrates that water is prevented from entering the emplacement drifts as long as the fractured rock near the drift wall is above boiling temperature. During this time, seepage is limited not by capillary barrier behavior, but by the vaporization barrier that prevents water from penetrating the drift wall. Accordingly,

seepage “is not expected to occur as long as boiling temperatures and dryout conditions prevail in the rock above the repository.” *Id.* Therefore rock bolts can not facilitate liquid flow during the time period when the entire bolt is in a superheated environment.

This contention also ignores the LA discussion demonstrating that the super Swellex rock bolts would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, “Waste Package and Drip Shield Corrosion”:

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at § 2.3.6-6. Therefore, the durability of waste packages and drip shields is very long compared to the few thousand years relevant for thermal seepage.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion in the LA shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using failure rates that are higher than the most likely rates. As a result, even if the TSPA did not adequately account for the effects of certain rock bolts on seepage during the postclosure period, the effect on the TSPA results would likely be insignificant. Nevada does not dispute or even address the discussion in SAR § 2.3.6.

In addition, FEP 2.1.06.04.0A analyzes groundwater flow through ground support materials, and excludes it based on low consequence. FEP 2.1.06.04.0A, Flow Through Rock Reinforcement Materials in EBS, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824 (Mar. 6, 2008) at 6-512. FEPs excluded on the basis of low consequence are those whose omission would not result in significantly adverse changes in radiological exposures to the RMEI, or radionuclide releases to the accessible environment. This FEP demonstrates that Nevada's claim that the rock bolts will have the effect of increasing seepage into emplacement drift is incorrect:

Groundwater flow into emplacement drifts (seepage) is modeled in the TSPA as being completely unhindered by any rock reinforcement materials.

*Id.* at 6-512

Moreover, FEP 1.1.01.01.0B analyzes the effect of holes “drilled through the drift walls or crown for a variety of reasons,” including “rock bolt and ground support,” and states that sensitivity analyses were performed in which capillarity and permeability were examined. These features were found to have a minor effect on seepage, and this FEP was excluded on the basis of low consequence. FEP 1.1.01.01.0B, Influx Through Holes Drilled in Drift Wall or Crown, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#DEN001584824, 6-24 (Mar. 6, 2008).

Despite the fact that DOE has examined the effect on repository performance of rock bolts in the emplacement drift and has excluded it on the basis of low consequence, Nevada ignores this analysis in making unsupported claims to the contrary. Clearly, DOE has satisfied its obligation consistent with 10 C.F.R. Part 63. Significantly, Nevada has provided no analysis

countering DOE's exclusion of this FEP on the basis of low consequence. Consequently, Nevada fails to raise a genuine dispute of material fact or law.

In fact, paragraph 6 of this contention essentially admits that it does not know whether this contention raises a genuine dispute of a material issue: allegedly due to the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions" (Petition at 358), Nevada has not determined what effect the contention would have on dose. Petition at 358. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed. Nevada's position constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and this contention must be dismissed.

**65. NEV-SAFETY-65 - Structural Control Of Seepage In The Emplacement Drift**

SAR Subsection 2.3.2 and similar subsections, which describe unsaturated zone flow, fail to recognize that the Yucca Mountain fracture geometry controls the spatial distribution of seepage into the in-drift environment, which affects water delivery to the drip shield and waste package.

**RESPONSE**

Nevada asserts that SAR Section 2.3.2 and “similar subsections” are inadequate because DOE does not consider that fracture geometry controls spatial distribution of seepage into emplacement drifts, thereby failing to analyze the effect of seepage drip alignments that result in patterned corrosion of engineered barrier system (EBS) surfaces.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that water in the unsaturated zone flows in discrete fractures and faults, thereby causing drip seepage onto the EBS to occur in discrete patterns. Nevada claims that

DOE has failed to consider the implications of such patterned corrosion on the EBS and has failed to demonstrate that such information is being used to affect DOE's waste package and drip shield placement strategy.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.102(h)(2), 10 C.F.R. §63.113, 10 C.F.R. §63.115, and 10 C.F.R. § 114(f). Petition at 361-62. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. §

63.31(a)(2). However, as discussed in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing unsaturated zone flow and its impact on drift seepage is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada claims that the impacts of water flow through fractures and faults in the unsaturated zone on seepage has not been adequately considered, it has not alleged an increase in the mean dose above the regulatory limit. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Adrian P. Butler, Maurice E. Morgenstein, and Stephan K. Matthäi) which purportedly provide expert opinions to support this contention. Petition, Attachments 6, 17 and 21. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada argues that the LA's discussion of unsaturated zone flow is inadequate because it does not consider the impact of fracture geometry on spatial distribution of seepage into emplacement drifts and onto the EBS, and fails to analyze patterned corrosion resulting from seepage drip alignment. This contention, however, ignores the analysis conducted by DOE to address the impact of fracture-fault spatial patterning on drift seepage, fails to recognize the LA analysis showing that the EBS will demonstrate corrosion resistance to a wide range of solutions and temperatures, and fails to show how drip alignments that provide "patterned wetting of the EBS surfaces" (Petition at 363) will affect repository performance.

Several sections of the SAR analyze the effects of fracture geometry in the unsaturated zone on the spatial distribution of drift seepage. SAR § 2.3.3.2.3.2 examines the Conceptual and Numerical Models of Seepage used in the LA, stating that "[s]mall-scale features and processes, including discrete-fracture flow behavior, surface roughness, and film flow, are captured in effective model-related parameters determined from site-specific data that reflect the seepage process on the appropriate scale." SAR § 2.3.3.2.3.2 at 2.3.3-31-32. SAR § 2.3.3.2.3.5 also demonstrates DOE's examination of the impacts of percolation flux and flow focusing on seepage drip alignment. As stated, the site-scale unsaturated zone flow model "calculates flow fields accounting for climate changes and related uncertainties, variability in net infiltration, the effect of different stratigraphic units, and the presence of faults." SAR § 2.3.3.2.3.5 at 2.3.3-38. In addition to this model, the flow focusing model is a "high-resolution fracture continuum numerical flow model" that captures intermediate-scale heterogeneity. *Id.* In doing so, this model represents fracture heterogeneity "as a stochastic heterogeneous continuum with variable

permeability.” *Id.* Based on these results, among other analyses in the SAR, a distribution of flow focusing factors is developed for use in simulation of emplacement drift seepage.

Furthermore, SAR § 2.3.3.4 explains the TSPA implementation of drift seepage, explaining that seepage calculations in the TSPA are performed “using a probabilistic approach that accounts for the spatial and temporal variability and the inherent uncertainty of seepage-relevant properties and processes.” SAR § 2.3.3.4 at 2.3.3-69. As discussed in that section, the TSPA accounts for fracture geometry in the unsaturated zone, and its effects on spatial distribution of seepage into emplacement drifts.

Additionally, FEP 2.2.07.04.0A analyzes the differentiation of flow that may result in preferential flow paths and explains that fractures and faults in the unsaturated zone may result in focusing. Accordingly, this contention fails to raise a genuine dispute of material fact or law and must be dismissed. FEP 2.2.07.04.0A, “Focusing of Unsaturated Flow (Fingers, Weeps),” Features, Events, and Processes for the Total System Performance Assessment: Analyses (Mar. 6, 2008) (LSN#DEN001584824 at 6-929):

Drift-scale models focus on the vicinity of emplacement drifts. These models typically have a more refined grid resolution on the order of a few centimeters to decimeters that allows for explicit representation of preferential flows. Seepage models . . . represent preferential flow of water into drifts (i.e., in “weeps”) on two different scales. First, intermediate-scale focusing of flow from the site scale to the drift scale is accounted for in the seepage abstraction by using appropriate flow-focusing factors . . . Second, small-scale preferential flow is explicitly simulated in the seepage process model . . . Thus, preferential flow is inherently imbedded in the seepage lookup tables for ambient seepage . . . Uncertainty in flow focusing is therefore propagated to TSPA models through the use of distributions of flow-focusing factors and lookup tables for seepage.” *Id.* at 6-930.

This analysis demonstrates again that the impact of fractures and faults in the unsaturated zone on water seepage into emplacement drifts is accounted for in the TSPA and that DOE has

accordingly satisfied its obligations consistent with 10 C.F.R. Part 63. Significantly, Nevada has provided no support or analysis countering DOE's considerations. Accordingly, Nevada's claim that "DOE gives no consideration to the potential implications of patterned corrosion on drip shield and waste package failure" (Petition at 363) fails to raise a genuine dispute of material fact or law and must be dismissed.

Moreover, while Nevada claims that focused drift seepage "may have very significant controls on the focusing of corrosion on . . . EBS materials" (Petition at 363), Nevada does not demonstrate how any patterned or focused seepage will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 (1990).

Nevada also ignores the LA's discussion demonstrating that Nevada's claim that seepage drip alignments will cause patterned wetting of EBS surfaces, even if true, would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, "Waste Package and Drip Shield Corrosion":

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at 2.3.6-6.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using conservatively high estimates of the likely failure rates. As a result, even if the TSPA did not adequately account for the effect of fracture-fault spatial patterning on seepage into emplacement drifts, the effect on the TSPA results would likely be insignificant. Nevada does not dispute or even address the discussion in SAR § 2.3.6.

Finally, in providing background into its allegation that DOE has failed to consider the effect of fracture geometry in the unsaturated zone on water seepage into emplacement drifts, Nevada claims that “[c]aves and old mine tunnels that are fed by fracture flow dripping commonly develop a stalactite, stalagmite and column pattern which follows the fault pattern of the host rock.” Petition at 362. Thus, Nevada relies upon caves and mines to make observations about hydrologic behavior in underground settings. Similarly, SAR § 2.3.2.5.1.6.1 demonstrates that DOE has conducted this analysis in observing the hydrologic behavior of “ancient man-made tunnels and natural caves [which] provide information about water seepage into mine openings in an unsaturated zone over thousands of years.” SAR § 2.3.2.5.1.6.1 at 2.3.2-90. This data was used to estimate groundwater flow paths and “provided insight into processes controlling fracture and matrix flow under unsaturated conditions.” *Id.*

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must be dismissed.

**66. NEV-SAFETY-66 - Attenuation Of Seepage Into Naturally Fractured Drift Walls**

SAR Subsection 2.3.3 and related subsections argue for a flow diversion around the repository drifts due to capillary forces, but in the presence of drift-wall fractures this is not a valid assumption which implies that more water will enter the emplacement drifts than is asserted by DOE.

**RESPONSE**

Nevada asserts that SAR Subsection 2.3.3 and “related subsections,” which state or assume that water flow will be diverted around emplacement drifts due to capillary forces is incorrect because the presence of drift-wall fractures, which may result in variations in fracture aperture, imbibing of fluids into fractures, and other mechanisms, may cause water to enter emplacement drifts rather than being diverted around them.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that drift-wall fractures and associated features and processes will reduce capillary forces that divert water around emplacement drifts, resulting in more water entering the drifts. Petition at 368. But Nevada is silent as to how any increase in the probability of water entering emplacement drifts would result in DOE failing to comply with 10 C.F.R. Part 63. Therefore, Nevada has not demonstrated why this proposed contention – even if true – would be material to the findings the NRC must make in this proceeding.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(9), 10 C.F.R. §63.113, C.F.R. §63.21(c)(15), 10 C.F.R. §63.114(e), and 10 C.F.R. §63.114(c)). Petition at 365-68. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the impact of drift-wall fractures and other features on unsaturated zone water flow and drift seepage is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are

immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

While Nevada alleges an omission in DOE’s analyses of fractures in the drift-wall and their effect on diversion of water flow around emplacement drifts, it has not alleged an increase in the mean dose above the regulatory limit. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada claims that because of drift-wall fractures, the occurrence of flow diversion around emplacement drifts due to capillary forces “is not a valid assumption.” Petition at 368. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach three affidavits (by Michael C. Thorne, Adrian P. Butler and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. Petition, Attachments 6 and 21. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada argues that DOE fails to analyze fractures in the drift-wall and "considerations of variations in fracture aperture, the imbibing of fluids into fractures, and mechanisms akin to gas-oil gravity drainage" and that "alternative conceptual models are readily justified that may result" in water entering emplacement drifts rather than being diverted around them. Petition at 368. This contention, however, ignores the factors that reduce or prevent seepage into emplacement drifts, fails to recognize that the TSPA accounts for fractures, matrix imbibition, and other FEPs relevant to the effect of fractures on water entering emplacement drifts, and fails to recognize that the SAR identifies that the EBS will demonstrate corrosion resistance to a wide range of solutions and temperatures. Accordingly, this contention fails to raise a genuine dispute of material fact or law and must be dismissed.

First, while Nevada claims that flow diversion around repository drifts is not a valid assumption because of drift-wall fractures, it does not sufficiently allege, much less demonstrate,

how water allegedly entering emplacement drifts will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Nevada argues that SAR Subsection 2.3.3 does not comply with regulations requiring the “performance assessment to provide the technical basis for either inclusion of exclusion of specific FEPs, such as those relating to the behavior of water in fractures.” (Petition at 368). Nevada fails to recognize, however, the several FEPs analyzing water flow in fractures and that the TSPA accounts for such factors. For example, FEP 2.2.07.20.0A discusses seepage process models that “explicitly consider the impact of underground openings (including flow diversion and seepage),” which are accounted for in the TSPA. FEP 2.2.07.20.0A, “Flow Diversion Around Repository Drifts,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, Mar. 6, 2008 (LSN#DEN001584824 at 6-973).

Additionally, FEP 1.2.02.01.0A states that “[f]low processes in fractures or other channels are important for seepage because the amount of seepage is controlled by the fracture diversion capacity in the drift vicinity . . . These flow processes are influenced by fracture characteristics such as orientation, aperture, asperity, length, connectivity, and fillings. All seepage process models that feed into the seepage abstraction explicitly simulate the flow processes in fractures using appropriate continuum properties.” FEP 1.2.02.01.0A, Fractures, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824 at 6-81-2 (Mar. 6, 2008).

FEP 2.2.07.18.0A analyzes film flow into the repository, a process which “could allow water to enter a waste emplacement drift at non-zero capillary pressure.” FEP 2.2.07.18.0A, Film Flow into the Repository, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824 at 6-969. The impact of “film flow on seepage is included in the prediction of seepage into waste emplacement drifts” and “[u]ncertainty due to the potential effects of film flow is incorporated into TSPA by sampling a probability distribution for the capillary-strength parameter.” *Id.* In addition, FEP 2.2.07.09.0A identifies that matrix imbibition in the unsaturated zone is accounted for in the TSPA. FEP 2.2.07.09.0A, Matrix Imbibition in the UZ, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824 at 6-948.

Accordingly, Nevada’s assertions that the presence of drift-wall fractures will reduce flow around emplacement drifts ignore the wide-range of FEPs that DOE accounts for in the TSPA. Nevada has not adequately challenged these analyses and thereby fails to raise a genuine dispute of material fact or law.

Furthermore, this contention makes assertions that mischaracterize the processes affecting water flow within the unsaturated zone and that ignore DOE’s analyses of these processes. Significantly, these assertions fail to recognize the LA’s extensive analysis of the capillary barrier effect and its impact on processes occurring at interfaces between materials of different capillary strength, such as fractures and drift openings.

Nevada states that where “gradual aperture variations in the fractures exist, the end-effect argument does not apply.” Petition 367. Nevada also claims that “water can imbibe into narrow aperture segments without overcoming an entry pressure threshold,” (Petition at 367) and implies

that this mechanism is not considered in the LA seepage models. These assertions fail to raise a genuine dispute of material fact or law.

First, increases in fracture aperture towards emplacement drifts are discussed in the LA, and are appropriately accounted for in seepage models, as described in SAR § 2.3.3.2.1.3: “An increase in fracture aperture causes an increase in fracture permeability and a decrease in capillary strength. The ambient seepage models use excavation-disturbed rock properties in the simulation of seepage.” SAR § 2.3.3.2.1.3 at 2.3.3-15. Furthermore, as explained in this section, the capillary barrier effect continues to apply at the interface between fractures and the emplacement drift. Accordingly, Nevada’s claim that the end-effect argument does not apply where gradual aperture variations in the fractures exist is incorrect. In addition, as described in SAR § 2.3.3.2.3.2, the seepage models assume that all percolating water in the unsaturated zone has imbibed into and thus flows within the fractures.

In making claims to the contrary, Nevada has ignored the analyses provided in the LA, and in doing so, fails to raise a genuine dispute of material fact or law.

Nevada further argues “that alternative conceptual models are readily justified that may result in water preferentially entering the emplacement drifts rather than being diverted around them.” (Petition at 368). Nevada’s unsupported assertion challenging the models DOE considered in analyzing water flow and diversion around drifts is simply not a sufficient basis for rejecting the model. Nevada fails to demonstrate that its claims, even if accepted, would have any material effect on water diversion around emplacement drifts. In particular, the contention does not allege or demonstrate that the use of a different method would result in more accurate modeling of flow diversion or capillarity.

Nor does Nevada allege that DOE's modeling is not consistent with the reasonable expectation standard discussed in section V.A.3.c. If Nevada believes that quantification would show that DOE's modeling is not consistent with that standard, the burden is on Nevada to do so, as well as determine what effect, if any, acceptance of their contention would have on dose to the RMEI. *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Furthermore, Nevada ignores the LA discussion demonstrating that water entering emplacement drifts would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, "Waste Package and Drip Shield Corrosion":

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early

failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using conservatively high estimates of the likely failure rates. As a result, even if the TSPA did not adequately account for reduced flow diversion around emplacement drifts due to drift-wall fractures, the effect on TSPA results would likely be insignificant. Petitioner does not dispute or even address the discussion in SAR § 2.3.6.

In fact, Nevada essentially admits, in paragraph 6 of this contention, that it does not know whether this contention raises a genuine dispute of a material issue. Allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions” (Petition at 369), Nevada has not determined what effect the contention would have on dose. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed. Nevada’s position constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and this contention must be dismissed.

**67. NEV-SAFETY-67 - Evaluation Of Uncertainties In Estimated Chemical Properties, Especially pH Values, Of Evaporated Drift Brines**

The modeled compositional range for evaporated brines that might seep onto waste packages, and thus be the agent for corrosion, at the end of the thermal period should be broader than has been estimated and used in SAR Subsection 2.3.5.5 and related subsections.

**RESPONSE**

In this contention, Nevada challenges the uncertainties in the modeled compositional range for evaporated brines that might seep onto waste packages at the end of the thermal period. Nevada claims that the uncertainties are understated with respect to pH and thus the modeled composition range should be broader than DOE estimated.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station Units 1, 2 and 3)*, CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed in the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Michael C. Thorne, Adrian H. Bath, Don L. Shettel, Jr., and Maurice E. Morgenstein), which purportedly provide expert opinions to support this contention. Petition, Attachments 3, 4, 10, and 17. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Without any doubt, Nevada knows that it is obligated to provide "a concise statement of the facts or expert opinions supporting the contention, *along with appropriate citations to supporting scientific or factual materials.*" Petition at 372. Yet other than the license application, Nevada cites only one other document—the "Engineered Barrier System: Physical and Chemical Environment," LSN# DN2002452948—and does so for the sole purpose of explaining the assumptions that DOE used in estimating the modeled pH. Nothing Nevada cites from this document supports Nevada's position that in the model, DOE should have accounted for uncertainties identified by Nevada.

Nevada notes that DOE estimated that the uncertainty in pH can be reduced to less than +/- 1 pH unit for brines that are below the salt saturation limit. Nevada claims that the model fails to assume that there are *other* controls on pH besides P(CO<sub>2</sub>), and that, therefore, DOE has not properly estimated the uncertainty in pH for brines that are below the salt saturation limit. *Id.* Nevada then reaches the conclusion that that there is a “probability that uncertainties have been underestimated” and therefore, “the in situ pH range *could* be even greater than [5 to 11.] *Id.* (emphasis added).

Nevada cites no scholarly authority to support its view that DOE’s model failed to take into account the relevant controls on pH or that DOE has not properly estimated the uncertainty in the model. In addition, Nevada’s conclusions that because there is a “probability that uncertainties have been underestimated,” the “in situ pH range could be even greater” than DOE estimated is pure speculation. “[I]f the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation,’” the contention must be dismissed. *Fansteel*, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). Nevada’s contention fails in exactly that respect and thus must be dismissed.

Nevada has supplied four boilerplate expert affidavits that “adopt” this contention. *See* Petition Attachment Nos. 3, 4, 10, & 17. But, these affidavits are wholly inadequate support for Nevada’s challenge to DOE’s assumption that pH is controlled by equilibration with P(CO<sub>2</sub>). These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). Absent any tangible information or

substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel, Inc.* (Muskogee, Oklahoma site), CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

In summary, the contention fails to explain the basis for its challenges, much less identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw.

Nevada claims that there are more “uncertainties” in DOE’s modeled pH and thus that in situ pH could be higher than DOE estimated. The Commission, however, recognizes that “uncertainties” may exist in DOE’s postclosure model. *See* 66 Fed. Reg. at 55,747-748. Therefore, merely alleging that there may be more uncertainty than DOE accounted for in the TSPA is not alone grounds for denial of the Application. *Duke Energy Corp.*, LBP-03-17, 58 NRC at 236-38, *aff’d*, CLI-03-17, 58 NRC 419. For instance, in *Duke Energy*, the Board rejected as inadmissible the contention that Duke “failed to take adequate account of uncertainties and their effect on the results of its analysis.” *Id.* at 234. The underlying question is not whether uncertainties exist, but, more importantly, whether applicant “has satisfied

applicable NRC guidance with respect to such uncertainty analyses” or, in the alternative, “performed a qualitative analysis.” *Id.* at 236. In fact, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but that DOE “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” This is precisely what DOE has done with the pH model.

First, although Nevada seems to challenge DOE’s use of the modeled pH (Pitzer pH) because the Pitzer pH values do not correspond with pH measured in validating experiments, Petition at 373, the SAR specifically addresses this. The SAR explains that the Pitzer pH values (which are calculated using EQ3/6 and the Pitzer thermodynamic database account) are a more accurate representation of the hydrogen ion activity in high ionic strength multi-component brine systems. SAR at 2.3.5-129. Additionally, the SAR specifically points out that “there is significant experimental error in the process of measuring pH, especially in concentrated brines....” *Id.* Thus, the SAR cautions that “[b]ecause Pitzer pH and measured pH values are not equivalent, and because of likely measurement errors in the experimentally-determined pH, comparing them *significantly overestimates the uncertainty in predicted Pitzer pH values.*” *Id.* (emphasis added).

Nonetheless, DOE was able to bound the uncertainty in the Pitzer pH values. pH has a strong effect on the concentration of other ions in solution, and those other ions can be measured directly. SAR at 2.3.5-129. Here, total inorganic carbon concentrations ( $[C]_{\text{total}}$ ) is a pH-sensitive solution parameter that is relevant to the in-drift chemical environmental model. *Id.* DOE concluded that “examination of  $[C]_{\text{total}}$  uncertainty at neutral pH should provide a maximum, bounding uncertainty for all conditions.” *Id.* DOE also concluded that estimates of

uncertainty based on comparisons measured pH values “probably greatly overestimate the pH uncertainty, but provide an upper bound.” *Id.* at 2.3.5-129.

So, although the contention notes that the modeled pH is the “Pitzer pH,” and Pitzer pH does not correspond to the pH values measured in the validating experiments, that is irrelevant because, as even the contention notes, the uncertainties in Pitzer pH are estimated by proxy, using model/data comparisons for  $[C]_{\text{total}}$ . Petition at 373; SAR at 2.3.5-129 to -130. Corrosion test solutions, including those with solute concentrations or temperature unsuitable for direct pH measurement, were modeled using EQ3/6 and the resulting Pitzer pH values are used in the corrosion models. *See* SAR Tables 2.3.6-6 and -7, pp. 2.3.6-111-127. Nevada therefore has not created a genuine dispute of material issue of fact or law because Nevada does not cite any factual, scientific or expert materials that point out the ramifications of the allegedly incorrect use of the Pitzer pH. *Duke Energy Corp.*, LBP-03-17, 58 NRC at 236.

Second, Nevada is incorrect that “modeled pH is based on an assumption that it is controlled by equilibration with the partial pressure of  $\text{CO}_2$  in the atmosphere of the drifts” and “does not allow for the possibility that other chemical reactions might control pH.” Petition at 373. Nevada misstates DOE’s pH model. DOE’s seepage evaporation model evaluates the compositions of evaporated water in the emplacement drift using the Pitzer database to account for an extensive set of reactions between aqueous species and mineral precipitation/dissolution reactions, as well as the atmosphere in the drift. *See* SAR at 2.3.5.5.3.2. Thus, the predicted pH is a result of consideration of all these reactions, not just  $\text{P}(\text{CO}_2)$ . *See, e.g.*, Engineered Barrier System, LSN# DN2002452948 at Figure 6.6-17 (showing pore waters at the same  $\text{P}(\text{CO}_2)$  evolving to different pH values); *see also* Figures 6.13-5 to 6.13-8 at 6-233 to -234 (output of seepage evaporation model).

Thus, Nevada raises no genuine dispute of material issue of fact or law when it complains that DOE's model assumed no other controls on pH because Nevada has mischaracterized DOE's model. As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plant Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op. at 39) (Sept. 12, 2008).

Finally, Nevada never quantifies how much greater the in situ pH range would be if these unidentified, additional controls had been assumed in the model. In fact, the contention does not even state qualitatively that the modeled compositional range for the evaporated brines would be *materially* different if the uncertainties were not underestimated. Nevada's bare assertion that in situ pH range "could be even greater than [5 to 11]," Petition at 373, fail to create a genuine dispute of a material issue of law or fact. Such unsupported assertions, "without any specific source of evidence concerning the importance of the alleged omission," does not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990). Nevada must demonstrate how the use of a model different from the TSPA would change the results, and then tie those changes to a regulatory requirement that was not met. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff'd*, CLI-03-14, 58 NRC 207 (2003). Nevada has not done so and therefore, no genuine dispute is raised in this contention.

Third, this contention does not create a genuine dispute of material issue of fact or law because it ignores the TSPA's intrinsic conservatisms and margins of safety. *Duke Energy Corp.*, LBP-03-17, 60 NRC at 236, *aff'd*, CLI-03-17, 58 NRC 419. The contention completely ignores the fact that the "[o]nce the compositional parameters are determined for water on the waste packages and in the invert, the TSPA *accounts* for uncertainty in the in-drift

precipitates/salts model (Section 2.3.5.5.3.3.), and then the uncertainty in chloride-nitrate associated with use of a single pore water to represent each of the compositionally distinct pore-water groups.” SAR at 2.35-139; *see also* SAR § 2.3.5.5.4.3. Likewise, it ignores the conservatism in the in-drift chemical model and analyses. *See* SAR at 2.3.5-144 to 5-145. The SAR explains that:

Seepage waters on the waste package surface are assumed to reach equilibrium with the relative humidity on the surface of the waste package. Under most conditions, the waste package surface is hotter than its surroundings, resulting in a lower relative humidity, and the prediction that seepage will evaporate and concentrate on the waste package surface. This prediction is conservative because evaporation will result in a higher predicted chloride concentration, resulting in a less benign water composition with respect to localized corrosion.

SAR at 2.3.5-144. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster*

(Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001).

Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**68. NEV-SAFETY-68 - In-Drift Condensation On Mineral Dust**

SAR Subsection 2.3.5.4.2 and related subsections, which describe DOE's model for condensation, ignore condensation on surfaces of common and ubiquitous rock dust (siliceous and feldspathic) that coat EBS materials resulting in a much larger volume of liquid and vapor on these surfaces than calculated by DOE.

**RESPONSE**

In this contention, Nevada claims that DOE ignored condensation on the surfaces of the rock dust that coat the EBS materials. Nevada argues that by ignoring this condensation, DOE has miscalculated the volume of liquid and vapor on these surfaces.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention claims that “[t]he condensation model has not addressed the presence of dust on the metal EBS surfaces.” Petition at 377. Nevada, however, fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed in the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Michael C. Thorne and Maurice E. Morgenstein), which purportedly provide expert opinions to support this contention. Petition, Attachments 3 and 17. However, rather than providing information to support the assertions in this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

This contention alleges that DOE has ignored moisture condensation on rock dust particles that coat EBS materials, which would, according to Nevada, result in a much larger volume of liquid and vapor on these surfaces than calculated by DOE. Nevada does not provide a reasonable explanation of how a larger volume of "liquid and vapor" on these surfaces could be deleterious to the repository performance. In fact, Nevada's "statement of facts or expert opinions supporting the contention along with appropriate citations to support scientific or factual materials," Petition at 376-77, is devoid of a single reference to a source other than the SAR itself, which Nevada cites only to describe DOE's analyses. *Id.* Thus, numerous assertions

underpinning the contention are just unsubstantiated, attorney arguments: (a) dust has the propensity to form crevices that are favorable to localize corrosion, (b) the volume of liquids at or near the surface of C-22 and Ti-7 will be “greatly affected by the association of these surfaces with dust that is associated with condensation,” (c) DOE has underestimated the volume of liquids and this alleged underestimation “affects the validity of the in-drift condensation model,” (d) the local-scale thermal-hydrologic-geochemical variability is “much greater” due to the presence of dust, and (e) the liquid at the EBS metal surfaces is (allegedly) underrepresented, and therefore the hydrogeochemical conditions on the surface of the waste form and the timescale for corrosion will be affected. Petition at 377. Nevada cites no documents or expert opinions that vouch for these assertions and conclusions.

Furthermore, the affidavits of the two experts who merely “adopt” either paragraph 5 or paragraph 6 of this contention fall far short of the requirement to provide conclusions supported by reasoned bases or explanation. *See* Petition, Attachments 3 & 17. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006). Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel Inc.*, (Muskogee, Oklahoma site), CLI-03-13, 58 NRC 195, 203 (2003). The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these affidavits. *See USEC Inc.*, CLI-06-10, 63 NRC at 472.

Accordingly, not having cited any scientific or factual materials to support its assertions about the alleged inadequacies in data for DOE’s in-drift and near-field chemistry models, every one of Nevada’s challenges is necessarily based on nothing more than unsubstantiated attorney argument. The Commission has held that a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel Inc.*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). That is exactly what Nevada has done here and thus the contention should be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention fails to raise a genuine dispute on a material issue of law or fact because Nevada has not alleged a claim that even if accepted would have a material impact on the “hydrochemical conditions on the surface of the waste form and drip shield and therefore the timescale over which they will corrode.” Petition at 377. As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency.

Nevada never actually states to what degree the hydrogeochemical conditions would be affected and never quantifies the difference in the timescale over which the waste form and drip shield will corrode in light of the information that Nevada claims DOE ignored. Nevada does not provide any quantitative information about the alleged consequences, or any qualitative information regarding the impact on the model. Instead, Nevada simply claims that there will be “greater variability” and that increased volume of liquid “affects” the model. Such bare

assertions, “without any specific source of evidence concerning the importance of the alleged omission,” do not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990). Nevada must demonstrate how the use of a different model would change the results, and then tie those changes to a regulatory requirement that was not met. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff’d*, CLI-03-14, 58 NRC 207 (2003). Nevada has not done so and, therefore, no genuine dispute is raised in this contention.

Likewise, just claiming that there is more variability does not establish a genuine issue of material fact or law because, as discussed in the applicable Legal Standards section, Part 63 recognizes that uncertainties exist and cannot be eliminated. *See* Final Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, NV, 66 Fed. Reg. at 55,747-748. For that reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but that DOE “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.”

Importantly, Nevada mischaracterizes the behavior of such brine and thus misstates the possible consequences of this alleged increased of volume of liquid. Brine forms from salts that are deposited with, and initially distributed throughout the thin dust layer. DOE develops bounding estimates for the *total* quantity of brine, based on the *total* amount of salts deposited. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses,” LSN#: DEN001584824, FEP 2.1.09.28.0A at 6-708. The volume of brine is sensitive to the quantities of salts present and to the relative humidity, but is not sensitive to any additional water that may be adsorbed or condensed on the dust particles. The reason is that if such

additional water were to come into direct contact with brine, then mixing would occur and the brine would be diluted, followed by evaporation to restore equilibrium with the relative humidity. After evaporation, the equilibrated brine volume would be unchanged from the initial volume.

Therefore, if additional adsorbed or condensed water comes into contact with deliquescent brine, the net effect is to physically spread the brine throughout the dust. This is exactly the thesis of DOE's position that capillary induction of brine by the dust layer reduces the amount of brine, and the amount of salts, that are available at the metal barrier surface to support corrosion processes. *See* "Features, Events, and Processes for the Total System Performance Assessment: Analyses," LSN#: DEN001584824, FEP 2.1.09.28.0A, at 6-708. This position recently received experimental support as reported by He et al., "Effect Of Capillary Retention By Dusts On The Corrosivity Of Deliquescence Brines" (2007), LSN#: NEV000004013.

Thus, although Nevada attempts to set up a conflict between its hypothetical increase in volume of liquid and DOE's position that capillary induction of brine by the dust layer reduces the amount of brine and salts that are available at the metal barrier surface to support corrosion processes, there is no such conflict. Accordingly, the contention fails to raise a genuine dispute of material issue of fact or law and must be dismissed.

In addition, under Nevada's unsupported hypotheticals in this contention, the additional water would dilute the brine without evaporation and conducting it to the metal barrier surface, so the brine would no longer be in equilibrium with the relative humidity. Nevada presents no scholarly authority to substantiate this conjecture. As noted above, if adsorbed or condensed

water is not in contact with brine or deliquescent salts in the “dust field” then that water does not contribute to brine-driven corrosion processes at the metal barrier surface.

Accordingly, Nevada raises no genuine dispute of material issue of fact regarding DOE’s conclusions that capillary induction of brine by the dust layer reduces the amount of brine and salts that are available at the metal barrier surface to support corrosion processes.

Similarly flawed is Nevada’s claim that “the condensation model has not addressed the presence of dust on the metal EBS surfaces,” Petition at 377, and would thus cause an increase in the volume of liquid. *Id.* Nevada does not create a genuine dispute of material issue of fact by alleging that the dust could create an increased volume of liquid. This is because the “volume of liquid” by itself is not a factor in corrosion processes modeled by DOE, and Nevada has failed to show how the volume of liquid is important to corrosion of Ti-7 or Alloy 22.

The contention confuses dust deliquescence analysis with the drift wall condensation model. To be sure, both are part of the performance assessment. But, the condensation model represents macroscopic quantities of water that can condense on solid surfaces. *See In-Drift Natural Convection and Condensation*, LSN#: DN2002451236, Section 8, pp. 54[a] to 56[a]. Dust deliquescence, on the other hand, involves small quantities of water dissolving small amounts of salts and forming small quantities of brine. *See Features, Events, & Processes*, LSN#: DEN001584824, FEP 2.1.09.28.0A, at 6-708. In any event, if macroscopic condensation occurs under the drip shield (where contact with the waste package is possible) in the presence of dust (which is essentially what Nevada argues would be complicated by the presence of dust), the resulting brines will be dilute and no more aggressive than those formed directly from

deliquescence.<sup>60</sup> *See* Features, Events, and Processes, LSN#: DEN001584824, FEP 2.1.08.14.0A, at 6-604 to -611, and FEP 2.1.09.28.0A, at 6-705.

Macroscopic condensation can occur in the presence of dust, but the amount of condensate that can be produced, *see* “In-Drift Natural Convection and Condensation” (Aug. 2007), LSN#: DN2002451236, Section 8, Figures A-1[a] to A-8[a], given in kg condensate per meter of drift per year, is far greater than estimates for one-time formation of brine from deliquescent salts in dust, given in microliters of brine per square centimeter, *see* “Analysis of Dust Deliquescence for FEP Screening” (Sept. 2007), LSN#: DN2002478854, Table 6.4-4, p. 6-67. Again, this means that the contention—even if true—does not create a genuine dispute of material issue of fact regarding the outcome of the model that DOE used.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

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<sup>60</sup> Moreover, the potential for significant localized corrosion of Alloy 22 from deliquescent brines has been analyzed by DOE and found to be insignificant. *See* “Analysis of Dust Deliquescence for FEP Screening,” LSN#: DN2002478854 Section 7.1, pp. 7-1 to -5.

**69. NEV-SAFETY-69 - Coupled Seepage And Dust Deliquescence**

SAR Subsection 2.3.5.2 and similar subsections, which focus on coupled processes, fail to consider seepage and dust deliquescence reactions as combined processes and therefore underestimate the degree and extent of localized C-22 corrosion.

**RESPONSE**

In this contention, Nevada challenges SAR Subsection 2.3.5.2 and “similar” (though unspecified) subsections for failing to take into account seepage and dust deliquescence reactions as combined, or coupled, processes. Nevada claims that by omitting analysis of these coupled processes, DOE has underestimated the degree and extent of localized C-22 corrosion.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 379-80. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” *Id.* at 380. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . .” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp., (Oconee Nuclear Station, Units 1, 2 & 3) CLI-99-11, 49 NRC 328, 333-34 (1999).*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention argues that in SAR Subsections 2.3.5.2 as well as in other “similar subsections,” DOE did not consider the consequences of seepage coupled with salt brine production and related salt brine C-22 pit-corroded areas due to dust deliquescence. Petition at

379. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as explained below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert

opinion. Nevada's Petition does attach three affidavits (by Michael C. Thorne, Maurice E. Morgenstein, and Stephan K. Matthäi), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" these otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada claims that DOE neglected to consider dust deliquescence and in-drift seepage as either sequentially occurring processes, or simultaneously occurring processes. Petition at 380. The essential element of the "sequentially occurring processes" argument is that hygroscopic salt reactions resulting from dust deliquescence "may be enhanced by thermo-hydro-chemically (THC)-modified brines from unsaturated zone seepage at later containment periods when thermal-hydrologic conditions are optimal for fracture flow seepage." *Id.* at 381. This assertion describe a completely speculative scenario. Despite a dearth of factual or scientific authority, Nevada boldly claims that DOE "neglect[ed] to consider" this sequential coupling. *Id.* The Board should not accept these hypothetical, unsupported assertions. *See USEC, Inc. (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).*

Regarding the purported "simultaneous processes," Nevada's argument is layered with theoretical possibilities. For example, Nevada assumes that there could be a "scenario in which dust deliquescence occurs at the same time as unsaturated zone seepage." Petition at 381. DOE's assumption that there can be no such occurrence is supported by the SAR, *see, e.g.*, SAR 2.3.5.4.1.1.3, yet Nevada cites not even one expert opinion or scientific document to support its contrary view. Nevada's explanation for how this scenario could occur is based on yet another unsupported premise, namely that "the head of water available in large fractures would control

non-equilibrium seepage because a high hydraulic head would overcome both of the conceptual barriers [to seepage] (vaporization and capillary).” Petition at 382. Nevada is obligated to back up these assertions with a citation to scholarly authority. Nevada does not do so. Based on only attorney argument, Nevada simply announces, “Therefore, there is strong reason to consider coupled processes where both dust deliquescence and seepage occur together.” *Id.*

If a petitioner, like Nevada, “has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation,’” the contention must be dismissed. *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). The three boilerplate expert affidavits that “adopt” the contention do not change that outcome here. These affidavits are wholly inadequate support for Nevada’s argument that DOE should have considered these coupled processes. *See* Petition, Attachment Nos. 3, 17, & 21. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC*, CLI-06-10, 63 NRC at 472. Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel, Inc.* (Muskogee, Oklahoma site) CLI-03-13, 58 NRC 195, 203 (2003). The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

In summary, the contention fails to explain the basis for its challenges, much less identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw.

First, with respect to the “sequentially coupled processes,” Nevada’s contention assumes that as a result of these processes, localized corrosion would be easier to initiate under seepage conditions if the C-22 barrier were to be weakened by corrosion processes during the deliquescent period. *See* Petition at 379 (claiming that DOE’s model “underestimates the degree and extent of localized C-22 corrosion”). Nevada provides no authority for this position, but even if true, it would not raise a genuine dispute of material issue of law or fact, as explained below.

DOE’s localized corrosion model (SAR Section 2.3.6.4) conservatively predicts the initiation of localized corrosion. Nevada ignores the demonstration of the conservatism of the model presented by DOE in SAR Subsection 2.3.6.4.4.1, “Abstracted Model for Localized Corrosion.” *See* SAR § 2.3.6.4.4.12 at 2.3.6-41 (noting that: “[i]f localized corrosion due to seepage brines occurs, the affected area is modeled as the wetted waste package surface underneath the breached portion of the drip shield ... [t]his treatment is *conservative*, because the model is based upon samples with tight crevices, and only the area between the waste package and the emplacement pallet will be tightly creviced”) (emphasis added).

In the test used to develop the inputs to the localized corrosion model, an electrochemical potential is applied to the test coupon such that localized corrosion is initiated. General Corrosion And Localized Corrosion Of Waste Package Outer Barrier,” ANL-EBS-MD-000005 rev 003, LSN#: DN2002460404, Section 6.4.4.1 at 6-62 to 6-63. The electrochemical potential is then reduced until the already initiated and propagating localized corrosion process spontaneously arrests. This condition, where localized corrosion cannot be sustained, is used as the threshold for localized corrosion initiation. See “General Corrosion And Localized Corrosion Of Waste Package Outer Barrier,” ANL-EBS-MD-000005 rev 003, LSN#: DN2002460404, Section 6.4.4.1 at 6-62 to 6-63. Thus, DOE’s localized corrosion model includes the inherent assumption that upon seepage conditions, the C-22 barrier is already in a damaged state due to prior, extremely severe localized corrosion processes—and that is essentially what Nevada argues DOE did not consider.

Nevada only alleges that DOE’s model is incomplete; it does not allege that the results are inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Second, as to Nevada’s “simultaneously occurring” seepage and deliquescent processes, Nevada’s argument depends on a scenario in which non-equilibrium seepage would contact the

waste package while the temperature of the waste package surface is in excess of 100°C.

Petition at 381-82. As noted above, Nevada provides no authority for the position that this is even possible, or much less likely. DOE discussed this possibility (indeed, improbability) at length in the SAR. DOE concluded that “seepage under thermal conditions is possible only when two conditions are met simultaneously.” SAR Subsection 2.3.3.3.1 at 2.3.3-63.

Under the scenario presented by Nevada, simultaneously occurring seepage and deliquescence processes require non-equilibrium seepage to contact the waste package. Even assuming that capillary and vapor barriers could be compromised (as postulated in the contention), non-equilibrium seepage would not contact the waste packages until after failure of the titanium drip shields has occurred. In TSPA, for the nominal scenario class, initial breaches of the drip shields will not occur until approximately 230,000 years postclosure. See “Total System Performance Assessment Model/Analysis For The License Application,” LSN#: DEN001579005, Section 6.3.5.1.3. The range of waste package temperatures at postclosure times after 50,000 years is modeled to be below 50°C (SAR at 2.3.5-215)(Figure 2.3.5-33). The presence of the drip shields precludes non-equilibrium seepage waters contacting the waste package, making the asserted simultaneous action of deliquescence and in-drift seepage not relevant to performance of the waste package.

Thus, even accepting Nevada’s hypothetical, Nevada’s bare assertion that the model “underestimates the degree and extent of localized C-22 corrosion” does not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990). Nevada must demonstrate how the inclusion of the different characteristics would change the results, and then tie those changes to a regulatory requirement that was not met. See *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power

Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff'd*, CLI-03-14, 58 NRC 207 (2003). Nevada has not done so and in light of the discussion above, cannot do so. Therefore, no genuine dispute is raised in this contention.

Indeed, the regulations require evaluation of degradation processes in detail only “*if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that the coupled processes would increase those risks at all, let alone that the risks would be “significantly changed by their omission.” Accordingly, Nevada fails to raise a genuine dispute of material issue of fact or law.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. Petition at 383. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**70. NEV-SAFETY-70 - JHC Evolution Of Near-Field Pre-Seepage Unsaturated Zone Water**

SAR Subsections 2.2.1, 2.3.5.5, 2.3.5.3 and similar subsections, which relate to hydrogeochemical changes in vadose fracture and matrix as a consequence of water evaporation and tuff dissolution, and thermal-hydrologic-chemical coupled processes, fail to recognize the critical significance of mineralization reactions on unsaturated zone seepage water chemistry.

**RESPONSE**

In this contention, Nevada challenges SAR Subsections 2.2.1, 2.3.5.5, 2.3.5.3, and “similar” (though unspecified) subsections for excluding the evolution of seepage water chemistry. Nevada also claims in this contention that the near-field chemistry model, is “inappropriate and inadequate for estimating the chemical composition of seepage waters.” Petition at 388. Nevada concludes that all these omissions demonstrate that DOE did not recognize the critical significance of mineralization reactions on unsaturated zone seepage water chemistry.

**a. Statement of Issue of Law or Fact to be Controverted**

This contention does not comply with C.F.R. § 63.309(f)(1)(v). In Section 1, Nevada’s statement of the contention, Nevada makes the general argument that “DOE fail[ed] to recognize the critical significance of mineralization reactions on unsaturated zone seepage water chemistry.” Petition at 384. Nevada’s “brief summary of the contention,” however, raises new issues—such as whether DOE has taken inconsistent approaches with respect to evolving geochemical interactions and whether DOE has used the proper model to compute the aqueous chemistry of the seepage waters. *Id.* In section 5 of the contention, Nevada expands the contention to include even more issues, such as challenge to a FEP, whether DOE’s in-field chemistry model is “unrealistic” because of evaporation along the fracture pathways, and

whether the unsaturated zone water is inappropriately defined on the basis of four pore waters from 34 samples. *Id.* at 386-87. The Board’s Case Management Order that contentions be “narrow, single-issue contentions” that are “sufficiently specific as to define the relevant issues” and do not require the Parties or Board to exhaust extensive resources to clarify the issue. *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_\_\_ (slip op. at 6). Based on the numerous issues raised in this contention, this contention lacks the specificity required by 10 C.F.R. § 63.309(f)(1)(v) and, therefore, must be rejected.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 384-85, section 4. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 385. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its

resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in

quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and as explained in the specific response below: (1) the contention does not reference any documents, other than the license application and one FEP; (2) the contention

contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach four affidavits (by Michael C. Thorne, Adrian H. Bath, Don L. Shettel, Jr., and Maurice E. Morgenstein), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

For example, Nevada makes assertions about the effect of geochemical interactions and thermal envelopes on the ground water chemistry; the chemical reactions that are possible in the DOE model; the singular importance of "average" feldspar dissolution in the characterization of DOE's water-rock interactions; the nature of the fault and fracture systems; the impact of the heat envelope; and various other deficiencies in DOE's in-drift model. After pages of these sweeping and unsupported assertions, Nevada claims that DOE failed to provide a "coherent statement on the evolution of seepage water chemistry," that DOE's near-field water chemistry model is inadequate, and that as a consequence, SAR Subsections 2.2.1, 2.3.5.5, 2.3.5.3 and "similar subsection," do not "recognize the critical significance of the mineralization reactions on unsaturated zone seepage water chemistry." Petition at 388-389. The Board should not accept a contention, like this one, based on hypothetical, unsupported assertions like these. *See USEC, Inc. (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).*<sup>61</sup>

The four boilerplate expert affidavits that "adopt" the contention do not change that outcome here. *See* Petition, Attachment Nos. 3, 4, 10, & 18. These one-page affidavits contain

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<sup>61</sup> Nevada's one-sentence argument that the "modern-day unsaturated zone water is inappropriately defined on the basis of four water types from 34 samples classified by DOE as "unjustified," is pure fiction. DOE has never classified the 34 samples as "unjustified," and Nevada's citation to SAR Subsection 2.3.5.52 certainly does not support Nevada's assertion.

no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC*, CLI-06-10, 63 NRC at 472. Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

In summary, the contention fails to explain the basis for its challenges, much less identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention challenges whether DOE considered the significance of mineralization reactions on unsaturated zone seepage water chemistry. The contention claims that DOE did not do so, and that this is demonstrated (a) by DOE’s alleged failure to take into account the evolution of seepage water chemistry, and (b) DOE’s use of an inadequate and inappropriate model to compute the aqueous chemistry of the seepage. For several reasons, the contention fails to raise a genuine dispute of material issue of fact or law.

Nevada is wrong that DOE failed to take into account the evolution of water seepage chemistry. In making this argument, Nevada is essentially challenging the exclusion of FEP 2.2.08.03.0B, “Geochemical Interactions and Evolution in the UZ.” Petition at 386. Relying only on the title of this FEP, Nevada suggests that this FEP excluded geochemical interactions from the chemical evolution of near-field unsaturated zone water. According to Nevada, the FEP was improperly excluded because these interactions “will lead to dissolution and precipitation of

minerals along the groundwater flow path and these reactions will be affected by changes in the thermal envelope.” Petition at 386. Instead of citing any scholarly authority for this proposition, Nevada attempts to bolster this argument by fashioning an inconsistency between the FEP and the near-field chemistry, claiming that unlike the FEP, the near-field chemistry model “does account for evolving geochemical interactions at least to some degree,” *i.e.*, the use of an “average” feldspar dissolution. *Id.*

But, Nevada misstates the FEP and, moreover, the FEP and the near-field chemistry model are fully consistent. “Features, Events, and Processes for the Total System Performance Assessment: Analyses” (March 2008). FEP 2.2.08.03.0B, LSN#: DEN001584824, at 6-992, specifically notes that the effects of geochemical interactions on groundwater evolution in the unsaturated zone are included in the TSPA. The description of the FEP indicates that it addresses a broad array of topics:

Groundwater chemistry and other characteristics, including temperature, pH, Eh, ionic strength, and major ionic concentrations, may change through time, as a result of the evolution of the disposal system or from mixing with other waters. Geochemical interactions may lead to dissolution and precipitation of minerals along the groundwater flow path, affecting groundwater flow, rock properties, and sorption of radionuclides. Effects on hydrologic flow properties of the rock, radionuclide solubilities, sorption processes, and colloidal transport are relevant. Kinetics of chemical reactions should be considered in the context of the time scale of concern.

The FEP then discusses the specific issues identified in the description. The FEP considers numerous geochemical aspects and evolution of the unsaturated zone. As FEP 2.2.08.03.0B demonstrates, only some aspects of geochemical interactions and evolutions were screened from consideration; others were included as described in the related FEP cited in FEP 2.2.08.03.0B. DOE also pointed out in this FEP that “[t]he effects of variations in potential seepage water

compositions on –in-drift chemistry are addressed in included FEP 2.2.08.12.0A (Chemistry of Water Flowing into the Drift)).” LSN#: DEN001584824 at 6-992.

Accordingly, Nevada’s argument regarding the outcome of this FEP rests on a mischaracterization of it and, thus, DOE’s model. As another licensing board has recently ruled, a mischaracterization of the application does not establish a genuine issue of material fact. *Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op. at 39) (Sept. 12, 2008). Nevada’s related argument—that “by removing the changing effects of the proposed repository on geochemical interactions and the evolution of the unsaturated zone from consideration, DOE has excluded normal evaporative geochemical reactions in fracture and fault conduits leading to the emplacement drifts”—fails for the same reason. Petition at 386. Moreover, in the very next paragraph of the contention Nevada quotes from the SAR for the proposition that evolution of pore waters is calculated as the waters move downward through the rock from the top of the TSw to the repository level. Petition at 386 (quoting SAR 2.3.5.3. 2.10 at 2.3.5-46). Thus, contrary to the assertions in the contention, the evolution of the thermal field of the repository through time is accounted for in the near field chemistry model (SAR Section 2.3.5.3) in evaluating water chemistry as it passes through the unit to the emplacement drifts and the aqueous chemistry.

Second, if Nevada were correct that DOE failed to take into account the geochemical evolution, the contention fails to raise a genuine dispute of material issue of fact or law because Nevada has not asserted, much less demonstrated with reference to scholarly authority, that the failure to consider the evolving geochemical interactions would change the results of DOE’s model. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff’d*, CLI-03-14, 58 NRC 207 (2003). Nor has Nevada then tied

those changes to an unmet regulatory requirement. *Id.* Indeed, the regulations require evaluation of degradation processes in detail only “*if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that the evolution of the geochemical interactions would increase those risks at all, let alone that the risks would be “significantly changed by their omission.” Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990). Accordingly, Nevada fails to raise a genuine dispute of material issue of fact or law.

Regarding Nevada’s separate challenge to DOE’s near field model for estimating the chemical composition of seepage waters, Nevada claims the model is inappropriate and inadequate. Petition at 388. Nevada asserts several reasons for this view, none of which raises a genuine dispute of material issue of fact or law. First, Nevada claims that by relying on the “average feldspar dissolution” the model is too limited. *See* Petition at 387 (arguing that “[t]he only chemical reactions that are possible in this DOE model during the transit of water from ground-surface infiltration to seepage (95°C thermal isotherm) into the emplacement drifts are derived from water-rock interactions characterized solely by ‘average’ feldspar dissolution.”). Notably, this sweeping conclusion is not supported by reference to any scientific or factual material.

Moreover, there is no merit to the argument that “average” feldspar dissolution is the only basis for the characterization of the water-rock interactions. Although feldspar dissolution

is the most important reaction that occurs (because feldspar comprises 60% of the tuff by weight), reactions with silica polymorphs (~35% of the rock) and calcite, an important trace mineral, are also considered in the model. *See* SAR Section 2.3.5.3.3.2. at 2.3.5 -36 to -37. In addition, SAR Section 2.3.5.3.3.3 addresses the precipitation of other secondary minerals that occurs as the fluid composition changes. *See* SAR 2.3.5-47. Moreover, the near field chemistry model is validated by comparisons to the THC seepage model (SAR Section 2.3.5.3.3.5.3), which explicitly includes several minor primary and secondary minerals, including biotite, zeolites, and clays. *See* “In-Drift Precipitates/Salts Model,” (LSN# DN2002371917) (Tables 1-27-1-28). Moreover, the near field chemistry model is validated by comparisons to the THC seepage model, SAR§ 2.3.5.3.3.5.3, which explicitly includes several minor primary and secondary minerals, including biotite, zeolites, and clays. *See* “Drift-Scale THC Seepage Model,” (SNL 2007)(LSN# DN2002490523, Section 4.1.6. at 4-8). Thus, Nevada is wrong that “average” feldspar dissolution is the only basis for the water-rock characterization and this argument, therefore, does not raise a genuine dispute of material issue of fact or law.

Second, Nevada challenges the near field chemistry model as “unrealistic” because “evaporation will occur along the fracture pathways between surface infiltration and the 95°C isotherm.” Petition at 387. Nevada claims that the model is particularly unrealistic for “fault and fracture systems that are presently breathing as a consequence of the normal unperturbed geothermal gradient. Once the proposed repository is closed, the heat envelope will extend further in fracture and fault conduits and will cause a breathing flux. . . .” *Id.* Nevada provides no authority for the notion that there is natural convection circulation in faults, driven by the geothermal gradient, or for the occurrence of such circulation under repository thermal loading.

In any event, however, simply claiming that the model is “unrealistic,” does not raise a genuine dispute of material issue of fact or law because Nevada does not take issue with whether the results are inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC at 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

For this same reason, Nevada’s argument that the DOE model is arbitrary, and that a modified in-drift model would be a more appropriate model also fails to state a genuine dispute of material issue of law or fact.

Third, the contention posits that “it is likely that” extensive evaporation will occur in the fractures above the drifts because of repository heat generation, potentially resulting in precipitation of soluble salts, which could later be remobilized. Petition at 387. Nevada provides no modeling, experimental, or observational basis for the assertion that repository heat generation could result in the high degrees of evaporation and low relative humidities required for precipitation of soluble salts. Accordingly Nevada fails to raise a genuine dispute of material issue of law or fact regarding whether DOE’s near field water chemistry model is flawed because of extensive evaporation that it alleges will occur in the fractures about the drifts. In any event, DOE considered mineral precipitation in the dryout zone around the drift, but screened it from performance assessment in excluded FEP 2.2.08.04.0A, Re-Dissolution of Precipitates Directs

More Corrosive Fluids to Waste Packages, LSN#: DEN001584824, at 6-995 to 6-998. Nevada fails to acknowledge that fact and certainly does not attempt to counter the analysis in excluded FEP 2.2.08.04.0A.

Finally, the contention concludes with more unsubstantiated arguments about errors in DOE's model relating to nitrate concentrations that may be reduced by bacterial action in the zone above the repository and a one-sentence argument regarding the opal and calcite in fractures found in trench 14. Petition at 388. But just like the other arguments in the contention, Nevada cites no scientific or factual support. As to the nitrate argument, the potential affects of microbial activity on nitrate concentrations is addressed in the response to contention NEV-SAFETY-076. Regarding the opal and calcite argument, Nevada fails to provide any supporting materials for this assertion and in any event fails to explain how it relates to the contention. Moreover, there is no basis in science to compare subsurface, host rock processes to Trench 14. Mineral precipitation in Trench 14 occurs within a few meters of the surface in soils and in a near-surface fracture zone, and has been established as pedogenic in origin. *See* Quade, J. and Cerling, T.E. 1990, "Stable Isotopic Evidence for a Pedogenic Origin of Carbonates in Trench 14 Near Yucca Mountain, Nevada," at 250, 1549-1552. Washington, D.C.: American Association for the Advancement of Science. Pedogenic processes are not expressed in the deep UZ where the hydrologic and chemical conditions are significantly different.

Thus, the contention fails to raise a genuine dispute of material issue of fact or law. Indeed, Nevada essentially admits in paragraph 6 of its contention that it does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at

389-90. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**71. NEV-SAFETY-71 - Microbially Induced Water Chemistry Changes In The Incubator Zone**

SAR Subsection 2.3.5 and similar subsections, which deal with the near-field chemistry model, fail to recognize the potential role of microbial communities in determining unsaturated zone water chemistry in the near-field environment.

**RESPONSE**

In this contention, Nevada claims that SAR subsection 2.3.5 and “similar,” although unspecified, subsections dealing with the near-field chemistry model fail to take into account the potential role of microbial communities in determining the chemistry of the unsaturated zone water in the near-field environment.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there

is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention claims that DOE should have “considered the role of microbial communities in determining the unsaturated water chemistry.” *See* Petition at 391, 393. Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed below: (1) other than the license application and DOE's supporting documents, the contention cites only one reference; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Adrian B. Bath and Maurice E. Morgenstein), which purportedly provide expert opinions to support this contention. Petition, Attachments 3, 4, & 17. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada's ultimate conclusion in this contention is that "[i]t is likely that the nitrate/chloride ratios used by DOE to describe corrosion inhibition are wrong." Petition at 393. This is mere speculation about what is "likely" to be.<sup>62</sup> Notably, other than citing the SAR for background, the only document that Nevada cites in the contention does not state that DOE's model of corrosion inhibition is wrong. *See* Petition at 393 (citing LSN#: NEV000004014). The cited document—"A Perspective on the Use of Anion Ratios to Predict Corrosion in Yucca Mountain"—asserts that without consideration of microbial alterations to the waters reaching the storage containers, predictions about corrosion cannot be based on anion ratios. LSN#:

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<sup>62</sup> Although Nevada makes the broad claim that the bacterial and fungal activity "has the potential to change the hydrogeochemistry of the unsaturated zone fluids," Petition at 393, Nevada discusses only one alleged change.

NEV000004014 at 704. This document does *not* state that the author reviewed the TSPA and based on that review, the nitrate/chloride ratios used by DOE are wrong.

Furthermore, the affidavits of the three experts who merely “adopt” this contention fall far short of the requirement to provide conclusions supported by reasoned bases or explanation. *See* Petition Attachment Nos. 3, 4, & 17. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451 at 472 (2006). Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite scientific or factual materials in support of the conclusion this contention asserts cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to raise a genuine dispute of material fact or law because (1) DOE considered the very issue that this contention asserts was omitted from DOE’s analysis, (2) the contention fails to address, much less dispute, numerous aspects of the SAR, showing that DOE’s analysis was conservative, and (3) the contention does not specify the ramifications of this alleged omission. As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency.

First, there is simply no merit to Nevada's claim that DOE did not evaluate the role of bacteria or fungi in changing the chemical properties of unsaturated zone fluids that have a role in drip shield and waste package degradation. In at least five instances, DOE identified microbial activity and corrosion as a feature, event, or process that should be screened. See "Features, Events, and Processes for the Total System Performance Assessment: Analyses," ("Features, Events, and Processes") (March 2008) LSN#: DEN001584824 at 6-422, 6-716, 6-424, 6-1042, 6-743 (respectively). These include FEP 2.1.03.05.0A ("Microbially Influenced Corrosion (MIC) of Waste Packages), FEP 2.1.10.01.0A ("Microbial Activity in EBS"), FEP 2.1.03.05.0B ("Microbially Influenced Corrosion (MIC) of Drip Shields"), FEP 2.2.09.01.0B ("Microbial Activity in the UZ"), and FEP 2.1.11.08.0A ("Thermal Effects on Chemistry and Microbial Activity in the EBS).

In FEP 2.1.10.01.0A, DOE recognized that "biological activity is important to consider because of the potential impact on the aqueous chemical conditions within the waste and the EBS." LSN#: DEN001584824 at 6-716. DOE concluded that, based on several authorities, "due to severe environmental constraints, microbial activity in the repository is expected to be low, and its impact on drift chemistry will be insignificant." *Id.* at 6-717. One of the authorities on which DOE relied in considering whether to include the FEP was the "Evaluation of Potential Impact of Microbial Activity on Drift Chemistry," LSN#: DN2002308488. In this report, DOE observed the importance of chloride/nitrate ratio as a "parameter in the control of the longevity of the waste package and drip shield as engineered barriers." LSN DN2002308488 at 6-22.

Significantly, in the "Evaluation of the Impact of Microbial Activities on Drift Chemistry," DOE concluded that:

In principle, microorganisms could consume nitrate through denitrification, either heterotrophically or autotrophically, under

anaerobic conditions (Korom 1992 [DIAS 172324], pp. 1657 to 1668). *This, however, will be unlikely in the repository because the overall environment will be oxic, which, together with low organic-carbon concentrations, will prevent significant anaerobic microbial reactions, including denitrification, as shown by the field observation that a significant amount of NO<sub>3</sub> is currently present in groundwaters.* Even if some anaerobic microenvironments may exist in rock matrix, their impact on nitrate concentration has already been captured by the current water analysis.

LSN#: DN2002308488 at 6-22 (emphasis added). Based on the analysis in this report, DOE concluded that “thermal effects and water availability [in the repository] will limit microbial activity during, and for a period after, the thermal pulse, and that nutrient limitations will limit activity throughout. Because of the multiple and overlapping limitations on microbial growth, there will be no significant effects resulting from bio-reduction of multivalent contaminants, metals, or sulfate, nor will there be any significant potential to form organic complexants.”

LSN#: DEN001584824 at 6-717.<sup>63</sup>

DOE also considered “Microbial Activity in the UZ,” in FEP 2.2.09.01.0B. There, DOE examined the degree to which microbial activity in the UZ may affect radionuclide mobility in the rock and soil through colloidal processes. *See* LSN# DEN001584824 at 6-1042. DOE’s analysis led to the conclusion that “[t]he justifications for excluding the effects of microbial-produced complexing agents, biotransformation, and biocolloid transport in the EBS also apply in the unsaturated zone given that they are based on information obtained primarily from unsaturated zone and saturated zone rocks and saturated zone waters.” *Id.* Thus, after consideration of this FEP, DOE determined that it could be excluded. *Id.*

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<sup>63</sup> DOE reached a similar conclusion regarding FEP 2.10.03.05.0B. In this FEP, DOE determined that even assuming that (contrary to excluded FEP 2.1.10.01.0A) microbial activity did occur on the drip shield, the MIC will not compromise the ability of the drip shields to perform and thus “will not significantly change radionuclide releases to the accessible environment or radiological exposures to the RMEI.” LSN#: DEN001584824 at 6-424.

Although DOE excluded these FEPs, the discussion in them as well as the analysis in the “Evaluation of the Impact of Microbial Activities on Drift Chemistry”—none of which Nevada acknowledges, much less attempts to address—demonstrates that, contrary to Nevada’s claim, DOE did evaluate the role of bacteria in changing the chemical properties of unsaturated zone fluids. Therefore, Nevada does not raise a genuine dispute of a material issue of fact or law.

The mere fact of these FEPs demonstrates that Nevada’s claim does not raise a genuine dispute of material fact. But the deficiency in Nevada’s contention is even more apparent given that DOE actually included FEP 2.1.03.05.0A (“Microbially Influenced Corrosion (MIC) of Waste Packages”) in the TSPA. The analysis of this FEP is reflected in the SAR at page 2.3.6-107 and in SAR §§ 2.3.6 and 2.3.6.3.3.2. The SAR also explains that, “some *excluded* FEPs are described in Section 2.3.6 particularly where an FEP is included for the waste package, but the corresponding FEP is excluded for the drip shield.” SAR at 2.3.6-10 & § 2.3.6.2.3. In the SAR, DOE explained that “[t]he effect of microbial influenced corrosion [on the waste package] is included as a multiplier to the general corrosion rates.” SAR at 2.3.6-11. As to the drip shields, DOE reported that “[m]icrobially influenced corrosion was also evaluated and found to have no significant effect on either general or localized corrosion process of titanium alloys under the exposure conditions of the repository.” SAR at 2.3.6-16 (citing “General Corrosion and Localized Corrosion of the Drip Shield” (Aug. 2007), LSN# DN2002467884).

Nevada does not discuss or even acknowledge these FEPs, SAR sections, or the sources cited in the FEPs and SAR sections. Thus, Nevada clearly fails to raise a genuine dispute of a material issue of fact as to whether DOE took into account the potential role of microbial communities in determining the chemistry of the unsaturated zone water in the near-field environment. Additionally because Nevada does not address any of this authority, there is no

genuine dispute of material fact that by the exclusion of microbially-induced changes to water chemistry does *not* result in a condition or circumstance that fails to comply with the regulations cited by Nevada.

Second, Nevada fails to address the numerous conservative aspects of DOE's analysis discussed in the SAR. These include DOE's conclusions that:

Because the data were obtained in a nutrient-rich environment, the effects of microbial activity on corrosion rates in these tests are expected to be greater than they will be in the repository environment, which is expected to be limited by the factors discussed in Section 2.3.6.3.3.2. Therefore, the effects of data uncertainty are adequately and conservatively represented in the microbially influenced corrosion model.

SAR at 2.3.6-22. The SAR also concluded that:

Overall, the corrosion rates from the electrochemical tests in microbial environments are so low that a temperature dependency for microbially influenced corrosion cannot be established. Since microbes are less likely to thrive at elevated temperatures, the use of a multiplier developed at room temperature is conservative and appropriate for all temperatures.

*Id.*

Furthermore, at SAR pages 2.3.6-26 to 6-27, DOE explained that

Environmental factors that affect levels of bacterial growth include temperature and radiation. These factors, however, are closely related to relative humidity; as temperature and radiation decrease in the repository, relative humidity is predicted to increase. At the same time, while there are some types of microorganisms that can survive the elevated temperatures ( $\geq 120^{\circ}\text{C}$ ) and high-radiation doses, if there is no available water, then microbial activity is completely prevented. Thus, because water availability is the primary limiting factor and this factor is coupled to other less critical limiting factors, water availability (as expressed by relative humidity) was used as the primary indicator of microbial activity (SNL 2007c, Section 6.4.5; BSC 2004b, Sections 6.4 and 7.1).

This relative humidity threshold range is based on the viability of microbes in repository conditions. The low value is set at the

minimum value at which microbes can be active (75%), and the high value is the relative humidity at which most microbes can thrive (90%) (SNL 2007c, Section 6.4.5). This treatment is appropriate and conservative because the other factors, such as limited nutrient supplies, will limit microbial activity (SNL 2007c, Section 6.4.5).

Nevada does not dispute that DOE was conservative, as demonstrated above. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Third, even assuming Nevada was correct that DOE ignored the information relating to microbial activity, which DOE clearly did not, the contention still fails to establish a genuine dispute of material issue of fact or law. This is because the contention makes only generalized statements regarding the consequences of DOE's alleged failure. Nevada merely states that "it is likely" that DOE nitrate/chloride ratios are "wrong." Nevada never provides any quantitative information about the consequences, much less any qualitative information, regarding the implications of the allegedly incorrect ratio. Nevada's bare assertions, "without any specific source of evidence concerning the importance of the alleged omission," do not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990). Nevada must demonstrate how the use of a different model would change the results, and then tie those changes to a regulatory requirement that was not met. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-

12, 58 NRC 75, 92-93 (2003), *aff'd*, CLI-03-14, 58 NRC 207 (2003). Nevada has not done so and therefore, no genuine dispute is raised in this contention.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, the contention fails to raise a genuine dispute of a material issue of fact or law and must be dismissed.

**72. NEV-SAFETY-72 - Characterization Of Dust Sources**

SAR Subsections 2.3.5, 2.3.5.1 and similar subsections, which describe the in-drift physical and chemical environment, fail to consider dust as an important physical factor in the in-drift environment and have poorly characterized the genesis of dust in that environment.

**RESPONSE**

In this contention, Nevada claims that SAR subsections 2.3.5, 2.3.5.1, and “similar,” although unspecified, subsections that describe the in-drift physical and chemical environment do not take dust into account as an “important physical factor” as part of that environment and, moreover, that DOE has “poorly” characterized the genesis of the dust in the environment.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there

is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention claims that DOE did not sufficiently characterize dust in the emplacement drifts, which in turn causes DOE to “inappropriately and inaccurately characterize the EBS environment.” *See* Petition at 398-399. Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed in the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Don L. Shettel, Jr. and Maurice E. Morgenstein), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" these otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

As Nevada concedes, DOE considered the impact of dust deliquescence to influence the localized corrosion of the waste package and drip shields. *See* Petition at 396 & 397; *see also* "Features, Events, and Processes for the Total System Performance Assessment: Analyses," (March 6, 2008) (LSN#: DEN001584824, at 6-705, 6-711). In this contention, Nevada's essential claim is that dust has implications for assessing modes and rates of corrosion of the drip shield and the waste package beyond those analyzed in these FEPs. In particular, Nevada asserts that the characteristics of the dust environment are "important properties," and the "role of dust" is "critical with respect to the behavior of C-22 and T-7." Petition at 397. This assertion fails to explain whether Nevada believes that the characteristics are important to deliquescence or to

some other unspecified process, or both. Moreover, having made these assertions, Nevada was obligated to back them up with a citation to scholarly authority. Nevada does not do so.

Similarly, Nevada claims that DOE omitted certain sources of dust from its consideration. Petition at 397. Nevada later lists four categories of direct dust that it claims DOE should have considered. Petition at 396. According to Nevada certain characteristics of these sources of direct dust must be examined in the TSPA. But, importantly, Nevada fails to provide any explanation, or authority for, its view that these characteristics are “important” or “critical” to the analysis.

For example, Nevada states that the trace elements in the geochemical composition of the four deposits have not been examined. Petition at 398. But, Nevada does not explain why they need to be examined and cites no authority that shares its view. Likewise, Nevada claims that “relative volume and hence the importance” of the four different dust deposits is unknown. *Id.* Nevada never even explains, though, how some unspecified, different volume of these dust materials would undermine the conclusions in the TSPA. In yet another example, Nevada maintains that calcium chloride dust concentrations from evaporative salt production must be examined. *Id.* As to why, however, Nevada is completely silent. Nevada also speculates about “potential concentrations of deleterious trace elements in decomposed EBS.” *Id.* Nevada cites no authority for the proposition that these materials will produce any significant amount of dust. Then, with no elaboration at all, Nevada simply concludes that the overall consideration of dust accumulation in the drift environment has been inadequate. Even this conclusion is unsupported, however.

If a petitioner, like Nevada, “has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation,’” the contention must

be dismissed. *Fansteel, Inc.* (Muskogee, Oklahoma site), CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). The two boilerplate expert affidavits that “adopt” the contention do not change that outcome here. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451 at 472 (2006). Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *USEC*, CLI-06-10, 63 NRC at 472.

In summary, the contention fails to explain the basis for its challenges, much less identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section V.A.3 above, contentions, like this one, that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw.

Nevada “contend[s] that the role of dust in the waste emplacement drift environment is critical with respect to the behavior of C-22 and T-7 [sic] as components of waste packages and

drip shields.” Petition at 397. Claiming that SAR 2.3.5 and 2.3.5.1 fail to consider dust as an important physical factor in the in-drift environment, Nevada mounts a challenge to DOE’s determination that FEPs 2.1.09.28.0A and 2.1.09.28.0B were of low consequence and thus could be excluded. *See Features, Events, and Processes for the Total System Performance Assessment: Analyses (“Features, Events, & Processes”)*, (March 6, 2008) LSN# DEN001584824 at 6-705, 6-711. Of course, these two FEPS—and the “Analysis of Dust Deliquescence for FEP Screening,” on which these FEPs are based—demonstrate that DOE recognized that dust could be an important factor, but that after an extensive analysis, determine that dust deliquescence was of low consequence. *See Analysis of Dust Deliquescence for FEP Screening (“Analysis of Dust Deliquescence”)*, ANL-EBS-MD-000074 REV 01 AD 01, LSN# DN2002478854.

To create a genuine dispute of material issue of fact or law regarding the propriety of the conclusions in these FEPs, Nevada needed to produce scholarly authority that explains why, how, and to what extent DOE is incorrect in its screening of these two FEPs and in its extensive analysis in *Analysis of Dust Deliquescence* on which these FEPs are based. Nevada did not do so.

As to Nevada’s challenge to the categories of dust considered in the screening process, in these FEPs, DOE explained that the screening justifications were developed “considering a wide range of the dust and brine compositions.” *Features, Events & Processes*, LSN#: DEN001584824 at 6-706 & 6-712. Nevada does not address that fact in the contention. Nevada also ignores the *Analysis of Dust Deliquescence*, which describes in greater detail the wide range of dust that DOE considered. *See Analysis of Dust Deliquescence*, LSN#: DN2002478854 at 6-4, 6-17, & 6-20. In this report, DOE explains that tunnel dust samples were collected and that these tunnel dust samples “consist mostly of crushed rhyolite, generated by excavation and other

support activities underground.” *Id.* at 6-4. The report also explains that DOE considered “atmospheric dusts” using “measured rain-out data collected by the National Atmospheric Deposition Program at Nevada sampling site, which reflects contributions of both atmospheric aerosols and windblown dust in the Yucca Mountain area.” *Id.* DOE evaluated the composition of these atmospheric aerosols, noting that they “have a number of natural sources, such as windblown surface soils/dust, sea spray, volcanic emissions, biosphere emissions, and the condensation of atmospheric gases.” *Id.* at 6-17.

In fact, in the 2008 addendum, DOE explicitly stated that the report “assumes the main source of dust that is of concern to the waste package corrosion performance comes from the atmospheric dust brought in during the preclosure ventilation period.” *Analysis of Dust Deliquescence*, at 5-1 (LSN# DN2002478854). This same addendum notes that “dust generated by the comminution of the host rock (so called rock flower) during excavation, repository operation or closure, or seismic events is also considered.” *Id.*

Similarly, in excluded FEP 1.20.03.02.0E, DOE considered rock dust generated by comminution of host rock fragments due to a drift collapse. While acknowledging that this dust is compositionally distinct from the dust deposited during the ventilation period, DOE concluded that the screening justifications for FEP 2.1.09.28.0A was equally applicable to the rock dust due to drift collapse. *Id.* at 6-124. DOE reached a similar conclusion with respect to cement dust due to the degradation of ground support material. *See* FEP 2.1.06.01.0A, LSN#: DN2002478854 at 6-504. In excluded FEP 2.1.06.01.0A, DOE concluded that while the effects of the added component of cement dust on deliquescent brine compositions are uncertain, “other aspects of the exclusion argument presented in FEP 2.1.06.01.0A . . . remain valid.” Thus, contrary to the assertions in the contention, DOE did take into consideration the possible

importance of dust as a physical factor in the in-drift environment; it just concluded that it was of low consequence. Nevada does not attempt to controvert DOE's conclusions in these FEPs, and thus fails to raise a genuine dispute of material issue of fact or law in this contention.

DOE also recognized that organic material likely could be present in repository dust. This would include material that originates with repository construction operations, such as machinery exhaust or abrasion of solid organic materials used in equipment. *See* Analysis of Dust Deliquescence, LSN#: DN2002478854 at 6-20. It also could include "atmospheric particles brought into the repository during the ventilation period." *Id.* Ultimately, DOE determined that it could not model the effects of these organic compounds, but concluded that "it is reasonable to expect that the addition of organic components would have only a modest effect on the deliquescence behavior." *Id.* at 6-21.

The record thus reveals that DOE considered an extensive range of categories of dust, if not all of those that Nevada lists on page 378 of the Petition, and still concluded that these FEPs were of low consequence. LSN# DN2002478854 at 6-123. Nevada does not address any of these documents in the contention. As already noted, Nevada offers only suppositions about the ways in which the characteristics of these other kinds of dust could have relevance to the corrosion of the C-22 and Ti-7. Petition at 398. The Board should not accept such hypothetical, unsupported assertions. *See USEC, CLI-06-10, 63 NRC at 472 (2006)* (holding that conclusory statements cannot provide "sufficient" support for a contention). This is particularly true where, as here, the contention allege errors, omissions, uncertainties or alternative approaches, without specifying the ramifications or results of such alleged deficiencies, fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. Nevada provides no quantitative or even qualitative information regarding whether, and the extent to which, the additional categories and

characteristics of dust would impact the waste package or drip shields in a way that is different from the conclusions in the FEP and the Analysis of Dust Deliquescence for FEP Screening. Thus, Nevada's bare assertion that the model is inadequate does not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990).

For example, in Analysis of Dust Deliquescence, DOE conducted an analysis to estimate the volume of brine that may form on the waste package by deliquescence. LSN#: DN2002478854 at 6-56. DOE examined the volume of dust that would be brought in by ventilation and the compositions of the salts in the dust. *Id.* DOE concluded that volume of brine would be 1.8 uL/cm<sup>2</sup>—and if integrated over the footprint area of the waste, it would give a fraction of a liter. *Id.* at 6-67. Nevada was required to demonstrate how the inclusion of the different characteristics would change these results, and then tie those changes to a regulatory requirement that was not met. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff'd*, CLI-03-14, 58 NRC 207 (2003). Nevada has not done so and, therefore, no genuine dispute is raised in this contention.

The regulations require DOE's evaluation of degradation processes in detail only “*if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that these additional potential characteristics of dust would increase those risks at all, or even that they would be “significantly changed by their omission.” Accordingly, Nevada fails to raise a genuine dispute of material issue of fact or law.

In summary, the contention fails to raise a genuine dispute of a material issue of fact or law and must be dismissed.

**73. NEV-SAFETY-73 - In-Drift Organic Contribution By Ventilation Or Unsaturated Zone Water**

SAR Subsection 2.3.5.5 and similar subsections, which describe the in-drift chemical environment models, fail to include organic components in the composition of unsaturated zone water, or ventilation dust in the in-drift environment, and therefore omit these components from all of their experimental and model-based estimates of corrosion and other factors influencing repository performance.

**RESPONSE**

In this contention, Nevada claims that SAR subsections 2.3.5.5 and “similar” (although unspecified) subsections that fail to take into account organic components that are in either the composition of the unsaturated zone or the ventilation dust in the in-drift environment. Nevada argues that organic components thus have been omitted from DOE’s experiments and model-based estimates of corrosion and “other factors affecting repository performance.”

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, &3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic

setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention claims that DOE’s “geochemical-hydrogeochemical characterization of the in-drift environment is *incomplete*” because of DOE’s “lack of attention to natural organic compounds.” Petition at 400 (emphasis added). Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed in the specific response below: (1) the contention does not reference any documents, other than the license application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach two affidavits (by Maurice E. Morgenstein and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” these otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada asserts that organic compounds involve a “variety of important reactions” (including corrosion, the complexation of transition metals, the formation of colloids, and the distribution of complexes) and have a role in the formation of carbonates that “is also of potential importance in the near field.” Nevada also claims that organic compounds have the ability to

enhance bacterial metabolism and promote radionuclide transport. *See* Petition at 402. Nevada is obligated to substantiate these technical assertions with citations to scholarly authority. Nevada’s Petition concedes this much. *See id.* at 401 (heading 5 stating, “A concise statement of the facts or expert opinions supporting the contention, *along* with appropriate citation to supporting scientific or factual materials”). Here, however, in the entire contention, Nevada cites only the SAR, and even then, cites it only two times. *See id.* at 400 & 402. Thus, instead of meeting its obligation to cite scientific or factual materials, Nevada relies only on attorney argument. This is insufficient under the applicable regulations, as described in section V.A.3 above. A contention is “inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma site) CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). Indeed, even Nevada’s ultimate conclusion—that DOE’s characterization of the in-drift and near filed environment is “incomplete and inadequate,” *id.*, -is unsupported.

The two boilerplate expert affidavits that “adopt” the contention do not change the conclusion that the contention must be dismissed. These affidavits are wholly inadequate support for Nevada’s challenge. *See* Petition Attachment Nos. 17& 18. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues whatsoever. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel*, CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is

underscored by the fact that the contention itself does not even mention them. Nevada's failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC, CLI-06-10, 63 NRC at 472.*

In summary, the contention fails to identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section V.A.3 above, contentions, like this one, that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw

Nevada's complaint is that SAR Subsection 2.3.5.5 and other, unspecified, but so-called "similar subsections" fail to include organic components when specifying the composition of the unsaturated zone or the ventilation dust to the in-drift environment. Petition at 402. Nevada argues—though without any supporting references—that organic compounds have a role in corrosion, the formation of colloids, the distribution of colloids, and the formation of carbonates, and have the ability to enhance bacterial metabolism and promote radionuclide transport. *Id.* Twelve FEPs address the issues that Nevada raises regarding organic compounds. Some of these FEPs were included in the TSPA and some were excluded for low consequence. Nevada ignores all of them in this contention.

First, FEPs included in the TSPA are FEP 2.208.06.0A (Complexation in the SZ), FEP 2.208.06.0B (Complexation in the UZ), and FEP 2.2.08.10.0A (Colloidal Transport in the SZ). *See Features, Events, and Processes for the Total System Performance Assessment: Analyses* ("Features, Events, & Processes"), LSN#: DEN001584824 at 6-314, 6-1002, 6-1005, 6-1015

(March 6, 2008). FEP 2.208.06.0A relates to “[c]omplexing agents such as carbonate, fluoride, and humic and fulvic acids present in natural ground waters,” which could affect radionuclide transport in the saturated zone. LSN#: DEN001584824 at 6-1002. Similarly, FEP 2.208.06.0B relates to “[c]omplexing agents such as humic and fulvic acids present in natural ground waters,” which could affect radionuclide transport in the unsaturated zone. *Id.* at 6-1005. These FEPs observe that the “potential effects of organic complexing agents on sorption were investigated in Summary and Synthesis Report on Radionuclide Retardation for the Yucca Mountain Site Characterization Project, Section IVB.” LSN#: DEN001584824 at 6-1003 & 6-1006. *See also* Summary and Synthesis Report on Radionuclide Retardation for the Yucca Mountain Site Characterization Project, Section IVB., LSN#: DEN000855121. The Summary and Synthesis report concluded that tests showed very little effect of the organic materials for sorption of plutonium and neptunium on tuff materials. *See* LSN#: DEN001584824 at 6-1003 & 6-1006. Further detailed analysis of these FEPs is in SAR Subsections 2.3.9.3.2.2 and 2.3.8.2.2.2, respectively. Thus, contrary to Nevada’s assertion, organic components in connection with complexation and radionuclide transport are specifically addressed in the SAR.

Even these included FEPs reflect that the organic aspects of those FEPs are a negligible contributor to the included processes. For example, FEP 2.2.08.06.0A states that “[i]n the saturated zone, inorganic complexing agents, such as carbonates, are dominant, whereas organic complexing agents are not found in significant amounts (see excluded FEP 2.2.09.01.0A (Microbial Activity in the SZ)).” *See also* FEP 2.2.09.01.0A at pages 6-1039 (stating that “[i]n the saturated zone, heterotrophic microbial activity, which uses organic carbon as the sole energy source, is expected to be limited because geochemical analyses of groundwater samples taken

from saturated zone wells within the Yucca Mountain vicinity indicate that there is little organic carbon in these waters”).

Second, Nevada similarly fails to acknowledge or address the screening analysis for nine other relevant FEPs that were considered but excluded for low consequence. *See* FEP 1.1.02.00.0A, Chemical Effects of Excavation and Construction in EBS, LSN#: DEN001584824 at 6-26 (concluding that emplaced waste is expected to contain only trace amounts of organic/cellulosic materials that will not affect the degradation of FEP 2.1.02.10.0A, Complexation in EBS, LSN#: DEN001584824 at 6-344 (concluding that the emplaced waste is expected to contain only trace amounts of organic/cellulosic materials that will not affect the degradation of the waste forms or the dissolved and colloid concentrations of elements with radioactive isotopes); FEP 2.1.09.13.0A, Complexation in EBS, LSN#: DEN001584824 at 6-664 (concluding that because microbial activity in the repository will be low, there will be a low presence of organic compounds and thus the impact of organic materials in natural groundwater on radionuclide transport will be negligible); FEP 2.1.09.19.08.0A, Formation of Microbial Colloids in EBS, LSN#: DEN001584824 at 6-673 (concluding that organic compounds will not affect generation of inorganic colloids); FEP 2.1.10.01.0A, Microbial Activity in the EBS, LSN#: DEN001584824 at 6-716 to 6-717 (concluding that there will be no significant potential to form organic complexants); FEP 2.1.12.04.0A, Gas Generation (CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>S) from Microbial Degradation, LSN#: DEN001584824 at 6-765 (concluding that gases produced from microbial activity were of low consequence); FEPs 2.2.09.01.0A & 0B, Microbial Activity in the SZ and in the UZ, LSN#: DEN001584824 at 6-1038 & 1042 (concluding that organic carbon is expected to be limited in the saturated zone and any increase in HCO<sub>3</sub> due to it is small in comparison to the range of uncertainty in carbonate/bicarbonate concentrations for radionuclide

*Kd* values and further concluding that same conclusions apply to the unsaturated zone); FEP 2.11.01.0A, Gas Effects in the SZ, LSN#: DEN001584824 at 6-1103 (concluding that gas generation effects, including microbial degradation of organic material, was of low consequence).

In addition, excluded FEP 2.1.10.01.0A, FEP 2.2.09.01.0A, and FEPs 2.2.09.01.0B rely on an extensive analysis in “Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry,” LSN#: DN2002308488. This report concluded that the small quantities of organic substances expected in the repository “will have an insignificant effect on the bulk chemical environment in the drifts.” LSN#DN2002308488 at 6-37. It also examined the potential microbial effects on radionuclides, such as those associated with microbial degradation of organic carbon in the invert. *Id.*, Section 6.5.4. The report concluded that not only would the effects likely be immaterial, they might actually help the immobilization of radionuclides. *Id.* at 6-43.

As to organic compounds in ventilation dust (Petition at 400 & 402), DOE recognized that organic material likely could be present in repository dust. This would include material that originates with repository construction operations, such as machinery exhaust or abrasion of solid organic materials used in equipment. *See* “Analysis of Dust Deliquescence for FEP Screening,” LSN#: DN2002478854 at 6-20. It also could include “atmospheric particles brought into the repository during the ventilation period.” *Id.* Ultimately, DOE determined that it could not model the effects of these organic compounds, but concluded that “it is reasonable to expect that the addition of organic components would have *only a modest effect on the deliquescence behavior*” and, thus, corrosion. *Id.* at 6-21. (emphasis added).

The record thus reveals that DOE extensively considered the role of organic compounds in the repository operations, including the unsaturated zone and the in-drift environment. Nevada fails to present any factual material that disputes even one aspect of the FEPs or the extensive reports cited therein. Rather, Nevada relies on conclusory and hypothetical assertions without presenting any factual or scientific support for them. Petition at 402. Such assertions can not be the basis for a contention. *See USEC, Inc. (American Centrifuge Plant), CLI-06-10, 63 NRC at 472* (holding that conclusory statements cannot provide “sufficient” support for a contention). Having failed to address, much less refute, DOE’s conclusions in these FEPs, Nevada fails to raise a genuine dispute of material issue of fact or law in this contention.

Moreover, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches, without specifying the ramifications or results of such alleged deficiencies, fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. Nevada provides no quantitative or even qualitative information regarding whether and to what extent DOE’s conclusions in the TSPA and the FEPs regarding organic compounds would be affected by the alleged omissions. Nevada’s bare assertion that the model is inadequate does not raise a valid basis for attacking the model. *Fla. Power and Light Co., (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990)*. The regulations require evaluation of degradation processes in detail only “*if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Even if organic compounds do play the roles that Nevada asserts, Nevada has not shown how there would be an increase in those regulatory-defined risks, let alone that they would be “significantly changed by

their omission.” Accordingly, Nevada fails to raise a genuine dispute of material issue of fact or law.

In summary, the contention fails to raise a genuine dispute of a material issue of fact or law and must be dismissed.

**74. NEV-SAFETY-74 - Impact Of Microbial Activity**

SAR Subsection 2.3.6.3.3.2, and similar subsections, which predict limited microbial activity in the repository, and therefore, limited impact on drift chemistry and the waste package, ignore the archaea, resulting in an underestimation of the potential for microbial activity and microbially influenced corrosion.

**RESPONSE**

In this contention, Nevada alleges that LA Section 2.3.6.3.3.2, “and similar subsections,” ignore the potential effect of archaea, a domain of microorganisms, “resulting in an underestimation of the potential for microbial activity and microbially influenced corrosion.” Petition at 405. For the reasons discussed below, this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention fails to state, with requisite specificity, an issue of law or fact justifying its admissibility in this proceeding.

**b. Brief Explanation of Basis**

For the many reasons discussed below, this contention lacks adequate factual or legal bases, and must be dismissed pursuant to 10 C.F.R. § 2.309(f)(1)(ii).

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

As a general matter, with respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage, LLC (Independent Spent Fuel Storage Installation) LBP-98-7*, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998). Such is the case here. Specifically, in attempting to provide the alleged facts or expert opinion that support its contention, *see* Petition at 406, Nevada describes the LA's discussion of microbially influenced corrosion at LA Section 2.3.6.3.3.2, noting that DOE's conclusions are based on data presented in “Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry” (ANL-EBS-MD-000038) Rev. 01 (Nov. 18, 2004), (LSN# DN2002308488), referenced in the LA. Nevada also notes that much of the information about microorganisms specific to Yucca Mountain is taken from “Comparison of the Microbial Community Composition at Yucca Mountain and Laboratory Test Nuclear Repository Environments” (Oct. 9, 2002), (LSN# DEN000027985). Petition at 406.

Nevada then alleges that “[m]any of the limitations for microbial activity in the repository are based on the assumption that the microbial population is limited to eubacteria.” Petition at 407. In support of this proposition, Nevada notes that “Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry” indicates that “[t]he maximum temperature at which known microorganisms can exist in an active state is 110°C.” Petition at 407. Next, Nevada asserts that “archaeal strain 121 grows at 121°C,” and notes that one scientist has

suggested that archaea can “exist in a wide variety of terrestrial, freshwater, and marine habitats, sometimes in very high abundance.” Petition at 407 (quoting “Oceans of Archaea,” DeLong, E. (2003), ASM NEWS, Vol. 69, No. 10 at 503-511). In this regard, Nevada also ignores the fact that the description of the conceptual model documented in “Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry,” does not rely on the distinction among the three polygenetic domains of microbes (eukaryotes, bacteria and archaea). Instead, the model categorizes microorganisms into two general groups- heterotrophic and autotrophic microbes- based on their metabolic functionalities. Archaea are included in these two groups. See “Evaluation of Potential Impacts of Microbial Activity on Drift Chemistry,” ANL-EBS-MD-000038, Rev. 1, (LSN#: DN2002308488), Figure 6.1-1 at 6-5. Therefore, the License Application does not “ignore” any possible effect of archaea. The contention misses the key point of the LA model that the extent of each individual microbial reaction will be limited by environmental constraints, not by the types of microbes present. See *id.* at 7-3 (noting that “[m]icrobial activity, including [microbially influenced corrosion] is expected to be minimal in the Yucca Mountain repository”).

Without support or reference to relevant scholarship or expert opinion, however, Nevada jumps to the unsupported conclusion that bacteria and archaea have developed alternative mechanisms for carbon fixation that have varying sensitivities to oxygen, and that archaea can use a variety of energy sources to fix carbon, including oxidation of ammonia or hydrogen sulfide using either oxygen or metal ions as electron acceptors. Petition at 407. Again, without support or reference to relevant scholarship, Nevada further concludes that “[t]he wide range of distinctive metabolic pathways used by the archaea mean that they can have distinctive effects on corrosion processes and water chemistry that could substantially enhance the degradation rates of

engineered barrier components and also modify radionuclide release and transport mechanisms.”  
Petition at 408.

Importantly, Nevada does not allege that the existence of such archaea would have any material effect on DOE’s analysis relating to the effects of microbial activity on corrosion. Such conclusory assertions are inadequate to support admission of Nevada’s contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any relevant documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach two affidavits (by Brenda J. Little and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if this claim is construed to have been submitted by an expert, such support would not be sufficient to justify its admission. As the Commission has stated, “an expert opinion that merely states a conclusion (*e.g.*, the application is ‘deficient,’ ‘inadequate,’ or ‘wrong’) without providing a reasoned basis or explanation for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion” of the

alleged basis for the contention. *USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998)).

This contention, therefore, is inadmissible

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada seemingly attempts to demonstrate a genuine dispute with DOE by repeating the unsupported assertions, discussed above, that DOE inappropriately ignored the potential effects of archaea and consequently underestimated the potential for microbially influenced corrosion. Petition at 408. As fully detailed above, however, Nevada does not assert that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). An allegation that some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

Nevada also alleges, without foundation or reference to any purported expert opinion or supporting documentation, that SAR Section 2.3.6.3.3.2 violates 10 C.F.R. §§ 63.114(a), (b) and (f). Petition at 408. Indeed, Nevada’s “Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References” identifies no material facts, expert opinion, or supporting references regarding these sections of the LA. Nevada simply takes no steps to explain or support its naked assertions and blatant speculation. By so doing, Nevada has underscored another basis for rejection of its contention, as it is fundamental that a contention

“will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma, Site), CLI-03-13, 58 NRC 195, 203 (2003) (*quoting GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Accordingly, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi).

For all of the reasons discussed above, this contention must be rejected in its entirety.

**75. NEV-SAFETY-75 - Microbially Influenced Corrosion Model**

The model described in SAR Subsection 2.3.6.3.3.2 and DOE reference “General Corrosion and Localized Corrosion of Waste Package Outer Barrier, ANL-EBS-MD-000003 Rev. 03” (07/25/2007), LSN# DN2002460404, to calculate an enhancement factor for microbially influenced corrosion as a multiplier to a general corrosion rate is not a standard or recommended practice and cannot be used to estimate localized corrosion resulting from the presence and activities of microorganisms.

**RESPONSE**

In this contention, Nevada alleges that the model described in SAR Section 2.3.6.3.3.2 is “not a standard or recommended” practice and is thus inappropriate for use in estimating the localized corrosion resulting from the presence and activities of microorganisms. Petition at 409. For the reasons discussed below, this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention fails to state, with requisite support, an issue of law or fact justifying its admission in this proceeding.

**b. Brief Explanation of Basis**

For the reasons discussed below, this contention lacks adequate factual basis, and must be rejected by the Board.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide

complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has

failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any relevant documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Brenda J. Little and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

In its statement of supporting facts, expert opinion, and references in support of this contention, Nevada observes that the model developed to estimate the alteration of corrosion rates of Alloy 22 due to microbially influenced corrosion was based, in part, on experiments that

were reported on in “Corrosion of Candidate Container Materials by Yucca Mountain Bacteria” (Feb. 5, 1999), LSN#: DEN000045571 (hereafter, “the 1999 experiments”). Petition at 410. Nevada generally describes the conduct of some of the 1999 experiments and alleges various purported deficiencies with them. As described more fully below, however, Nevada completely fails to demonstrate that the alleged deficiencies provide an adequate basis for supporting the contention, as they are unsupported by expert opinion or scientific and factual materials.

Nevada first comments that the researchers who conducted the 1999 experiments and who later published their results in “Corrosion of Candidate Container Materials by Yucca Mountain Bacteria” did not “cite a standard.” Petition at 410-411. Nevada notes that the “current ASTM standard for conducting polarization resistance measurements is ASTM Standard G59-97 (2003), “Standard Test Method for Conducting Potentiodynamic Polarization Resistance Measurements” and that ASTM G59-97 (2003) “specifies the bias due to solution resistance (i.e., low conductivity media) that results in an overestimation of polarization resistance and an underestimation of corrosion rates,” and that this standard provides that “[c]urrent interruption methods can compensate for solution resistance.” *Id.* at 411.

Apart from these general observations, however, Nevada notes that in the 1999 experiments there was “no indication ... that solution resistance was resolved.” *Id.* Nevada does not otherwise comment on the effect of these purported deficiencies. Nor does it comment on the effect, if any, that a lack of a citation to a standard with respect to the validity of the experiments has on the content of the LA or underlying model used by DOE. Most importantly, Nevada does not allege *any material effect* on the experiments or the model that is the subject of this contention as a consequence of there not being an indication in the text of “Corrosion of

Candidate Container Materials by Yucca Mountain Bacteria” that the “solution resistance was resolved.” *Id.*

Nevada next alleges, again without support or reference to relevant scholarship, that with respect to the 1999 experiments, “the method ... used to evaluate the electrochemical impact of microorganisms on electrode surfaces is not a standard practice.” Petition at 411. Nevada does not further explain this wholly-conclusory assertion, and, in particular, does not explain the resulting effect, if any, of using a purported “nonstandard practice” in the 1999 experiments. Nevada next describes the experiments, noting, for example, that “[m]icrobial cell densities were established before aseptically combining and spreading a defined number ... of all isolates on specimens which were air dried before they were exposed to growth media in corrosion cells.” *Id.* at 412. Nevada then comments that “[i]t is not clear whether the authors air-dried the coupons before or after spreading the cells on the surface” but asserts, without support or reference to any relevant scholarship, that “[i]n any case, spreading cells on a surface before exposure to growth media cannot have the same electrochemical impact as allowing a biofilm with living cells to form.” *Id.* Yet again, apart from its general commentary, Nevada does not allege any negative material impact or result on the experiments or the model that is the subject of this contention as a consequence of the circumstances described above. In particular, Nevada does not allege that the asserted different “electrochemical impact” noted above made any material difference in the outcome of the 1999 experiments.

Continuing along this same line of discourse, Nevada next observes that the text of “Corrosion of Candidate Container Materials by Yucca Mountain Bacteria” describing the 1999 experiments does not “describe any procedure for separating cells from culture medium and specifically eliminating yeast extract from the medium in which electrochemical measurements

were made.” Petition at 412. Nevada notes that an earlier (1994) experiment involving sulfate reducing bacteria suggested that “yeast extract caused interferences on electrochemical measurements in their experiments.” *Id.* (citing Webster, B.J. and Newman, R.C., “Producing Rapid Sulfate-Reducing Bacteria (SRB)-Influenced Corrosion in the Laboratory” (1994) at 33, Microbiologically Influenced Corrosion Testing, ASTM STP 1232. While Nevada acknowledges that the 1994 experiment used a different growth medium than the one used in the 1999 experiments, it does not further explain the relevance, if any, of the 1994 experiment to the 1999 experiments. Nevada simply asserts, again without support or reference to relevant scholarship, that the 1999 experiments did not include “essential control experiments – evaluating the impact of the R2 (containing yeast extract), glucose or protease peptone on the electrochemical measurements.” Petition at 412.

Nevada then alleges, again without citation, that during the 1999 experiments, “no attempt was made to verify that the uninoculated media were sterile” and that “[t]he coupons were not checked for contamination.” Petition at 413. It is impossible to discern from where Nevada draws support for these assertions. As noted above, the Petition does not cite a source for these unsupported assertions.

In this regard, and illustrative of this generic deficiency that runs through this contention rendering it inadmissible, the document that Nevada cited previously in its comments about the 1999 experiments, “Corrosion of Candidate Container Materials by Yucca Mountain Bacteria” is an 18 page paper presented at the April 1999 National Association of Corrosion Engineers Conference and Exhibition. That paper, however, does not indicate in any way whether or not Nevada’s statements above are correct. Nevada nevertheless concludes that “*If* the controls were contaminated, the corrosion rates for the controls would not represent corrosion rates in the

absence of bacteria.” Petition at 413 (emphasis added). Importantly, Nevada does not assert that the controls for the 1999 experiments *were* contaminated, but only speculates about the possibility of contamination. And yet again, Nevada does not allege, much less demonstrate, any negative material effect on the 1999 experiments or the model that is the subject of this contention as a consequence of these asserted deficiencies.

Lastly, Nevada notes that one of the documents referenced in SAR Section 2.3.6.3.3.2 describes additional experiments in which welded Alloy 22 coupons were exposed to a certain type of well water (100X J-13), plus 0.1% glucose with and without microorganisms from Yucca Mountain. Petition at 413 (citing “General Corrosion and Localized Corrosion of Waste Package Outer Barrier, ANL-EBS-MD-000003 Rev. 03” (LSN# DN2002460404 at 6-111, -112)). Nevada observes that “the results of the electrochemical tests are described in this referenced document as ‘conservative’ because of the addition of 0.1% glucose as an additional nutrient that would not be in the Yucca Mountain repository” but asserts that “it is well established that glucose can inhibit the growth of some microorganisms.” Petition at 413 (citing Marchand, E.A. and Silverman, J. (2003), “The Role of Enhanced Heterotrophic Bacterial Growth on Iron Oxidation by *Acdithiobacillus ferrooxidans*,” GEOMICROBIOLOGY JOURNAL, Vol. 20 (3)). Nevada does not attempt to explain the relevance of this information to the material content of SAR Section 2.3.6.3.3.2, and thereby does not demonstrate that this information was relied upon by DOE in any material way. Most importantly, Nevada does not allege, much less demonstrate, any negative material effect on the 1999 experiments or the model that is the subject of this contention as a consequence of its observations and speculation, cited above.

In summary, Nevada has failed to reference any expert opinion and/or scientific or factual materials in support of this contention. Instead, the contention appears to largely consist of

assertions of counsel. The various claims voicing perceived inadequacies or alleged inconsistencies or errors in the LA or materials referenced therein are conclusory in nature or not directly relevant to the issue raised in this contention; *i.e.*, that the model used by DOE to estimate the localized corrosion resulting from the presence and activities of microorganisms is not a “standard or recommended practice.” Petition at 409. As such, Nevada does not provide a reasoned basis that adequately supports its contention.

Even if the claims above were construed to have been submitted by an expert, they would not be sufficient to support the proffered contention. It is well established that with respect to factual information or expert opinion offered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Conclusory statements, such as these that are rife throughout this contention, do not provide sufficient support for admissibility under NRC rules of practice. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006). In addition, “an expert opinion that merely states a conclusion ... without providing a *reasoned basis or explanation* for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion as it is alleged to provide a basis for the contention.” *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added).

As a result of these major deficiencies, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

In its attempt to establish a genuine dispute on a material issue of law or fact, Nevada merely states that this contention “challenges SAR Subsection 2.3.6.3.3.2 and DN2002460404 Section 6.4.4 that describe a model for predicting the rate of microbially influenced corrosion as a multiplier to the general corrosion,” and that the model and multiplier “are based on flawed electrochemical experiments that do not represent any condition of microorganisms on a surface in the repository.” Petition at 413-14. Nevada concludes that “the potential for microbially influenced corrosion is underestimated.” Petition at 414. Nevada’s assertion is wholly conclusory and unsupported by any expert opinion or any facts that provide a reasoned basis for the contention, as fully described in paragraph d. above. Moreover, an unsupported allegation that some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). Additionally, Nevada’s assertion in this regard ignores the discussion in “Evaluation of Potential Impacts of Microbial Activity On Drift Chemistry”, ANL-EBS-MD-000038, Rev. 1 (LSN#: DN2002308488), which describes the environmental constraints on microbial activity in the repository, and notes that the microbial activity “is expected to be low” in the repository, and that “its impacts on drift chemistry can be negligible.” *See* “Evaluation of Potential the Impacts of Microbial Activity On Drift Chemistry” (LSN#: DN2002308488) at 7-2.

With respect to Nevada’s unsupported assertion challenging the microbially influenced corrosion model, it simply is not a sufficient basis for rejecting the model. Even if Nevada’s claims were somehow accepted by the Board, the contention provides no basis for demonstrating

that the claims would have any material effect on corrosion, or the content of the LA. In particular, the contention does not allege, even qualitatively, that the use of a different method would result in more accurate modeling of the corrosion. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Furthermore, Nevada ignores the demonstration of the conservatism of the model presented by DOE in SAR Section 2.3.6.3.3.2. *See* SAR § 2.3.6.3.3.2 at 2.3.6-26 (noting that “the linear polarization resistance results . . . are not necessarily indicative of actual corrosion rates, and therefore the results may overstate the effect of microbes on corrosion”; and “all current from the electrochemical tests was conservatively considered to be entirely due to metal oxidation”).

Accordingly, Nevada has failed to demonstrate that there is a genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For the many reasons discussed above, this contention must be rejected in its entirety.

## **76. NEV-SAFETY-76 - Microbial Denitrification**

DOE underestimates some important modes of corrosion that depend on nitrate concentrations in SAR Subsection 2.3.6.4, and similar subsections, because of the conclusion in SAR Subsection 2.3.6.3.3.2, at 2.3.6-25, that oxic conditions will prevail in the repository over the growth-permissive high humidity and cooler period, and because of the erroneous assumption that microbial denitrification of nitrate is a strictly anaerobic process.

### **RESPONSE**

In this contention, Nevada generally alleges that DOE underestimates “some important” modes of corrosion “that depend on nitrate concentrations because DOE inappropriately concludes” that oxic conditions will prevail in the repository over the growth-permissive high humidity and cooler period, and because of the erroneous assumption that the microbial denitrification of nitrate is a strictly anaerobic process. Petition at 415. Nevada also challenges the Localized Corrosion Initiation Model described in SAR Section 2.3.6.4.3.1.1 and all similar and related sections, as well as all models that use the corrosion inhibition of the nitrate ion to predict that there will be no localized corrosion susceptibility for Alloy 22. For the reasons set forth below, this contention is inadmissible.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Nevada states in subsection 1 of its contention that DOE underestimates some important modes of corrosion that depend on nitrate concentrations in SAR Subsection 2.3.6.4, but then states in subsection 6 of its contention that “[t]his contention challenges SAR Subsections 2.3.6.4.3.1.1 (at 2.3.6-34), based on DN2002308488, Section 6, and all similar and related sections, that do not account for the possibility of anaerobic respiration and that inaccurately define denitrification as a strictly anaerobic process.” Petition at 419. Nevada also challenges

“... all models that use the corrosion inhibition of the nitrate ion to predict that there will be no localized corrosion susceptibility for Alloy 22.” Petition at 419. Nevada further alleges in subsection 6 that SAR Section 2.3.6.4.3.1.1 does not meet the requirements of 10 C.F.R. § 63.114(b) and (c). It is not clear what Nevada really wants to challenge in this contention. Furthermore, it is not clear what “all models that use the corrosion inhibition of the nitrate ion ...” means. The vagueness and inadequately-pled structure of this contention warrants its dismissal.

**b. Brief Explanation of Basis**

For the reasons explained in subsections e and f of this Answer, Nevada has not satisfied the requirements of 10 C.F.R. § 2.309(f)(1)(ii) by providing sufficient bases in law or fact for this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations.

In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due

to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

As more fully described below, Nevada asserts a number of purported deficiencies associated with DOE's evaluation of the chemical environment of the repository that purport to be bases for this contention.

First, Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because: (1) for the most part, the contention does not reference any relevant supporting documents and as more fully described below, the supporting documents that Nevada does reference in support of its contention are mischaracterized; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Brenda J. Little, Maurice E. Morgenstein, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada asserts that DOE underestimated the effect of certain corrosion processes because:

- (1) DOE has improperly evaluated the overall chemical environment in the repository as "oxic" and therefore has improperly concluded that significant anaerobic activity is "unlikely" (Petition at 416);
- (2) DOE has not recognized that oxygen gradients will form due to respiring aerobic microorganisms (*Id.*);
- (3) DOE has inappropriately claimed that there will be no biofilm in formation in the repository (*Id.* at 417); and

- (4) DOE has inappropriately failed to consider the effects of aerobic denitrification (*Id.* at 418).

As described below, these purported bases are insufficient to support admission of this contention.

In support of the four general propositions summarized above, Nevada cites to several documents, including a document referenced in the LA, “Evaluation of Potential Inputs of Microbial Activity on Drift Chemistry” ANL-EBS-MD-000038, Rev. 1 (Nov. 11, 2004) LSN#: DN2002308488 (hereafter, “Evaluation”), that DOE, in part, relied upon in predicting and evaluating the conditions that will prevail in the repository during the post-closure period. As discussed below, Nevada mischaracterizes the text and selectively quotes from this supporting document.

Nevada first posits a scenario that will allow oxygen gradients to form in biofilms due to respiring aerobic microorganisms, and challenges DOE’s findings that such biofilms will not form in the repository. In this regard, Nevada first asserts that the “overall chemical environment in the repository is described in SAR Subsection 2.3.6.3.3.2 as oxic, and therefore significant anaerobic activity is described as *unlikely*.” Petition at 416 (emphasis added). This assertion mischaracterizes the information presented in Section 2.3.6.3.3.2. Nowhere in the text in this section is this claim made. Rather, Section 2.3.6.3.3.2 notes that “[a]n oxic environment will prevail in the repository over the growth-permissive high-humidity and cooler period hundreds of years after peak temperatures are reached, and, therefore, prevent the generation and accumulation of reduced inorganic species that are the prerequisite for autotrophic metabolism.” SAR § 2.3.6.3.3.2 at 2.3.6-25.

Nevada also notes that there is recognition in Evaluation that: (a) metal corrosion will consume oxygen; (b) some bacteria can survive intense radiation and will grow when conditions

are favorable; (c) bacteria create their own environments by forming biofilms; and (d) there is possibility of limited microbial activity. Nevada, however, then claims, without scholarly support, that there is “no recognition that oxygen gradients will form due to respiring aerobic microorganisms.” Petition at 416.

Nevada then asserts that DOE has overlooked the possibility that “oxygen gradients will form [in biofilms] due to respiring aerobic microorganisms.” *Id.* In support of this proposition, Nevada cites to “Lewandowski, Z. and Beyenal (2007), “Fundamentals of Biofilm Research” (CRC Press Taylor & Francis Group) which, assertedly, notes that the authors “measured oxygen profiles from the bulk medium through biofilms and demonstrated a distinct decrease in oxygen concentration at the biofilm/water interface.” *Id.*

Nevada further alleges, without support or reference to relevant scholarship, that “oxygen gradients exist in many oxygenated media, for example open oceans.” *Id.* at 417. Yet, Nevada acknowledges that Evaluation demonstrates “that a combination of low relative humidity and high temperature will inhibit biofilm formation.” *Id.* (citing Evaluation at 6-32).

In continuation of its quest for admission of this contention, Nevada questions the applicability of one of the references that Evaluation relied on in making this demonstration. In particular, Nevada questions the evaluation of biofilm formation by “scanning electron microscopy” (SEM) as discussed in Else, T.A., Pantle, C.R., and Amy, P.S. (2003), “Boundaries for Biofilm Formation: Humidity and Temperature,” *Applied and Environmental Microbiology*, Vol. 69(8) (hereafter, “Else”), referenced in Evaluation. *Id.* In this regard, Nevada asserts that “because of biofilm dehydration, SEM cannot be used to quantify biofilm area coverage and thickness. *See* Petition at 417 (quoting Little, B.J., Wagner, P.A., Ray, R.I., Pope, R., and Scheetz, R. (1991), “Biofilms: An ESEM Evaluation of Artifacts Introduced During SEM

Preparation,” J. INDUSTRIAL MICROBIOLOGY AND BIOTECHNOLOGY, Vol. 8, No. 4 at 213-221).

Nevada acknowledges that the experiments discussed in Evaluation “demonstrate a relationship between relative humidity, temperature and biofilm formation.” *Id.* But Nevada mischaracterizes the description of these experiments; rather than merely demonstrating a “relationship between relative humidity, temperature, and biofilm formation” (*Id.*), Evaluation actually states that “increased temperature ... or decreased humidity ... impeded biofilm formation on N-316 stainless steel, C22 nickel alloy, and titanium coupon in surfaces.” *See Evaluation* at 6-33.

Nevada next asserts, without support or reference to relevant scholarship, or even any further explanation, that because “the microorganisms were not acclimated to the environmental conditions of the experiments ... [t]herefore, it is *not clear* that the Else ... experiments can be related to Yucca Mountain or that they can be used to substantiate the claim that there will be no biofilm formation in the repository.” Petition at 417 (emphasis added). This unsupported claim completely ignores the documentary evidence to the contrary. The complete description of the experiments presented in Evaluation notes that the experiments involved actual samples from Yucca Mountain. *See Evaluation* at 6-32 (noting that the experiments used “...[m]ined Yucca Mountain tuff ... collected near the North Portal entrance”). More importantly, Nevada ignores the fact that the results of the Else experiments are “consistent with a report that under unsaturated conditions of soil and vadose rock, extensive biofilm development has not been observed ....” *Id.* at 6-33. Furthermore, Nevada ignores the statement in Evaluation that “[t]his [result] is also consistent with a full-scale test conducted by AECL, in which a simulated waste container was buried for 2.5 years surrounded by a compacted buffer material. The test showed

that, together, decreased relative humidity (95 to 96 percent), elevated temperature (60° C to 90° C), high radiation doses, and limited nutrient supplies prevented biofilm formation (Stroes-Gascoyne 1996)....” *Id.*

Nevada’s assertions with respect to the research underlying the experiments related to the measurement of biofilms, discussed above, are important for what they *do not* contain. Nevada does not assert that the experiments evaluating biofilm formation and the resulting scholarship have rendered DOE’s analysis flawed in any material way. Nor does Nevada assert that the LA’s demonstration “that a combination of low relative humidity and high temperature will inhibit biofilm formation” is false or deficient in any way. Nevada has merely opined that “it is not clear” that the experiments can be related to Yucca Mountain and that “it is not clear” that the experiments can be used to substantiate the claim that there will be no biofilm formation in the repository. Petition at 417. Nevada has not asserted, much less demonstrated, that it is certain, or even likely, that the LA’s discussion of biofilms is deficient. Such assertions, devoid of supporting fact or expert opinion, are mere speculation and cannot form the basis for an admissible contention.

Nevada then attempts to assert that DOE failed to consider the effects of denitrification. Nevada first notes that Evaluation addresses the microbial aspects of the reduction-oxidation potential in drifts and states that “[nitrate (NO<sub>3</sub><sup>-</sup>)] is an inhibitor for metal corrosion as opposed to chloride (Cl<sup>-</sup>) ... and that [t]he ratio of NO<sub>3</sub><sup>-</sup>/Cl<sup>-</sup> is an important parameter in the control of the longevity of the waste package and drip shield as engineered barriers.” Petition at 418 (internal citation omitted). Nevada next notes that Evaluation provides that “[i]n principle, microorganisms could consume nitrate through denitrification, either heterotrophically or autotrophically, under anaerobic conditions....” *Id.* (internal citation omitted).

Importantly, Nevada fails to include the very next sentence in Evaluation, which provides that “this [consumption of nitrate through denitrification], however, will be unlikely in the repository because the overall environment will be oxic, which, together with low organic-carbon concentrations, will prevent significant anaerobic microbial reactions, including denitrification, as shown by the field observation that a significant amount of NO<sub>3</sub> is currently present in groundwaters. Even if some anaerobic microenvironments may exist in rock matrix, their impact on nitrate concentration has already been captured by the current water analysis.” Evaluation at 6-22. Thus, Evaluation, rather than supporting the proposition that microorganisms will consume nitrate through denitrification, indicates that this process will be unlikely to occur.

Nevada then asserts that researchers have reported that “denitrification can occur in fully aerobic conditions with a wide range of bacteria.” Petition at 418 (quoting Robertson, L.A., van Niel, E.W., Torremans, R.A.M., and Kuenen, J.G. (1988), “Simultaneous Nitrification and Denitrification in Aerobic Chemostat Cultures of *Thiosphaera pantotropha*,” APPLIED AND ENVIRONMENTAL MICROBIOLOGY, Vol. 54, No. 11 at 2812-2818), and that “Robertson and Kuenen ... identified a denitrifying mixotroph capable of simultaneously ‘utilizing nitrate and oxygen as terminal electron acceptors in respiration.’” *Id.* (quoting Robertson, L.A. and Kuenen, J.G (1984), “Aerobic Denitrification: A Controversy Revived,” ARCH MICROBIOL, Vol. 139 at 351-354). Nevada fails to demonstrate, or even assert, the relevance of the previous statements to Yucca Mountain or the LA, and does not allege, much less demonstrate, any negative material effect on DOE’s evaluation of corrosion generally, or any of DOE’s corrosion models in particular.

Moreover, none of Nevada's claims discussed above challenge the *accuracy* of the SAR. Nevada does not further explain these assertions or their relevance, and does not show how these statements relate to *any* section of the LA or how they assertedly render *any* portion of the LA deficient. Furthermore, these statements are not referenced or discussed in any other section of the contention. In this respect, an allegation that some aspect of a license application is inadequate or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material aspect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4, LBP-90-16, 31 NRC 509, 521 n. 12 (1990)). Relatedly, Nevada does not allege that the circumstances and purported deficiencies asserted above are in conflict with any regulation, SAR provision, or any other requirement. A contention that does not *directly controvert a position taken by the applicant in the application* is subject to dismissal. *See Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992) (emphasis in original).

In summary, Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Even if these claims were construed to have been submitted by an expert, they would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, "the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention." *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26. Conclusory statements cannot provide "sufficient" support for a contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). In addition, "an expert opinion that merely states a conclusion ... without providing *a reasoned basis or explanation* for that conclusion is inadequate because it deprives the Board

of the ability to make the necessary, reflective assessment of the opinion as it is alleged to provide a basis for the contention.” *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Notably, Nevada fails to meet its 10 C.F.R. § 2.309(f)(1)(i),(ii) and (v) pleading requirements for the alleged deficiencies relating to SAR Section 2.3.6.4.3.1.1, which discusses the development of the Localized Corrosion Initiation Model, and are asserted for the first time in paragraph 6 of the contention. For this reason alone, these assertions cannot provide adequate support for the admission of this contention.

Additionally, with respect to Nevada’s assertion challenging DOE models that use the corrosion inhibition of the nitrate ion to predict that there will be no localized corrosion susceptibility for Alloy 22, Nevada’s claim is not a sufficient basis for rejecting the model. Even if Nevada’s claim were to be accepted, the contention provides no basis for believing that it would have any material effect on corrosion. In particular, the contention does not allege that use of a different method would result in a more accurate modeling of corrosion. *Cleveland Elec. Illuminating Co. (Perry Nuclear Power Plant, Units 1 and 2)*, LBP-85-35, 22 NRC 514, 534-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Since the contention does not allege that DOE’s results are inconsistent with the reasonable expectation standard not conservative, it does not establish a genuine dispute on a material issue of fact.

Accordingly, Nevada has failed to demonstrate that there is a genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**77. NEV-SAFETY-77 - Corrosion From Rock Bolt Seepage**

SAR Subsection 1.3.4.4 and similar subsections, which discuss the ground support system in the emplacement drifts, fail to mention or consider the fact that the Super Swellex™ are hollow and would act as a conduit for seepage into the emplacement drifts and the neglect of this process means that the TSPA-LA assumptions relating to isolation of the wastes within the waste package are unfounded.

**RESPONSE**

This contention states that the discussion of the ground control system in SAR section 1.3.4 does not address the effect of the rock bolts on seepage and that, consequently, the TSPA assumptions regarding the isolation of wastes in the waste package are “unfounded” and “understated.” Petition at 421.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(2) and (3), 63.21(c)(9)

and (c)(15), and 63.114(a) in the contention. *See* Petition at 421-22. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as stated in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate

that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

Nevada argues that this contention raises a material issue because the Application does not consider the potential effect of Super Swellex™ bolts on in-drift seepage prior to the installation of drip shields, the potential for corrosion of the waste packages and the impact that could have on the TSPA assumptions that relate to the isolation of wastes within the waste package. Petition at 423. The method the DOE used in addressing waste package corrosion in the TSPA is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

In this contention, Nevada does not assert that any seepage due to the Super Swellex™ bolts prior to the installation of drip shields would have a significant effect on the waste packages or on the TSPA results. Nevada simply states that the TSPA assumptions related to the isolation of wastes within the waste package are “unfounded” and that the potential for corrosion of the waste package is “understated” because DOE did not consider the alleged effect of using Super Swellex™ rock bolts. Petition at 421. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

In paragraph 5, Nevada states that the Application does not mention potential issues due to seepage prior to the installation of the drip shields (Petition at 422) and that the Super Swellex™ rock bolts can directly transfer water to the drifts (id. at 423). From this, Nevada concludes that “the potential for corrosion of the waste packages is understated” and the “assessment of the ability of the EBS system to isolate the waste” is inaccurate. *Id.*

Nevada does not cite any basis for asserting that the rock bolt would increase the amount of seepage, or that such seepage would cause significant corrosion of the waste packages. Moreover, the Application shows that such seepage would not have a significant effect. First, Nevada does not reference or dispute any of the following statements from SAR section 2.3.3, which specifically address the effect of rock bolts on seepage:

The seepage model for performance assessment is also used to simulate the potential effect of rock bolts in the drift ceiling on seepage (BSC 2004a, Section 6.5). Several rock bolts scenarios are examined in a sensitivity analysis, including cases representing both grouted and ungrouted boreholes. It is shown that these features have a minor effect on seepage, and can be excluded in the TSPA drift seepage submodel (Section 2.2, Table 2.2-5, for excluded FEPs 1.1.01.01.0B, Influx through holes drilled in drift wall or crown; and 2.1.06.04.0A, Flow through rock reinforcement materials in EBS).

SAR at page 2.3.3-35. This shows that Nevada is wrong in asserting that the License Application does not consider the effect of the rock bolts on seepage, and that DOE's analysis concluded that the effect would be insignificant. Nevada has not claimed that the effect would be significant, nor has it provided a reasoned basis for disputing DOE's conclusion.

Second, SAR Subsection 2.3.3.2.2.3.1 (SAR at 2.3.3-26) explains that during the period of forced ventilation the dry air pushed through the emplacement tunnels has a large capacity for

taking up moisture from the surrounding rocks, and is much larger than the rates of percolation arriving at the emplacement drifts. The relevant SAR Section states:

The evaporation potential of the dry drift air in response to forced ventilation has a strong impact on seepage under natural ambient conditions (Table 2.3.3-1, FEP 1.1.02.02.0A, Preclosure ventilation). Seepage can only occur when the amount of percolating water is large enough to overcome evaporation. This has evidently not been the case in any of the ventilated openings in the rock units below the PTn unit at Yucca Mountain, as no unambiguous evidence of dripping from natural percolation water has ever been observed (SNL 2007a, Section 7.1.1[a]). The significant evaporation potential of the dry drift atmosphere is evident not only from theoretical considerations, but also from (1) temporal observations of wet spots observed at the drift crown during liquid-release tests conducted in the ECRB Cross-Drift (BSC 2004f, Section 6.10.2.2); and (2) the fact that a damp-looking feature observed along a the vertical end wall immediately after the dry excavation of Niche 1 (also referred to as Niche 3566) dried up within a few hours (BSC 2004f, Section 6.2.1.2; Wang et al. 1999) before a bulkhead could be installed to increase the relative humidity in the opening.

SAR Subsection 2.3.3.2.2.3.1 (SAR at 2.3.3-26) Thus, the License Application indicates that seepage would be expected to simply evaporate and be removed by the forced ventilation. For this reason, seepage during the preclosure period while forced ventilation is in operation in the emplacement drifts is not included in the TSPA. See SAR Section 2.3.3.2.4.2.4 (SAR at 2.3.3-57 to 2.3.3-58). Nevada does not reference or dispute this discussion or provide any basis for asserting that the amount of any moisture transferred via the rock bolts would be large enough to overcome evaporation.

Finally, even if Nevada had shown that there would be enough seepage to overcome the evaporative effect of the forced ventilation and drip onto the emplaced waste packages, it also would need to show that such seepage could have a significant effect. SAR section 2.3.6 “Waste Package and Drip Shield Corrosion” states that:

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at 2.3.6-6. SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using conservatively high estimates of the likely failure rates. As a result, even if seepage were to occur during the preclosure period, the effect on the TSPA results would likely be insignificant. This contention does not dispute or even address the discussion in SAR Subsection 2.3.6, or provide any basis for concluding that any seepage during the preclosure period could have a significant effect on the TSPA results.

In sum, nowhere in this contention does Petitioner show—either quantitatively or qualitatively—how DOE’s alleged failure to address enhanced seepage caused by Super Swellex™ rock bolts calls into question DOE’s TSPA results as they related to the isolation of wastes within the waste package. Nevada also does not dispute those portions of the SAR that address the effects of rock bolts on seepage and indicate that the seepage caused by rock bolts will not have significant impact on the isolation of wastes in the waste package. Accordingly, this contention does not demonstrate that this contention raises a material issue of law or fact.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in the specific response below: (1) the contention does not reference any documents, other than the License Application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Michael C. Thorne, Doug F. Hambley and Don L. Shettel, Jr.) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In this particular contention, Nevada fails to provide any basis for concluding that any alleged increase in seepage caused by Super Swellex™ rock bolts would have a significant effect on the TSPA results. In fact, Nevada does not even assert that the bolts would have a significant effect on the TSPA results. Nevada simply states, without any support whatsoever, that the TSPA assumptions related to the isolation of wastes within the waste package are "unfounded" and that the potential for corrosion of the waste package is "understated" because DOE did not consider the effect of using Super Swellex™ rock bolts in the LA. Petition at 421. This hardly puts DOE's TSPA results in dispute, let alone in a material way. Moreover, Nevada has not provided a reasoned explanation of its basis for contending that there would be a significant

effect. Consequently, Nevada has failed to demonstrate that there is a genuine dispute on a material issue of fact or law, and for this reason, as well, this contention should be dismissed.

**78. NEV-SAFETY-78 - Static Corrosion Tests On Alloy 22**

SAR Subsection 2.3.6.3 and similar subsections, which describe long-term weight loss measurements of the outer corrosion resistant material, alloy C-22, of the waste canister at the long-term test corrosion facility, fail to adequately represent the corrosion environment that is expected in a mined geologic repository situated in the unsaturated zone.

**RESPONSE**

In this contention, Nevada alleges that DOE's long-term weight loss measurements of the Alloy C-22 outer corrosion resistant material fail to adequately represent the corrosion environment that is expected to exist in the repository.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. In particular, this contention does not reference any expert opinion or documentary materials, other than the license application and DOE's description of the corrosion tests related to the long-term weight loss measurements of the Alloy C-22. Instead, this contention appears to consist entirely of assertions of counsel. *See* Petition at 426-27. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention mainly contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach four affidavits (by Don L. Shettel, Jr., Adrian H. Bath, Maurice E. Morgenstein, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if the claims are construed to have been submitted by an expert, they would not be sufficient to support a contention. For example, Nevada merely asserts, without support or

reference to any relevant scholarship, that DOE's experiments were not conducted in the precise environment that Nevada believes will be the environment that the waste containers will experience at Yucca Mountain. Petition at 427. Nevada next asserts, without support or reference to any relevant scholarship, that the outer canister will be subjected to changing temperatures, high humidity, and "dripping seepage water ..." of "*possibly* varying chemical conditions" where the resultant "aqueous solutions *may* dry out" leaving behind "salt deposits that *may* interact with dust on the canister surface," and where rockfall and drip shield material "*may* also be in contact" with the outer canister. *Id.* (emphasis added). Nevada then concludes that the "actual physico-chemical surface environment" posited above differs from DOE's test conditions, thus rendering the test results "unrealistic, non-site specific, and non-conservative." *Id.* Nevada fails to demonstrate why "different" equates to "unrealistic."

The scenarios postulated by Nevada leading up to its conclusion depend on multiple independent events of causation, and Nevada merely asserts their theoretical possibility and provides no support for the proposition that such a scenario is even likely. The Board should not accept such hypothetical, unsupported assertions. With respect to factual information or expert opinion proffered in support of a contention, "the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention." *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26. Nevada's unsupported conclusion, that DOE's test results are "unrealistic, non-site specific, and non-conservative" should likewise not be accepted by the Board. Conclusory statements cannot provide "sufficient" support for a contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada attempts to demonstrate “a genuine dispute with DOE” by merely asserting, without foundation or reference to any relevant scholarship, that: (1) DOE’s corrosion tests described in SAR Section 2.3.6.3 “are not an appropriate basis to assess the degradation of the EBS,” and thus violate 10 C.F.R. § 63.114(f); and (2) the complexity of the TSPA Model does not allow Nevada to determine whether the dose rate standard would be violated by the issues raised by this contention. Petition at 427-28.

With regard to Nevada’s first assertion, Nevada ignores DOE’s exhaustive description of its corrosion experiments and the development of the general corrosion model in SAR sections 2.3.6.3 and related subordinate sections of the SAR, as well as the documents referenced in these SAR sections. *See* SAR § 2.3.6.3 at 2.3.6–18--2.3.6–27. Nevada merely disagrees with aspects of the testing, and as noted above, has not set forth sufficient expert opinion or documentary evidence to support a contention. Nevada’s mere allegation of inadequacy of DOE’s experiments is also insufficient to support this contention. An allegation that some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

With respect to Nevada’s second assertion regarding the inadequacy of the TSPA Model, Nevada’s assertions similarly are not adequate to support a contention. Paragraph 6 of the

contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

**79. NEV-SAFETY-79 - Static General Corrosion Test Solutions**

SAR Subsection 2.3.6.3 and similar subsections, which describes static long-term general corrosion tests on the waste package outer material, alloy C22, fail to address the need for and use of realistic, site-specific aqueous test solutions that are appropriate for waste packages situated in a humid, thermally perturbed, unsaturated environment.

**RESPONSE**

In this contention, Nevada alleges that DOE's static long-term general corrosion tests on the alloy C-22 waste package outer material fail to address the need for and use of realistic, site-specific aqueous test solutions that are appropriate for waste packages situated in a humid, thermally perturbed, unsaturated environment.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 430. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Section V.A.3, above, discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach four affidavits (by Don L. Shettel, Jr., Adrian H. Bath, Maurice E. Morgenstein, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if Nevada's claims are construed to have been submitted by an expert, they would not be sufficient to support the contention. In its "Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position," Nevada makes a single assertion related to the adequacy of the water used by DOE in its corrosion tests on alloy C-22, declaring, without foundation or reference to any relevant scholarship, that the J-13 well water used in the static long-term

corrosion tests on alloy C-22 “is a groundwater ... and is therefore a non-conservative, unrealistic, and non-site specific choice on which to base a series of test solutions.” Petition at 430-431. Nevada notes, again without foundation or reference to any relevant scholarship, that “[m]ore environmentally realistic choices for long-term general corrosion aqueous test solutions would have included fracture water ..., pore waters ... and thermally evolved seepage evaporation waters.....” *Id.* Nevada does not further explain these bare assertions and provides no other statements that could arguably provide a reasoned basis to conclude that these assertions provide adequate support for the contention.

The Board should not accept such hypothetical, unsupported assertions. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Nevada’s unsupported conclusion, that the selection of the J-13 well water for use in the static long-term corrosion tests was “a non-conservative, unrealistic, and non-site specific choice on which to base a series of test solutions,” does not provide adequate support for this contention. Conclusory statements cannot provide “sufficient” support for a contention. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

In summary, this contention sets forth no documentary evidence or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada first attempts to demonstrate a genuine dispute with DOE by repeating the bare allegation noted above, asserting, again without foundation or reference to any relevant scholarship, that the use of J-13 well water was a “non-conservative, unrealistic, and non-site specific,” and that this use of the J-13 well water was, assertedly, “not an appropriate basis to assess the degradation of the EBS” and is thus violative of 10 C.F.R. § 63.114(f). Petition at 431.

This assertion is bare speculation and does not adequately support a finding of a genuine dispute. Nevada merely disagrees with an aspect of the testing, and as noted above, has not set forth any expert opinion or documentary evidence to support a contention in this regard. An allegation that some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, n.12 (1990).

Secondly, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute

exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

**80. NEV-SAFETY-80 - Localized Corrosion, Chloride Bearing Mineral Deposits And Hot Wall Effects**

SAR Subsection 2.3.6.1.1 and similar subsections state that titanium is extremely resistant to localized corrosion due to its very passive film, and as a result, DOE has concluded that localized corrosion of titanium will not occur in repository environments and is excluded from the TSPA; DOE is incorrect because the most likely failure mode of titanium in this application is localized corrosion under insulating mineral deposits from seepage water, which has not been properly considered by DOE, that could lead to early failure of the drip shield due to penetration of the water diversion surface.

**RESPONSE**

In this contention, Nevada alleges that in SAR Subsection 2.3.6.1.1 and similar subsections, DOE has inappropriately concluded that localized corrosion of titanium will not occur in repository environments and is excluded from the TSPA. Nevada also asserts that DOE has not properly considered the localized corrosion of titanium under insulating mineral deposits from seepage water, which Nevada asserts could lead to the early failure of the drip shield due to penetration of the water diversion surface.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R.

§ 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Section V.A.3, above, discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention mainly contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach three affidavits (by James A. McMaster, Robert A. Cottis, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if Nevada's claims were construed to have been submitted by an expert, they would not be sufficient to support a contention. Nevada quotes from the text of SAR Subsection 2.3.6.2.3, and concludes that, "DOE has stated that it is *ignoring* localized corrosion of the titanium." Petition at 435 (emphasis added). To the contrary, the SAR Subsection quoted by Nevada provides that "[g]iven the exposure conditions expected in the repository, localized corrosion of titanium alloys is not considered possible and is, therefore, excluded from TSPA..." SAR Subsection 2.3.6.2.3 at 2.3.6-16. Rather than ignore the possibility of localized titanium corrosion, DOE has exhaustively studied the possibility of such corrosion and excluded it as part of its evaluation of the features, events, and processes (FEPs) required by 10 C.F.R. § 63.114(e). In this regard, Nevada ignores the relevant screening justification for FEP 2.1.03.03.0B, "Localized Corrosion of Drip Shields" found in "Features, Events, and Processes for the Total System Performance Assessment: Analyses." See "Features, Events, and Processes for the Total System Performance Assessment: Analyses" (March 28, 2008) (LSN# DEN001584824 at 6-405 to -413), (describing DOE's screening justification for exclusion of "Localized Corrosion of Drip Shields" due to "low probability").

Nevada next asserts, without foundation or reference to any relevant scholarship, that a number of what it perceives as relevant failures of titanium tubing "have been reported in National Association of Corrosion Engineers (NACE) publications and conferences" and that the "conditions associated with the failure[s] observed by NACE are likely to occur under conditions present at Yucca Mountain." Petition at 435. However, Nevada fails to cite any such NACE publications; its assertions in this regard are bare speculation and conclusory.

Nevada then claims, without foundation or reference to any relevant scholarship, that “DOE has not adequately assessed localized corrosion, because it has failed to use tests that generate, or at least simulate, the chemistry, pH and temperature conditions that are expected to occur in the emplacement drifts” and that “DOE has not adequately considered the significant risk of localized corrosion of the Grade 7 Drip Shield” which would “result in high concentrations of chlorides, fluorides or other species, and low pH, and would be exacerbated by the hot wall effect of the heat from the canister.” *Id.* at 436. Nevada concludes, again without foundation or reference to any relevant scholarship, that “[l]ocalized corrosion in the form of under deposit corrosion ... *could* lead to premature failure by local penetration of many drip shields, followed by localized seepage on to many of the waste packages.” *Id.* (emphasis added).

Nevada does not further explain these assertions and provides no other statements that could arguably provide a reasoned basis to conclude that these assertions provide adequate support for a contention. Importantly, Nevada only asserts that the end result of these various independent events is only that localized corrosion *could* lead to premature failure by local penetration of many drip shields. Most importantly, none of these assertions is supported by reference to any scholarly research or expert opinion. The Board should not accept such hypothetical, unsupported assertions. Such conclusory statements cannot provide “sufficient” support for a contention. *See USEC, Inc. (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).*

In summary, this contention sets forth no documentary evidence or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada attempts to demonstrate a genuine dispute with DOE by reference to the speculative claims discussed above, and asserting, again without foundation or reference to any relevant scholarship that, consequently, “DOE has not adequately considered the significant risk of localized corrosion of the Grade 7 Drip Shield under conditions where seepage from above evaporates on the surface.” Petition at 436. Nevada next asserts that SAR Subsection 2.3.6 and similar subsections do not comply with 10 C.F.R. § 63.114(f) and 10 C.F.R. § 63.114(g), which require the provision of the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment, and the provision of the technical basis for models used in the performance assessment, respectively.

With respect to Nevada’s assertion regarding 10 C.F.R. § 63.114(f), its allegation is false. As discussed above, DOE’s exclusion of FEP 2.1.03.03.0B is documented in “Features, Events and Processes for the Total System Performance Assessment: Analyses,” (LSN# DEN001584824). Further, Nevada ignores the related discussion at SAR Subsection 2.3.6.2.1, Summary of Features, Events and Processes Included in Waste Package and Drip Shield Corrosion Models. *See* SAR Subsection 2.3.6.2.1 at 2.3.6-10.

With respect to Nevada’s assertion that “SAR Subsection 2.3.6 and *similar subsections*” do not comply with 10 C.F.R. § 63.114(g)’s provisions regarding DOE’s obligation to provide the technical basis of models, it is difficult to discern what Nevada is alleging, given the lack of specificity regarding the purportedly deficient portion of the SAR. Nevada sets forth no expert testimony or supporting references with respect to the local corrosion model, nor does its “Statement of the Contention Itself” or its “Brief Summary of the Basis for the Contention” refer to such model. In any event, it appears that Nevada has ignored the various sections of the LA

that discuss the technical basis of the local corrosion model. *See* SAR Subsection 2.3.6.8.2.3, “Localized Corrosion Model”; and SAR Subsection 2.3.6.8.2.4, “Localized Corrosion Model Adequacy” at 2.3.6-77-78. Thus, this assertion fails to show a genuine dispute with DOE related to the provisions of 10 C.F.R. § 63.114(g).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**81. NEV-SAFETY-81 - Hydrogen Uptake Resulting From General Corrosion**

SAR Subsection 2.3.6.8.1 and related subsections describe general corrosion of the drip shield, provide calculations of weight loss due to general corrosion, and consider the effect of thinning in terms of mechanical weakening of the structure, but DOE fails to consider the effects of localized embrittlement due to hydride formation resulting from general corrosion, and consequently DOE incorrectly assumes that the drip shield will not fail by brittle fracture resulting from rockfall or similar event.

**RESPONSE**

In this contention, Nevada alleges that in SAR Subsection 2.3.6.8.1 and related subsections, the DOE inappropriately failed to consider the effects of localized embrittlement due to hydride formation resulting from general corrosion, and that, consequently, DOE incorrectly assumes that the drip shield will not fail by brittle fracture resulting from rockfall or a similar event.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide

complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative

analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. In particular, this contention does not reference any expert opinion and refers to one supporting document, which appears to present only background information. Instead, the contention consists essentially of the unsupported assertions of counsel. *See* Petition at 440. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by James A. McMaster and Robert A. Cottis), which purportedly provide expert opinions to support this contention. Petition, Attachments 14 and 18. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention.

That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if Nevada's claims were construed to have been submitted by an expert, they would not be sufficient to support a contention. In its "Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position," Nevada states a series of random assertions that do not provide support for its contention. Nevada first asserts, without foundation or reference to relevant scholarship, that "[t]itanium general corrosion is typically accompanied by absorption of a small percentage" of hydrogen and that "a titanium or titanium alloy component *exposed to sulfuric acid strong enough* to cause corrosion will take up hydrogen as it corrodes." Petition at 440 (emphasis added). Notably, Nevada does not allege that the conditions in the repository would allow the titanium to be exposed to sulfuric acid, of any strength.

Next, Nevada asserts, without foundation or reference to relevant scholarship, that the "effects of the hydrogen *can sometimes* destroy the function of a part long before the significant corrosion allowance is consumed" and that "hydrogen uptake *can* lead to hydride formation and embrittlement, residual stresses, and cracking long before the part is consumed." Petition at 440 (emphasis added). Nevada's assertions are important for what they do not contain – Nevada does not assert that the hypothetical circumstances are certain to occur, or even that they are probable, or likely, or even significantly plausible. Rather, Nevada only asserts that its claim above *can sometimes* occur. In short, Nevada's claims are conclusory and mere speculation without basis.

Finally, Nevada concludes, again without foundation or reference to relevant scholarship, that "DOE fails to demonstrate that the hydrogen absorbed during general corrosion (of the corrosion allowance) will not result in hydride formation, with its consequent effects on

component integrity.” Petition at 440. Again, this declaration is unsupported by citation to any supporting reference, and is therefore mere speculation without basis.

Nevada cites to a single document in the contention, noting simply that the “absorption of hydrogen accompanying corrosion is described on page 4-1 in ANL-EBS-MD-000006 Revision 02, Hydrogen-Induced Cracking of the Drip Shield, September 2004 ....” Petition at 440.

Nevada does not further refer to this document, or otherwise link it to any of its assertions above. Nevada does not state how, or even if, this document supports Nevada’s assertions related to hydrogen absorption.

The Board should not accept Nevada’s hypothetical, unsupported assertions. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Nevada’s unsupported conclusion, that “DOE fails to demonstrate that the hydrogen absorbed during general corrosion ... will not result in hydride formation, with its consequent effects on component integrity” is unsupported as well. Conclusory statements cannot provide sufficient support for a contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

In summary, this contention sets forth no documentary evidence or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada attempts to demonstrate a genuine dispute with DOE by alleging, again without foundation or reference to relevant scholarship, that DOE’s asserted “neglect of the effects ... by

hydrogen absorption . . . increases *the potential* for brittle failure due to rockfall or other impact loads,” thus “substantially degrading the drip shield’s performance and hence increasing the predicted dose to the RMEI.” Petition at 440-41 (emphasis added). Consequently, Nevada alleges that the SAR does not comply with 10 C.F.R. § 63.102(h), which requires the performance assessment to address how the natural barriers and the engineered barrier system work in combination to enhance the resiliency of the geologic repository, and 10 C.F.R. § 63.113, which requires the geologic repository to be designed with proper consideration to the engineered barrier system working in combination with the natural barrier to limit radiological exposures. *Id.* at 441. Nevada’s allegations in this regard are not supported by any facts and it has offered no reasoned basis for their validity. Nevada fails to allege, much less demonstrate, that its asserted deficiencies are anything more than a potential circumstance. Most importantly, Nevada fails to even allege that resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). As noted above, such contentions are immaterial and inadmissible. An allegation that some aspect of a license application is inadequate or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

Nevada also alleges that because of DOE’s asserted “failure to address [the] hydrogen-mediated embrittlement process,” DOE has failed to comply with the provisions of 10 C.F.R. § 63.114(f) with respect to the evaluation of degradation, deterioration, or alteration processes of engineered barriers. Petition at 441. Notably, Nevada has failed to provide any expert opinion

or facts from supporting references in this regard. Thus, Nevada's assertion is mere speculation, unsubstantiated and conclusory. Conclusory statements cannot provide sufficient support for a contention. *See USEC, CLI-06-10, 63 NRC at 472.* In summary, a contention "will be ruled inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits', but instead only 'bare assertions and speculation.'" *Fansteel, CLI-03-13, 58 NRC at 203 (quoting GPU Nuclear, Inc. (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).*

Nevada next asserts, again without foundation or reference to relevant scholarship, or even to any purported facts or purported expert opinion asserted in paragraph 5 of the contention, that the complexity of the TSPA Model does not allow it to determine whether the dose rate standard would be violated by the issues raised by this contention.

With respect to this allegation regarding the inadequacy of the TSPA Model, Nevada's assertions similarly are not adequate to support a contention. As discussed in Section IV.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency. This assertion essentially admits that Nevada does not know whether this contention is material. Nevada asserts that, because of the "burden and complexity of showing the dose effects" of acceptance of Nevada's contentions, it has not attempted to determine what effect, if any, acceptance of its contention would have on doses. *See* Petition at 442. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001).* Therefore, it is Nevada's burden to

show that its contention raises an issue that is material to this proceeding. In contrast, Nevada's assertion essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

To the extent that Nevada is asserting that DOE has failed to consider the effects of localized embrittlement due to hydride formation resulting from general corrosion, this assertion is incorrect. In this respect, Nevada ignores the related discussion in "Features, Events, and Processes for the Total System Performance Assessment: Analyses" (March 28, 2008) LSN# DEN001584824, (ANL-WIS-MD-000027) REV 000. This discussion summarizes an analysis performed that assumed that the cathodic reaction rate supporting the passive dissolution of titanium in an aggressive solution was due entirely to the hydrogen evolution reaction. *See* "Features, Events, and Processes for the Total System Performance Assessment: Analyses" (March 28, 2008) LSN# DEN001584824, (ANL-WIS-MD-000027) REV 000 at 6-418. In that analysis, embrittlement of the drip shield did not result until a period of 58,000 years; however, because this was well in excess of 10,000 years after permanent closure, it was not required to be included in the DOE's TSPA.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

## **82. NEV-SAFETY-82 - Corrosion Of Thermally Oxidized Titanium**

SAR Subsection 2.3.6.8.3 and similar subsections state that the drip shield will be fully stress-relief-annealed before emplacement and describe the process to be conducted in fuel-air atmosphere at 1150°F which will result in significant surface oxide thickness compared to normal oxide films formed in air; however, DOE has failed to evaluate the effects of thermally oxidized titanium (simulating air stress relieved material that is specified as a manufacturing step intended to eliminate residual stresses assumed to eliminate stress corrosion cracking (SCC) and other hydrogen cracking issues) under the relevant repository corrosion conditions, including effects on general corrosion rates and under-deposit corrosion from seepage water evaporating on hot wall surfaces, which affect the validity of the corrosion analysis used to predict drip shield performance in the LA and could lead to early drip shield failures due to unanticipated decreased corrosion performance.

### **RESPONSE**

In this contention, Nevada alleges that DOE failed to evaluate the effects of thermally oxidized titanium under the relevant repository corrosion conditions. Nevada alleges that this failure affects the “validity of the corrosion analysis used to predict drip shield performance in the LA and could lead to early drip shield failures due to unanticipated decreased corrosion performance.” Petition at 443. For the reasons explained below, this contention is inadmissible.

#### **a. Statement of Issue of Law or Fact to be Controverted**

As explained below, Nevada’s conclusory, unsupported, generalized statements and allegations fail to present a dispute on a genuine issue of fact or law, as required under 10 C.F.R. § 2.309(f)(1)(i) to be admissible in this proceeding

**b. Brief Explanation of Basis**

As explained below, Nevada’s reliance on SAR Subsection 2.3.6.8.3, and the undefined, unidentified “similar subsections,” does not provide an adequate basis in law or fact for the proffered contention. Moreover, as demonstrated below, this contention is rife with mere speculation, as well as unsubstantiated and conclusory allegations. Conclusory statements simply do not provide sufficient support for an admissible contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations.

In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due

to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. In particular, this contention does not reference any expert opinion

or documentary materials, other than the LA. Instead, this contention consists entirely of the unsupported assertions of Nevada's counsel. *See* Petition at 445. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by James A. McMaster, Michael C. Thorne and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if Nevada's claims were construed to have been submitted by an expert, they would not be sufficient to support admission of this contention in this proceeding. The Statement of Alleged Facts or Expert Opinion and Supporting References is but three sentences long. *See* Petition at 445. In it, Nevada asserts, without foundation or reference to relevant scholarship or expert opinion, that although thermally thickened titanium oxide films have been shown to be beneficial to corrosion resistance of titanium under some conditions involving normal industrial exposures of a few years, "none of the tests described in the LA and supporting materials have

attempted to simulate thermally thickened oxide under the long-term conditions involved in the repository.” *Id.* at 445.

Nevada next asserts, again without foundation or reference to relevant scholarship or expert opinion, that “[t]he performance of this thicker oxide layer and the specific effect on the material compositions and combinations of material compositions ... in the drip shield is *uncertain*.” *Id.* (emphasis added). Lastly, Nevada alleges, once again without foundation or reference to any relevant scholarship or expert opinion, that “[o]xide growth is generally accepted to slow over time, but the effects of a pre-existing thermally enhanced oxide layer two orders of magnitude thicker than the air-formed oxide tested by DOE are unknown.” Petition at 445. In sum, Nevada’s assertions do no more than acknowledge that thermally thickened titanium oxide films have been shown to be beneficial to corrosion resistance and vaguely assert that: (1) the performance of the thick oxide layer and its specific effect on the material compositions and combinations of material compositions ... in the drip shield is *uncertain*; and (2) the effects of a pre-existing thermally enhanced oxide layer two orders of magnitude thicker than the air-formed oxide tested by DOE are *unknown*.

Such unsupported, vague speculation, devoid of any documentary reference, cannot support admission of this contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). This contention is a textbook example of inadmissibility for these reasons.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As a threshold matter, the Commission has stated that a petitioner must “read the pertinent portions of the license application, . . . state the applicant’s position and the petitioner’s opposing view,” and explain why it disagrees with the applicant. Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170. This Nevada has not done, counter to one of the key underlying principals of the NRC hearing process. Thus, the contention is also inadmissible pursuant to 10 C.F.R. § 2.309(f)(1)(vi), as demonstrated in the following paragraphs.

In a first step, Nevada seemingly attempts to demonstrate a genuine dispute with DOE by challenging, “the validity of DOE long-term corrosion test results reported in SAR Subsection 2.3.6, and similar subsections,” because, assertedly, “the condition of materials tested for corrosion do not duplicate the conditions of material to be placed in the repository.” Petition at 445. In this regard, Nevada claims that DOE “failed to test the thermally oxidized surface condition resulting from stress relief of the titanium material, as described in SAR Subsection 2.3.6.8.3, and similar subsections.” Petition at 446.

As noted above, however, this assertion is wholly conclusory, and completely fails to demonstrate that the purported inadequacy in the application is material in nature or effect. It is axiomatic that an allegation—such as that proffered here by Nevada— that some aspect of a license application is inadequate or unacceptable, does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 n.12 (1990)(emphasis added). On this point, Nevada does not allege that the circumstances asserted above -- that the conditions of materials tested for corrosion do not

duplicate the conditions of materials to be placed in the repository, and that DOE failed to test the thermally oxidized surface condition -- are in conflict with any regulation or any other requirement.

Rather, Nevada simply concludes that because of the purported failure asserted above, and “[s]ince this is the condition of the drip shield material as it is proposed for placement, there is no demonstration of fitness for purpose which impacts the predicted dose to the RMEI.” Petition at 446. Yet Nevada fails to identify the source of any purported requirement that DOE demonstrate the fitness of the drip shield material and otherwise does not explain how, or even whether, Nevada’s allegation relates to the predicted dose to the RMEI. Importantly, Nevada fails to even allege that resultant dose rates will evidence an increase in the mean dose *above regulatory limits*.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada next alleges that, because of the perceived deficiency discussed above, “*these various subsections* do not comply with 10 C.F.R. § 63.114(f), which requires *any* performance

assessment used to demonstrate compliance with Section 63.113 to provide the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment, including those processes that would adversely affect the performance of natural barriers.” Petition at 446 (emphasis added). In so doing, Nevada fails to identify which portion(s) of the LA relates to the alleged deficiency, and fails to identify the performance assessment that it believes to be deficient. As such, Nevada yet again fails to “provide sufficient information to show . . . a genuine dispute . . . with the applicant . . . on a material issue of law or fact,” as required by 10 C.F.R. § 2.309(f)(1)(vi), and provided yet another reason for the Board to reject this contention.

Nevada also notes that “[d]egradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.” Petition at 446. Nevada fails to allege a specific deficiency with respect to this claim, and, as noted above, does not claim that there will be any increase in radiological dose rates as a result of the alleged deficiencies let alone a significant change. Thus, the claim above cannot support any genuine material dispute of law or fact.

Along this same line, Nevada next asserts that the same “various subsections” noted above also do not comply with 10 C.F.R. § 63.114(g), which “requires any performance assessment used to demonstrate compliance with Section 63.113 to provide the technical basis for models used in the performance assessment . . . .” *See* Petition at 446. Nevada does not identify the “various subsections,” further explain this assertion or otherwise discuss the

perceived deficiency. Mere, unfocused speculation does not demonstrate a genuine dispute of a material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For all of these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact and the contention must therefore be dismissed in its entirety.

**83. NEV-SAFETY-83 - Adequacy of Methods of General And Localized Corrosion Testing of The Drip Shield**

SAR Subsection 2.3.6 at 2.1-104 and 105 describe corrosion tests as long-term immersion exposures of open, creviced, and stressed specimens all together in closed tanks under two temperature conditions; however, the tests are not adequately representative of corrosive conditions in the proposed repository that will affect repository performance and specifically do not address the effects of  $Ti^{++}$  ion concentrations and aeration in the test solution that could change corrosion behavior and lead to erroneous conclusions that fail to predict corrosion performance of the actual drip shields.

**RESPONSE**

In this contention, Nevada alleges that DOE's conduct of corrosion tests involving long-term immersion exposures of open, creviced, and stressed specimens all together in closed tanks under two temperature conditions is not "adequately representative of corrosive conditions in the proposed repository that will affect repository performance." Petition at 448. In particular, Nevada alleges that the tests "do not address the effects of  $Ti^{++}$  ion concentrations and aeration in the test solution that could change corrosion behavior and lead to erroneous conclusions that fail to predict corrosion performance of the actual drip shields." *Id.* For the reasons discussed below, this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention fails to state, with requisite specificity, an issue of law or fact justifying its admissibility in this proceeding.

**b. Brief Explanation of Basis**

For the many reasons discussed below, this contention lacks adequate factual or legal bases, and must be dismissed for that reason.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R.

§ 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or documentary materials, other than the license application. Instead, this contention appears to consist entirely of arguments of counsel. *See* Petition at 450-52.

Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach three affidavits (by James A. McMaster, Michael C. Thorne and Robert A. Cottis), which purportedly provide expert opinions

to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada alleges a series of unsupported random facts and mere assertions that do not provide adequate support for its contention. First, Nevada asserts that with respect to the “Long Term Corrosion Test Facility Tests ... described in SAR Subsection 2.3.6 ... “[t]he reader is led to believe that the specimens were immersed in the original solution for the exposure times described in the report.” Petition at 450. Nevada next asserts that the “effects of titanium ions in solution were interpreted by early researchers to lead to a reduction of corrosion rates over time, a contention refuted in subsequent tests where solution replenishment was addressed” and that a “lack of description of replenishment of solutions or of tests of alternate aeration conditions leads one to believe this important practice in titanium corrosion testing was not considered in the DOE tests described.” *Id.* Nevada then alleges that “[i]n repository conditions, dripping solutions are constantly replenished” and that the “[f]ailure to replenish solutions in ‘beaker’ corrosion tests of titanium ... was the source of many erroneous results in the early years before the corrosion inhibiting effect of  $Ti^{++}$  ion in the test solution from specimen corrosion was discovered to be critically important ... [and that] [a]lthough the corrosion rates of Grade 16 or Grade 7 are low, leading to low levels of  $Ti^{++}$ , the effect is uncertain without data as to the  $Ti^{++}$  levels in the test solution prior to replenishment.” *Id.*

According to Nevada, “DOE did not check or did not report titanium ion concentration in the test solutions, something that might have been a useful guide to very low corrosion rates” and “that the failure to test alternate aeration conditions fails to simulate many conditions that

may be encountered, or to demonstrate that the method employed by DOE does produce fully aerated conditions (oxygen levels substantially in equilibrium with air), something that is also of critical importance in corrosion tests of titanium.” *Id.* at 450-51. Nevada then makes a number of general assertions and observations relating to weight loss tests and related issues and concerns. *Id.* It does not, however, tie any of these assertions and general observations to DOE or to the LA, except to allege that the “effects of changes in pH, species concentration increases, and hot wall effects that are probable under repository exposure conditions are not adequately addressed in the LA.” *Id.* at 451.

None of Nevada’s assertions and speculation is supported by a reference to expert opinion, relevant scholarship, or documentary material. In fact, Nevada does not even explain how this unfocused collection of statements is relevant to any specific portion of the LA. As such, the statements do not provide adequate support for admission of this contention. It is axiomatic that a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.* (Muskogee, Oklahoma, Site) CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). This is another textbook example of an inadmissible contention as defined by 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada unsuccessfully attempts to demonstrate a genuine dispute with DOE by challenging “the sufficiency of conditions tested and validity of the titanium corrosion data from the Long Term Corrosion Test Facility Tests described in SAR Subsection 2.3.6. and similar subsections.” Petition at 452. Nevada is unsuccessful in this attempt because it fails to specify

the portion of SAR Section 2.3.6 about which it seeks to assert some deficiency. SAR § 2.3.6 is 192 pages long, and Nevada fails to specify either the subordinate subsection or the page of this 192-page SAR section it seeks to challenge.

This pleading deficiency is further evident in Nevada's attempt to set forth alleged facts or expert opinion in paragraph 5 of its contention. *See* Petition at 450 (referring only to "SAR Subsection 2.3.6"). Curiously, the "Statement of the Contention Itself" in paragraph 1 refers to corrosion tests described in "SAR Subsection 2.3.6. at 2.1 – 104 and 105." Petition at 448 (emphasis added). All of the pages in SAR § 2.3.6. fall between 2.3.6.-1 and 2.3.6.-192. Page 2.3.6-104 is "intentionally left blank," and page 2.3.6-105 contains Table 2.3.6, which is unrelated to the long-term immersion exposure test that Nevada purports to challenge. SAR at 2.3.6-104 to-05. Thus, it is entirely unclear which portion of the SAR it is that Nevada seeks to challenge.

Such vague references to documents are not permissible and do not warrant admission of a contention. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). For this reason alone, this contention is inadmissible. A contention "will be ruled inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits', but instead only 'bare assertions and speculation.'" *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *Gen. Pub. Utils. Nuclear, Inc.*, CLI-00-06, 51 NRC at 208).

Nevada also asserts, again without reference to any section of the SAR or any other authoritative reference, that the titanium corrosion data "are used by DOE to support its assumed performance of the drip shield in the TSPA model and thus the predicted dose to the RMEI." Petition at 452. Nevada then claims, without expert support or reference to relevant scholarship,

or even further explanation, that DOE's tests "are not valid for use in this context." *Id.*

Proceeding in this unsupported fashion, Nevada concludes, with the same lack of specificity noted above, that "[t]hus, SAR Subsection 2.3.6 and similar subsections do not comply with 10 C.F.R. § 63.114(g), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must provide the technical basis for models used in the performance assessment ..." and that "... the comparisons made with empirical observations do not provide a legitimate technical basis for the models used." *Id.* at 452-53. Such argument amounts to mere speculation.

Nevada next asserts, without support and, again, with same lack of specificity noted above, that "SAR Subsection 2.3.6 and similar subsections" also do not comply with 10 C.F.R. § 63.114(g), which "requires any performance assessment used to demonstrate compliance with Section 63.113 must provide the technical basis for models used in the performance assessment..." *See* Petition at 452. Nevada does not further explain this assertion or otherwise explain the perceived deficiency. Mere, unfocused speculation does not demonstrate a genuine dispute of a material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In

contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

**84. NEV-SAFETY-84 - Use Of Differential Weight Loss To Estimate Very Low Corrosion Rates**

SAR Subsection 2.3.6.8.1 and similar subsections state that general corrosion may occur, but DOE describes immersion corrosion testing methods and differential weight loss measurements to predict both general and localized corrosion where corrosion rates are very low and the data are to be extrapolated for thousands of years. The test methods are not sufficient to measure general and localized corrosion to an accuracy level sufficient for extrapolation to predict drip shield performance.

**RESPONSE**

This contention alleges that SAR section 2.3.6.8.1 and other similar subsections state that general corrosion may occur, but DOE describes immersion corrosion testing methods and differential weight loss measurements to predict both general and localized corrosion where corrosion rates are very low and the data are to be extrapolated for thousands of years. The test methods are not sufficient to measure general and localized corrosion to the accuracy level sufficient for extrapolation to predict drip shield performance.

**a. Statement of Issue of Law or Fact to be Controverted**

In this contention, at paragraph 1, “A statement of the contention itself,” Petitioner alleges that “*SAR section 2.3.6.8.1 and similar sections* state that general corrosion may occur, but DOE describes immersion corrosion testing methods and differentiated weight loss measurements to predict both *general and localized corrosion* where corrosion rates are very low and the data are to be extrapolated for thousands of years.” Petition at 454 (emphasis added). Petitioner further asserts that “use of weight loss measurement for localized ... corrosion is inaccurate for general corrosion and fails to estimate the severity of *localized corrosion* ....”

Petition at 454 (emphasis added). SAR section 2.3.6.8.1, however, discusses only *general corrosion*. Localized corrosion is discussed in SAR section 2.3.6.8.2.

It is impossible to discern what precisely the focus of this contention is and which section of the LA Nevada seeks to challenge. 10 C.F.R. § 2.309(f)(1)(i) requires “a specific statement of the issue of law or fact to be raised or controverted.” The June 20, 2008 Case Management Order further notes that “this [§ 2.309(f)(1)(i)] statement shall set forth petitioner’s contention in precisely the form it wishes the contention to be considered.” *U.S. Dep’t of Energy*, (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board) LBP-08-10, 67 NRC \_\_\_ (slip op. at 6) (June 20, 2006). Nevada’s inability to clearly delineate which SAR section it is challenging, coupled with its vague and imprecise references to “similar subsections” (Petition at 454, 456) make it clear that Nevada has not met the pleading specificity requirements of 10 C.F.R. § 2.309(f)(1)(i) and its related obligations of the June 20, 2008 Case Management Order. Accordingly, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies various regulations in support of the contention. *See* Petition at 455. Nevada concludes this general description of various

sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Petitioner asserts that the erroneous data cannot be used to assess drip shield degradation upon which dose to the RMEI is predicated, it fails to establish that the error is relevant to DOE’s compliance with any Part 63 requirement. Petition at 457. Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance

objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing general and localized corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by James A. McMaster, Maurice E. Morgenstein, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

For example, without foundation or reference to any relevant scholarship, Nevada asserts the following in this contention: (1) "[l]ocalized corrosion ... tends to cause minimal weight loss even with severe penetration rates" (Petition at 456); (2) "[u]sing weight loss as a means for assessing this type of corrosion is not valid compared to examining surfaces for attack and judging failure based on such evidence" (Petition at 456); (3) "[i]mmersion testing with numerous specimens in a single container, without describing solution replenishment procedures, *leaves open the possibility* that all test results are compromised due to the presence of titanium

ions in the solution” (Petition at 457) (emphasis added); and (4) “[t]esting on limited air aeration compared to a more positive way to assure oxygen equilibrium with the test solution ... as well as failure to test using nitrogen or pure oxygen aeration to better quantify the limits of aeration effects, *leaves open the possibility* that all test results are compromised due to the effects of different levels of aeration.” Petition 457 (emphasis added).

With the exception of providing its own unsupported example weight loss for localized corrosion, Nevada does not further explain these assertions and provides no other statements that could arguably provide a reasoned basis to conclude that these assertions provide adequate support for a contention. Most importantly, none of these assertions is supported by reference to any scholarly research or buttressed by expert opinion. The Board should not accept such hypothetical, unsupported assertions. Such conclusory statements cannot provide “sufficient” support for a contention. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

In summary, this contention sets forth no documentary evidence or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention asserts that DOE’s use of differential weight loss based on immersion corrosion testing methods to predict both long term general and localized corrosion, as well as its failure to evaluate the effects of  $Ti^{++}$  ion concentration in the solution and various aeration effects “*leaves open the possibility* that all test results are compromised.” Petition at 457 (emphasis added). For several reasons, this contention does not establish a genuine dispute of material fact.

First, regarding Nevada's assertion pertaining to the requirements of 10 C.F.R. § 63.114(g) with respect to the technical basis of models, it is entirely unclear as to what deficiency Nevada is alleging. *See* Petition at 457. Nevada sets forth no expert testimony or supporting references with respect to any model, nor does its "Statement of the Contention Itself" or its "Brief Summary of the Basis for the Contention" refer to any such model. In this respect, this assertion fails to provide sufficient information to show a genuine dispute with DOE related to the provisions of 10 C.F.R. § 63.114(g).

Next, this contention contains only unsupported speculation. For example, Nevada maintains that "[m]easuring weight loss on specimens with extremely low corrosion rates is *problematic*." (Petition at 456) (emphasis added). With respect to its example regarding drip shield corrosion, Petitioner asserts that "[w]ith the *relatively* rapid penetration rates due to localized corrosion, the time until penetration *can be much less* than the time for loss due to general corrosion of 1mm of surface." Petition at 456 (emphasis added). Similarly, Nevada alleges that DOE's use of differential weight loss based on immersion corrosion testing methods for general and localized corrosion, and its failure to evaluate the effects of  $Ti^{++}$  ion concentration in the solution and various aeration effects, "*leaves open the possibility* that all test results are compromised." Petition at 457 (emphasis added).

The Board should not accept such unsupported and speculative assertions. Even if these claims were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, "the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention." *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26.

Furthermore, Nevada's unsupported conclusion that DOE's extrapolation of this "questionable data ... affects the basis upon which the dose to the RMEI is predicted" should likewise not be accepted by the Board. Petition at 457. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency. Petitioner provides no quantitative or even qualitative information regarding the extent to which DOE's corrosion data used to predict drip shield performance effect its evaluation of dose to the RMEI. Thus, Petitioner fails to demonstrate a genuine dispute.

In addition, Petitioner mischaracterizes the LA and a supporting reference. Petitioner maintains, without citing to a specific paragraph or page, that "[i]n the testing reported in SAR subsection 2.3.6.8.1 and similar subsections, and as described in ... "General Corrosion and Localized Corrosion in the Drip Shield" (4/27/2006), LSN#: DN2002228104 it was noted that cleaning procedures to remove surface deposits on the test coupon material sometimes resulted in weight gain due to inadequate cleaning." Petition at 456. Neither SAR section 2.3.6.8.1 nor LSN#: DN2002228104 discusses inadequate cleaning procedures.

Lastly, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 458. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed

Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. See Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be dismissed.

**85. NEV-SAFETY-85 - Declining Corrosion Rate Over Time**

SAR Subsection 2.3.6 states that the model implementation for corrosion is considered conservative because the general corrosion rate of metals and alloys is known to decrease with time, but the referenced tests are invalid and therefore this assumption is not applicable.

In this contention, Nevada alleges that “SAR Subsection 2.3.6 states that the model implementation for corrosion is considered conservative because the general corrosion rate of metals and alloys is known to decrease with time, but the referenced tests are invalid and therefore this assumption is not applicable.” Petition at 459. For the reasons discussed below, this contention is inadmissible.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

As explained below, Nevada’s one-sentence statement set forth in subsection 2 of its contention is not sufficiently specific and unsupported by fact or expert opinion to meet the bases requirements of 10 C.F.R. § 2.309(f)(1)(ii).

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or relevant documentary materials in support of its position, other than the license application. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any relevant documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by James A. McMaster and Robert A. Cottis), which purportedly provide expert opinions to support this contention. Petition, Attachments 14 and 18. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if the claims are construed to have been submitted by an expert, they still would not be sufficient to support admission of this contention. Nevada references one document in its proffered contention, citing to Millaway, E.E. (1965), "Titanium: Its Corrosion Behavior and Passivation," *Material and Protection* (1965), for the proposition that corrosion rates have been understood to decrease over time. *See* Petition at 461. As discussed more fully below, Nevada asserts that the opposite is true. Thus, Nevada presents *no* expert opinion and offers *no* supporting scientific or factual material in support of its contention. Therefore, this contention's "Statement of the Facts or Expert Opinions Supporting the Contention and Supporting References" consists entirely of assertions of counsel and, as such, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Nevada first asserts, without support or reference to relevant scholarship -- and even without citation to any specific portion of the LA or to any of the documents that are referenced in the LA -- that "DOE appears to have ignored possible corrosion inhibiting effects of titanium corrosion product ion (Ti<sup>++</sup>) in solution and of various aeration conditions in its long-term immersion corrosion tests by failing to periodically refresh the test solutions" and, consequently, that the immersion test results are "highly questionable." Petition at 461. Nevada's claim is indefinite and nonspecific, lacks the required specificity required to support a contention, and is mere speculation.

Next, Nevada acknowledges that in the past, it was understood that corrosion rates decreased over time. *See* Petition at 461 (noting that "in early testing in the 1950's it was thought that corrosion rates fell over time" (internal citation omitted)). But, Nevada then asserts, without support or reference to any relevant scholarship, that "... subsequent research demonstrated the inhibiting effect of the titanium ion, the effects of titanium ion (Ti<sup>++</sup>) in

solution, and of variable aeration on corrosion test results, which have been demonstrated in numerous tests made by laboratories engaged in testing of titanium for corrosion applications.” Petition at 461. Nevada next asserts, again without support or reference to any relevant scholarship, that “[a]eration effects have also been shown to be significant in the results of corrosion tests with titanium.” *Id.* Lastly, Nevada acknowledges that DOE examined the effects of aeration, but asserts, once again without support or reference to any relevant scholarship, that DOE did not “... compare aeration using oxygen, air and nitrogen, for example, to better define valid bounds for its data, nor does the aeration method described, air passing over the surface, provide assurance that the aeration conditions were really known or consistent throughout DOE’s testing.” Petition at 461. These assertions are mere speculation.

None of the above assertions are supported by any reference to relevant scholarship and Nevada does not assert the relevance of any of them to any specific portion of the LA. Importantly, Nevada does not even allege, much less demonstrate, that any of the possible circumstances or claims described above has any material effect on DOE’s corrosion testing or on the validity of any of DOE’s corrosion models. These indefinite claims amount to mere unfocused speculation, unsupported by any documentary reference or expert opinion. As such, they cannot provide adequate support for a contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

The Board should not accept such hypothetical, conclusory and unsupported assertions. Even if these claims were construed to have been submitted by an expert, they would not be

sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada attempts to demonstrate a genuine dispute with DOE by challenging “DOE’s assumption in SAR Subsection 2.3.6 that corrosion rates decrease over time.” Petition at 461. Nevada specifically alleges that “[b]y ignoring the effects of build-up of titanium ions in their experimental configuration and by inadequately simulating aeration, DOE test results are questionable ... and DOE inappropriately presents the unproven assumption that the rates will decline over time as making the results even more conservative.” *Id.* at 461-62. Nevada’s assertion is unclear. In terms of the modeling of the general corrosion rate of titanium in the TSPA, although it has been experimentally demonstrated that the corrosion rate for titanium does decline over time, the TSPA conservatively models it as being constant. *See* SAR § 2.3.6.8.1.1 at 2.3.6-71 (noting that “[t]he general corrosion rate of the drip shield is modeled to be constant with time. This treatment results in earlier drip shield failures than expected because the general corrosion rate of metals and alloys tends to decrease with time....”).

Nevada’s attempts to demonstrate a factual dispute fail for a variety of reasons. First, Nevada fails to specify the portion of SAR Section 2.3.6 about which it seeks to assert some

deficiency. SAR Section 2.3.6 is 192 pages long, and Nevada fails to specify either the subordinate subsection or the page of this 192 page SAR section it seeks to challenge. This pleading deficiency is also demonstrated in Nevada's Statement of the Contention Itself in subsection 1 of its contention. *See* Petition at 459 (referring only to "SAR Subsection 2.3.6"). Such vague references to documents are not permissible. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-0 3, 29 NRC 234, 240-41 (1989). For this reason alone, this contention is inadmissible.

Second, as noted above, Nevada's assertions are wholly conclusory and unsupported by any expert opinion or any facts that provide a reasoned basis for the contention. An allegation that some aspect of a license application is inadequate or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 n.12 (1990). Relatedly, Nevada does not allege that the circumstances asserted above – that DOE's test results are questionable and DOE inappropriately presents an unproven assumption that the rates will decline over time – are in conflict with any regulation or any other requirement.

Nevada concludes, with the same lack of specificity noted above, that "[t]hus, SAR Subsection 2.3.6 does not comply with 10 C.F.R. § 63.114(f), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must provide the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment...." *See* Petition at 462. Nevada next asserts, without support or amplifying information, that SAR Subsection 2.3.6 does not

comply with 10 C.F.R. § 63.114(g), which “requires any performance assessment used to demonstrate compliance with Section 63.113 to provide the technical basis for models used in the performance assessment ....” *See* Petition at 462.

These claims amount to mere speculation. Nevada provides no support for these two purported deficiencies and does not further explain either assertion or otherwise explain the perceived deficiency. Mere, unfocused speculation does not demonstrate a genuine dispute of a material fact. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

**86. NEV-SAFETY-86 - Role Of Rock Dust On Canister Surfaces In Localized Corrosion**

SAR Subsection 2.3.6.4.4.1 and related subsections, which describe DOE's model for localized corrosion, are grossly incomplete because common and ubiquitous rock dust (siliceous and feldspathic) can form crevices on C-22 and Ti-7 surfaces that are favorable environments for localized corrosion.

**RESPONSE**

In this contention, Nevada alleges that "SAR Subsection 2.3.6.4.4.1 and related subsections, which describe DOE's model for localized corrosion, are grossly incomplete because common and ubiquitous rock dust (siliceous and feldspathic) can form crevices on C-22 and Ti-7 surfaces that are favorable environments for localized corrosion." Petition at 464.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or adequate documentary materials in support of its position. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any relevant supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Maurice E. Morgenstein and Robert A. Cottis), which purportedly provide expert opinions to support this contention. Petition, Attachments 17 and 18. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if the claims are construed to have been submitted by an expert, they still would not be sufficient to support admission of this contention.

In an attempt to present support for its proffered contention, Nevada alleges a series of unsupported and seemingly random facts and assertions that do not provide adequate support for its contention. Nevada first asserts, without support or reference to relevant scholarship, that “[g]eochemically benign dust can form loosely spaced crevices that are favorable physical environments for localized corrosion initiation with acid brines and vapors produced by hygroscopic salt dust and/or unsaturated zone seepage.” Petition at 465-66. Next, Nevada observes that SAR Subsection 2.3.6.4.4.1 notes that:

Brines produced from dust deposits onto the Alloy 22 waste package outer barrier will not generate a favorable environment for localized corrosion initiation and growth. If brine exists at elevated temperatures (>120°C), it will be benign, rather than corrosive and initiation of localized corrosion and subsequent penetration of the waste package outer barrier are not expected.

Petition at 466.

Nevada next declares, and without reference to any portion of the SAR or to any other relevant documentary source, that “[t]he operating DOE premise is that acid vapors will evolve into the tunnel atmosphere and therefore will not have time to react with critical EBS materials such as the C-22 outer canister barrier.” Petition at 466. Nevada next notes that “... SAR Subsection 2.3.6.4.3.1.3 ... suggests that crevices may form on the waste package below ‘mineral scales, corrosion products and rocks.’” Petition at 466 (quoting SAR Subsection 2.3.6.4.3.1.3 at 2.3.6-38). Nevada then asserts that it “has laboratory evidence ... that supports these statements in SAR Subsection 2.3.6.4.3.1.3, which contradict SAR Subsection 2.3.6.4.4.1.” Petition at 466 (citing “Experiments Devised to Studying Temperature and Geometry Effects of Corrosion of C-22 Alloy” (04/23/2008), LSN# NEV000005235). Yet, even with this

opportunity, Nevada provides no specific evidence, supported by scholarly opinion in associated affidavits.

Nevada also fails to explain the relevance of its allegation of inconsistency between the text of SAR Subsection 2.3.6.4.4.1 and the text of SAR Subsection 2.3.6.4.3.1.3 quoted above. In any case, its assertion mischaracterizes the text quoted from SAR Subsection 2.3.6.4.4.1 above, which merely indicates that brine from dust deposits on Alloy 22 will not provide a favorable environment for localized corrosion. In fact, the next two sentences following the text that Nevada quotes provide that “[t]he quantity of brine at elevated temperatures is small, which hinders corrosion initiation and extent” and that “... the overall consequence of dust deliquescence on the localized corrosion of the waste package outer barrier will be insignificant.” SAR § 2.3.6.4.4.1 at 2.3.6-41. This text then notes that “[t]herefore, localized corrosion of Alloy 22 due to dust deliquescence is excluded from TSPA. *Id.* (citing Section 2.2, Table 2.2-5; FEP 2.1.09.28.0A).

The text from SAR 2.3.6.4.3.1.3, which merely provides that “crevices may form on the waste package below mineral scales, corrosion products and rocks,” is not at odds with the former statement. The former statement addresses the possibility of a favorable environment for localized corrosion; the latter statement notes only that crevices may form on the waste package. In any event, Nevada does not further explain the purported discrepancy or its relationship to its contention.

Nevada then declares that “... nowhere within the SAR does DOE actually state that dust can form crevices.” Petition at 466. It is unclear what to make of this assertion, and Nevada does not explain it. However, the text that Nevada failed to quote from SAR § 2.3.6.4.4.1, noted above, describes the exclusion of localized corrosion of Alloy 22 due to dust deliquescence from

the TSPA, and refers to FEP 2.1.09.28.0A. FEP 2.1.09.28.0A's screening justification provides, in pertinent part, that "[t]his evaluation shows that dust deliquescence-induced localized (primarily crevice) corrosion of the waste package outer corrosion barrier (Alloy 22) is of low consequence with respect to repository performance ...." See "Features, Events, and Processes for the Total System Performance Assessment: Analyses" (March 2008) LSN DEN001584824 at 6-705. Thus, it is clear that not only did DOE consider the possibility of dust deliquescence-induced localized crevice corrosion, but that evaluation, in part, led to the exclusion of "Localized Corrosion on Waste Package Outer Surface Due to Deliquescence" from the TSPA.

Nevada next asserts, without support or reference to any relevant scholarship, that "thermally evolving seepage water may also be trapped under dust, dust combined with rock fall debris, or rock fall debris forming crevices that are therefore fed by low pH brines" and that these "environments are likely to enhance C-22 corrosion, but are not considered in DOE's corrosion models." Petition at 466. Nevada's assertions related to a purported failure by DOE to consider possible corrosion due to seepage water is misplaced. FEP 2.1.09.28.0A, discussed above, excludes localized corrosion from salt-containing dust, which can accumulate on the waste package. *Id.* A second included FEP, FEP: 2.1.03.03.0A, "Localized Corrosion of Waste Packages" accounts for the other forms of localized corrosion of waste packages. In this regard, FEP: 2.1.03.03.0A notes that "[t]he two main routes through which an aqueous solution could come into contact with the waste package surface are dust deliquescence and seepage. The possibility of localized corrosion of the [waste package outer barrier] due to brines produced by dust deliquescence is discussed in excluded FEP 2.1.09.28.0A (Localized Corrosion on Waste Package Outer Surface due to Deliquescence). Localized corrosion initiation due to seepage water contact is discussed [in FEP 2.1.03.03.0A ]." (LSN# DEN00158424, at 6-400.)

Thus, DOE has considered both dust deliquescence-induced localized crevice corrosion and localized corrosion of the waste packages due to seepage water. Nevada's assertions above are incorrect, unfounded and amount to bare speculation. As such, they cannot provide adequate support for a contention. A contention "will be ruled inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits', but instead only 'bare assertions and speculation.'" *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada attempts to demonstrate a genuine dispute in subsection 6 of its contention by challenging "SAR Subsection 2.3.6.4.4.1 and related subsections, which describe DOE's model for localized corrosion, because they are grossly incomplete because common and ubiquitous rock dust (siliceous and feldspathic) can form crevices on C-22 and Ti-7 surfaces that are favorable environments for localized corrosion." Petition at 467. As noted above, DOE considered the localized corrosion of waste packages with respect to both dust deliquescence and seepage, "[t]he two main routes through which an aqueous solution could come into contact with the waste package surface are dust deliquescence and seepage." See LSN#: DEN001584824 at 6-400.

In any event, Nevada's assertions are not sufficient to sustain its admission. Even if Nevada's claims were somehow to be accepted by the Board, the contention provides no basis for demonstrating that the claims would have any material effect on corrosion, or the content of

the LA. In particular, the contention does not allege, even qualitatively, that the use of a different method would result in more accurate modeling of the corrosion, or would be inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model.

*Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Thus, notwithstanding whether Nevada's contention is correct or not, the contention does not demonstrate that DOE's results are inconsistent with the reasonable expectation standard. In this regard, Nevada ignores the demonstration of the conservatism of the model presented by DOE in SAR Section 2.3.6.4.4.1, "Abstracted Model for Localized Corrosion." See SAR § 2.3.6.4.4.12 at 2.3.6-41 (noting that: "[i]f localized corrosion due to seepage brines occurs, the affected area is modeled as the wetted waste package surface underneath the breached portion of the drip shield . . . . This treatment is *conservative*, because the model is based upon samples with tight crevices, and only the area between the waste package and the emplacement pallet will be tightly creviced.") (emphasis added).

Nevada next alleges that, "SAR Subsection 2.3.5.6 does not comply with 10 C.F.R. § 63.114(f), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must evaluate in detail degradation, deterioration, or alteration processes of engineered barriers, if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission." Petition at 467.

With respect to Nevada's next assertion regarding the inadequacy of the TSPA Model, this too is not adequate to support admission of the proffered contention. As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

**87. NEV-SAFETY-87 - Intergranular Scc Corrosion During Dry-Wet Cycle**

SAR Subsection 2.3.6.5 and similar subsections, which describe stress corrosion cracking (SCC) of the waste package outer barrier, fail to consider SCC initiation as a consequence of dry-wet drip cycling inter-granular corrosion thereby underestimating the environmental causes for C-22 stress corrosion cracking.

**RESPONSE**

In this contention, Nevada alleges that in SAR Subsection 2.3.6.5 and similar subsections, DOE has not considered stress corrosion cracking (SCC) initiation as a consequence of dry-wet drip cycling inter-granular corrosion, thereby underestimating the environmental causes for C-22 stress corrosion cracking. In short, Nevada contends that DOE has not sufficiently studied a *possible* cause of corrosion. In addition to its pleading deficiencies, Nevada fails to provide a reasoned basis to substantiate that conclusion. Moreover, even if Nevada could show that DOE underestimated the causes for C-22 SCC, Nevada fails to demonstrate that the waste package will be compromised as a result or that the alleged deficiency would have any impact on DOE's ability to limit radiological exposures and releases. Consequently, this contention fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R.

§ 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Additionally, although Nevada has alleged an error on DOE’s part, Nevada has failed to establish that the error is material to DOE’s compliance with any Part 63 requirement. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a

contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Nevada has merely hypothesized a scenario involving cyclic water infiltration and dryout in the waste containment drifts (Petition at 471) that, at most, indicates that there is a possibility, given a series of events, that corrosion of the C-22 surfaces of the waste package could result. Nevada's assertions are important for what they do not contain – Nevada does not assert that the hypothetical scenarios that it alleges are certain to occur, or even that they are probable, or likely, or even significantly plausible. Nevada's claims are mere speculation, and should be ruled inadmissible as detailed below.

Although not referenced in this contention, three affidavits attached to Nevada's Petition to Intervene as a Full Party states that the affiant "adopt[s]" the discussion in paragraphs 5 and 6 of this contention. *See* Petition at Attachments 3, 17, and 18. As discussed in more detail in Section V.A.3 of this Answer, such an affidavit is not sufficient to satisfy the requirements of Section 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation. Indeed, because the contention itself does not even refer to the affidavits, it is unclear which statements are facts or opinions belonging to the technical experts as opposed to legal argument that cannot be ascribed to those experts.

Moreover, none of Nevada's proffered experts (Drs. Morgenstein, Thorne, and Cottis) is identified as an author of the scientific study to which Nevada cites in support of its contention. *See* Petition at 471 (citing Y. Z. Jia., *et al.*, "Experiments Devised to Studying Temperature and Geometry Effect of Corrosion of C-22 Alloy" (April 23, 2008) (hereinafter, "Jia Report") (LSN# NEV000005235). Nor is there any evidence that any of Nevada's experts had any involvement in the reported experiments. Thus, there is no basis for concluding that the proffered experts have any personal knowledge to explain the alleged significance of the Jia Report or its reported experiments.

Even if this claim were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, "the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention." *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26. Here, Nevada's only cited reference undercuts, rather than supports, Nevada's claims.

Nevada states that it has conducted experiments based on its hypothesis of cyclic dripping and dryout. Petition at 471. Conspicuously, the Jia Report it cites, on its face, was not designed to test cyclic water infiltration cycles. To the contrary, the "experiments were devised to study temperature effect and geometry effect of corrosion of C-22 alloy in UZ pore water." Jia Report, NEV000005235 at 1. Although the reported experiment involved dry-wet cycling, there is no evidence that the study's conceptual model accurately approximates the proposed repository environment or was even intended to do so. Indeed, nowhere does the Jia Report even discuss the reasons for selecting the particular dry-wet cycling parameters.

Nevada ascribes three supposed conclusions to the Jia Report that it says are relevant to this contention, but none of Nevada's descriptions are supported by the Jia Report.

First, Nevada says that there were "no differences between corrosion reactions in the vapor and salt submersion portions of the test samples." Petition at 471. The Jia Report makes no such explicit conclusion.

Second, Nevada states that reported experiments showed that a "significant amount of SCC was observed at the bottom of the re-nucleating inter-granular corrosion tunnels. Petition at 471. The Jia Report makes no such finding. In fact, it does not even mention "re-nucleating inter-granular corrosion tunnels."

Third, Nevada states that "SCC may be more active at lower temperatures." To the contrary, the Jia Report reported that the "corrosion rate of C22 alloy increases with the temperature increasing." Jia Report at 1.

Most significantly, Nevada's core assertion – that dry-wet cycling increases SCC corrosion contention – reflect nothing more than its wishful reading of the Jia Report. The Jia Report states that "Prof. Roger W. Staehle considered those [corrosion cracks] were SCC cracks, and he suggested the metallographic faces should be etched in order to show the bases for the initiation of the SCC." Jia Report at 7. "But," the Report concludes, "the results of etching metallographic faces [sic] not success." *Id.* at 8. Moreover, whatever corrosion the experiment found, the Jia Report makes clear that the study's author's do not know what caused the supposed SCC, and they concluded that "[f]urther study should be emphasized on why the SCC happens in the process of dry-wet cycling experiment." *Id.* Thus, the experiments on which Nevada relies merely confirm that this contention amounts to no more than hypothesis and speculation.

Nevada concludes that “DOE has not adequately investigated corrosion of C-22 in the drift environment.” Petition at 472. The scenarios postulated by Nevada leading up to this conclusion depend on multiple independent events of causation, and Nevada merely asserts their theoretical possibility and does not demonstrate – and does not even assert – that the causation described, much less the asserted result of corrosion of the C-22 material, is either certain or even likely. The Board should not accept such hypothetical, unsupported assertions. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (holding that conclusory statements cannot provide “sufficient” support for a contention).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada first attempts to demonstrate a genuine dispute with DOE by repeating the assertions, discussed above, that DOE failed to consider whether cyclic water infiltration and dryout in the waste containment drifts *possibly* could result in corrosion of the C-22 surfaces of the waste package. As explained above, these assertions do not give rise to a material deficiency. Nevada has not stated what radiological impact its postulated dryout testing would have on the corrosion modeling. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 (1990).

Even if Nevada had accurately described the results reported in the Jia Report (and it has not, as discussed above), Nevada fails to explain what significance those findings would have or how they in any way undercut DOE's corrosion analysis. Also, even if the Jia experiments showed that SCC of C-22 may occur in drift environment, Nevada has not shown that DOE failed to account for that corrosion or that it would materially change DOE's analysis. Indeed, DOE already "conservatively assumed that, regardless of the environment, the waste package will undergo stress corrosion cracking if stress conditions are met." SAR at 2.3.6-45-46.

Moreover, the regulations require evaluation of degradation processes in detail only "if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*" 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that SCC in fact would increase those risks at all, let alone that they would be "significantly changed by their omission." Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. Nevada asserts, without foundation or reference to relevant scholarship, that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 472-73. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, Nevada essentially argues that DOE must show that Nevada's

contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**88. NEV-SAFETY-88 - Thermodynamics of Complex Deliquescent Salt Reactions During C-22 Corrosion**

SAR Subsections 2.3.6.4.4.1, 2.3.5.5.4.2.1 and 2.3.5.5.4.3 and similar subsections, which describe hygroscopic dust and seepage environments, fail to consider the formation of a variety of complex hygroscopic natural salts such as tachyhydrite ( $\text{CaMg}_2\text{Cl}_6 \cdot 12\text{H}_2\text{O}$ ) and carnallite ( $\text{KMgCl}_3 \cdot 6\text{H}_2\text{O}$ ) that could substantially influence modes and rates of corrosion.

**RESPONSE**

This contention alleges that SAR sections 2.3.6.4.4.1, 2.3.5.5.4.2.1, and 2.3.5.5.4.3 fail to recognize the formation of a variety of complex hygroscopic natural salts, which could influence modes and rates of corrosion.

**a. Statement of Issue of Law or Fact to be Controverted**

In this contention at paragraph 1, “A statement of the contention itself,” Nevada states that, “*SAR Subsections 2.3.6.4.4.1, 2.3.5.5.4.2.1, and 2.3.5.5.4.3*, and similar subsections, which describe hygroscopic dust and seepage environments, fail to consider the formation of a variety of complex hygroscopic natural salts ... that could substantially influence modes and rates of corrosion.” Petition at 474 (emphasis added). However, Nevada raises for the first time at paragraph 5, (regarding the pleading requirement to show support for the contention) SAR subsections 2.3.5.3.3.5.2, 2.3.5.5.3, and 2.3.5.3.2, including the discussions of salts contained in these subsections. Petition at 476-77. Moreover, Nevada’s assertions at paragraph 6 only mention SAR subsections 2.3.6.4.4.1, 2.3.5.5.4.2.1, and 2.3.5.5.4.3 – all of which comprise “the statement of the contention itself” in paragraph 1 of the Petition. Petition at 477.

It is impossible to discern what precisely the focus of this contention is and which section of the LA it is that Nevada seeks to challenge. 10 CFR § 2.309(f)(1)(i) requires that “a specific

statement of the issue of law or fact to be raised or controverted.” The June 20, 2008 Case Management Order further notes that “this [§ 2.309(f)(1)(i)] statement shall set forth petitioner’s contention in precisely the form it wishes the contention to be considered.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6). Nevada’s conflicting statements regarding the specific SAR sections that it wishes to challenge make it clear that Nevada has not met the pleading specificity requirements of 10 CFR § 2.309(f)(1)(i) and its related obligations of the June 20, 2008 Case Management Order. Accordingly, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Petitioner generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.113, 63.114, and 63.115. Petition at 474-75. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Nevada alleges an omission in the analysis of the waste emplacement drifts, Petitioner fails to establish that the omission is relevant to DOE’s compliance with any Part 63 requirement. Additionally, while Nevada claims that “it is imperative to have some real basis for understanding the types and amounts of authigenic salts present,” it has not alleged an increase in the mean dose *above regulatory limits*. Petition at 477.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Petition at 479, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is

Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Don L. Shettel, Jr., Maurice E. Morgenstein, Michael C. Thorne, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Although Nevada makes copious technical assertions regarding the alleged need to consider complex salts, it does not provide any scholarly support. Therefore, this contention does not comply with 10 C.F.R. 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention states that “the potential for corrosion of C22 from salt deliquescence ... has been poorly studied from the prospective of the environmental conditions that are expected to exist in the waste emplacement drifts.” Petition at 474. For several reasons, this contention does not establish a genuine dispute of material fact.

First, the basis for this contention, that in-drift water compositions are based on calculations using only a few simple salts, is incorrect. In its contention, Nevada states that “[t]he seepage evaporation analysis and results (SAR Subsection 2.3.5.5.3.2) discusses the following salts: halite (NaCl), calcite or aragonite (CaCO<sub>3</sub>), and sylvite (KCl). The remaining discussion is confined to the composition of brines but not the relationship(s) between the brines and the authigenic salts.” Petition at 447. This assertion mischaracterizes the seepage evaporation abstraction model (*See* SAR 2.3.5.5.4), which implements the in-drift precipitates/salts model (SAR 2.3.5.5.3.1) and includes a Pitzer thermodynamic database (SAR 2.3.5.5.2). The Pitzer database comprises over 200 minerals including many complex salts (listed in “In-Drift Precipitates/Salts Model,” LSN#: DN2002371917, Tables 1-27 and 1-28) and includes all of the salts listed in part 5 of the contention. *See* Petition at 476-77.

Nevada further states in part 5 that “SAR Subsection 2.3.5.3.3.5.2 discusses ambient pore-water compositional trends and mineral assemblages without considering complex salts and considers only calcite as a simple salt.” Petition at 476. This statement, referring to the near-field chemistry model (*See* SAR 2.3.5.3.3.5.2) is also incorrect. The minerals permitted to

precipitate in the EQ3/6 simulations for the near-field chemistry model include the same complex salts discussed above for the seepage evaporation abstraction model, which encompass the salts that Nevada asserts were not considered. *See Engineered Barrier System: Physical and Chemical Environment*,” LSN#: DN2002452948, Table 6.2-3. Thus, Nevada fails to raise a genuine dispute.

Second, this contention is based on speculation and conjecture. By way of example, Petitioner asserts the following: (1) SAR subsections “fail to consider the formation of a variety of complex hygroscopic natural salts ... that *could* substantially influence modes and rates of corrosion” (Petition at 474) (emphasis added); and (2) “[s]eepage evaporation on C-22 surfaces has been discussed in terms of brine production ... but not in terms of common complex deliquescent salts that are likely to form” Petition at 476 (emphasis added). The Board should not accept such causal, hypothetical, and unsupported assertions. Even if these claims were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26.

Third, the contention alleges without support that because DOE did not consider corrosive effect of the formation of complex salts, “the environmental picture ... is inadequate, incomplete, and misleading.” Petition at 476. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers

from this deficiency. Petitioner provides no quantitative or even qualitative information regarding whether and the extent to which complex salts could influence the modes and rates of corrosion in the waste emplacement drifts. Thus, Petitioner fails to demonstrate a genuine dispute.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**89. NEV-SAFETY-89 - Inhibition Of C-22 Corrosion By High Nitrate To Chloride Ratio**

SAR Subsections 2.3.5.3.2.2.1 (unsaturated zone pore water chemistry), 2.3.6.4.4.1 (abstracted model for localized corrosion), 2.3.6.4.2 (data and data uncertainty), and similar subsections, which discuss the nitrate-to-chloride ratio with respect to C-22 corrosion inhibition, fail to describe any experimental conditions that represent the waste emplacement drift environment, and fail to consider low pH evaporative conditions that do represent that environment; consequently, the corrosion models utilized for C-22 are inappropriate.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsections 2.3.5.3.2.2.1 (unsaturated zone pore water chemistry), 2.3.6.4.4.1 (abstracted model for localized corrosion), 2.3.6.4.2 (data and data uncertainty), and similar subsections, which discuss the nitrate-to-chloride ratio with respect to C-22 corrosion inhibition, fail to describe any experimental conditions that represent the waste emplacement drift environment, and fail to consider low pH evaporative conditions that do represent that environment; consequently, the corrosion models utilized for C-22 are inappropriate.” Petition at 480.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R.

§ 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada essentially admits that it does not know whether this contention is material. In an attempt to escape its burden of proof, it claims that, because of the “burden and complexity of showing the dose effects” of acceptance of Nevada’s contention, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. *See* Petition at 485-86. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, Nevada would here have DOE demonstrate that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or any documentary materials in support of its position, other than the license

application. Therefore, it does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any relevant supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Maurice E. Morgenstein, Robert A. Cottis, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, these affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if the claims are construed to have been submitted by an expert, they still would not be sufficient to support admission of this contention.

In an attempt to present support for its proffered contention, Nevada alleges a series of unsupported and seemingly random facts and assertions that do not provide adequate support for its contention. Nevada first asserts without support or reference to relevant scholarship, that "Nitrate/chloride ratios as characterized by DOE in their 34 pore-water samples *may not be* representative of seepage waters ..." for a number of reasons. Petition at 482 (emphasis added).

Nevada also asserts without foundation or reference to relevant scholarship, that “[t]he nitrate/chloride ratio *may not be* representative of seepage waters because:

- 1) “Nitrate *can be* separated from chloride due to differences in vapor pressure” ;
- 2) “Nitrate salts *can be* separated from chloride salts during gravity flow evaporation on the surface of C-22 due to their differences in solubility” ;
- 3) “Nitrates *can be, in part,* removed from pre-seepage waters by bacterial action in the incubator zone above the proposed repository emplacement drifts” ; and
- 4) “Nitrate and chloride concentrations determined in the 34 pore-water samples have not been adequately correlated to nitrate and chloride concentrations in fracture flow unsaturated zone water, which is the type of water that will seep into the emplacement drifts.”

Petition at 482 (emphasis added).

Importantly, with respect to this assertion, Nevada only posits that the “[n]itrate/chloride ratios as characterized by DOE *may not be* representative ...” Petition at 482 (emphasis added).

In fact, Nevada merely asserts that such a circumstance is only a hypothetical possibility, and fails to allege that such a circumstance is probable, or likely, or even significantly plausible.

These assertions are mere speculation, and can provide no adequate basis to support a contention.

Similarly, Nevada next makes a series of seemingly random assertions, which are wholly unsupported by any foundation or reference to any relevant scholarship. Most importantly, Nevada fails to identify any particular portion of the LA, or any of the LA’s supporting documents, in making these assertions. For example, Nevada asserts, with no intervening explanatory or amplifying information, and without citation to the LA or the LA’s supporting references:

1. “The nitrate/chloride ratio may not determine oxygen repair at the C-22 passivating film

oxide-coating surface under environmental brine conditions where the pH is very low”;

2. “All of the DOE experimentation concerning the effect of the nitrate/chloride ratio on the passivating film layer, which protects the metal surface from corrosion, have been in bath experiments that do not have low pH characteristics (in contrast to the concentrated brines that form on evaporation in the relevant conditions) and that do not approximate the conditions that will prevail in the waste emplacement drifts” ;

3. “Most of DOE’s bath aqueous compositions have both Cl<sup>-</sup> and NO<sub>3</sub><sup>-</sup> in solution, and as long as there is more repair function than corrosion function, the passive film layer will remain intact. If the chloride aqueous values increase in concentration, or the nitrate aqueous values drop in concentration (to some extent SO<sub>4</sub><sup>2-</sup> -- to SO<sub>3</sub><sup>2-</sup> conversion would also have a similar effect) the rate of repair of the passivating film will be affected” ;

4. “There are no experimental data obtained or discussed by DOE to show that C-22 is offered corrosion protection by high nitrate concentrations in very low pH brine environments, especially at elevated repository temperatures” ;

5. “The passivating film cannot even repair itself under low pH nitric acid conditions without the presence of chloride, although the rate of corrosion for nitric acid is much less than for hydrochloric acid”;

6. “When the two acids are mixed, as in the DOE immersion experiments, the apparent lower rate of corrosion with the increasing presence of nitric acid is not due to inhibition as much as it is due to a mixing ratio of about 1:200 for the nitrate: chloride corrosion rate ratio” ;

7. “A bath environment, as utilized by DOE, maintains several characteristics that are inappropriate to the waste emplacement drift environment”:

a) “the nitrate/chloride ratio used for experimentation remains constant for

that experiment and is based upon the simulated pore-water composition chosen” ;

- b) “there is no dry out” ;
- c) “the reacting liquid temperature is relatively low”; and
- d) “concentrations of corrosive species are low” ;

8. “It is totally unrealistic to assume that the canister will be submerged in the emplacement drifts and therefore laboratory bath experiments only approximate non-brine ponding conditions that do not represent the emplacement drift environment” ;

9. “In summary, SAR Subsections 2.3.5.3.2.2.1 (vadose pore water chemistry), 2.3.6.4.4.1 (abstracted model for localized corrosion), and 2.3.6.4.2 (data and data uncertainty) relate to a combined model of nitrate/chloride corrosion inhibition that, although well supported by immersion experiments, does not apply to waste emplacement drift conditions”; and

10. “Experiments and models relevant to evaluating SCC and localized corrosion of C-22 must address”:

- a) “Hydro geochemistry, based upon a valid mode of transport and seepage introduction into the waste emplacement drift environment from an aqueous source” ;
- b) “Salt dust geochemistry based upon salt source compositions, brine chemistry, dust deposit morphology, and dust delivery to the EBS metal surfaces” ;
- c) “The dynamics of temperature, humidity and atmospheric pressure” ; and
- d) “Mode of contact with the C-22 surface that is consistent with the geologic thermal-physical conditions that exist in the waste emplacement drift environment.”

Petition at 482-84.

Nevada's next conclusion, made, as with all of the other allegations above, without support or reference to any relevant scholarship, and without citation to the LA or the LA's supporting references, is that "DOE has not provided an adequate link between the characteristics of the environment in the waste emplacement drifts and their laboratory analysis/model support for proposed reactions in that environment." Petition at 484. Nevada further alleges that "[d]uring salt-cap-crevice corrosion starting with simulated, unconcentrated unsaturated zone water that then undergoes evaporative concentration, massive pitting and channeling occurs in C-22 when the pH is low, even when the nitrate/chloride ratio is greater than 1" and that "[i]n reality, when nitrate is present,  $\text{NO}_3^-$  reacts to  $\text{NO}_2^-$ , and the corrosion potential is raised into the passive zone as long as the pH is high enough so that the chemistry at the passive layer favors layer stability." Petition at 484. Nevada observes that "[t]his is a condition that is easy to maintain under the DOE bath experimentation protocol" but that it "... however, is not representative of the waste emplacement drift environment, and consequently, the DOE nitrate/chloride ratio inhibition philosophy does not apply in the conditions of practical relevance." Petition at 484.

To the extent that Nevada asserts that DOE's corrosion testing has not adequately represented the various environment scenarios postulated above, Nevada's assertions fail to provide any support for its contention. The goal of the DOE testing program was to produce data that are reasonably bounding for modeling of corrosion in anticipated repository environments, and this goal does not require testing in every conceivable postulated environment. The corrosion models used in performance assessment implement several conservatisms to ensure that corrosion rates are not underestimated include:

- General corrosion rates for C-22 used in TSPA are weighted towards the highest rates from the most aggressive exposure conditions. *See* SAR § 2.4.2.3.2.1.5 at 2.4-147.
- General corrosion rates for Ti-7 on the outer surfaces of the drip shields are modeled using only the fastest corrosion rates from the most aggressive environments. *See* SAR § 2.3.6.8.1.2.1 at 2.3.6-73.
- For interpreting polarization tests, the condition where localized corrosion cannot be sustained is conservatively used as the threshold for localized corrosion initiation. *See* SAR § 2.3.6.4.2.2 at 2.3.6-33.
- Stress corrosion cracking is modeled to occur whenever a stress threshold is reached independent of the chemical environment; this is very conservative in view of the fact that only aggressive environments support stress corrosion cracking. *See* SAR § 2.3.6.5.1 at 2.3.6-46.

Additionally, Nevada alleges, incorrectly, that the DOE model predicts that nitrate will continue to protect C-22 from corrosion under very low-pH conditions. Rather, the model does not give inappropriate credit to the influence of nitrate to chloride ratio on the propensity for localized corrosion initiation. As noted in SAR Figure 2.3.6-27, as the pH decreases, the model predicts a higher probability of localized corrosion initiation even with significant nitrate concentration. *See* Figure 2.3.6-27 at 2.3.6-171. Additionally, as discussed in SAR Section 2.3.6.4.4.1, for pH less than 1.9, the model predicts localized corrosion initiation for all chemical compositions, independent of the levels of chloride and nitrate. *See* SAR § 2.3.6.4.4.1 at 2.3.6-41.

As noted above, Nevada sets forth no supporting documents in its Statement of Alleged Facts or Expert Opinion in support of any of the above assertions and offers no expert opinion.

Consequently, the many and varied statements, allegations and conclusions set forth in subsection 5 of Nevada's contention, described above, are merely unsupported assertions of counsel. As such, they cannot provide adequate support for a contention. A contention "will be ruled inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits', but instead only 'bare assertions and speculation.'" *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada attempts to demonstrate a genuine dispute in subsection 6 of its contention by merely noting that "SAR Subsections 2.3.5.3.2.2.1, ... 2.3.6.4.4.1, ... 2.3.6.4.2 and similar subsections, which discuss the nitrate to chloride ratio with respect to C-22 corrosion inhibition, fail to describe any experimental conditions that represent the waste emplacement drift environment, and fail to consider low pH evaporative conditions that do represent that environment." Petition at 484. As with the assertions offered in subsection 5 of the contention, this observation is unsupported by any fact or expert opinion, and is conclusory and mere speculation. Next, Nevada alleges that "the corrosion models for C-22 are inappropriate ...." As with the claims above, this assertion is conclusory and unsupported by fact or expert opinion, and amounts to mere speculation. Unsubstantiated conclusory statements cannot provide sufficient support for a contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

Additionally, these bare assertions challenging the (unspecified) corrosion models, even if they were somehow to be accepted by the Board, provide no basis for demonstrating that the claims would have any material effect on corrosion, or the content of the LA. In particular, the contention does not allege, even qualitatively, that the use of a different method would result in more accurate modeling of the corrosion, or is inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 534-44, 550 (1985). Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Nevada ignores the demonstration of the conservatism of the model presented by DOE in SAR Section 2.3.6.4.4.1, “Abstracted Model for Localized Corrosion.” See SAR § 2.3.6.4.4.1. at 2.3.6-40 (noting that the description of the set of rules used to implement the model provides: “[i]f the nitrate-to-chloride ion ratio in the environment exceeds 1.0, then evaluate Ecrev and Ecorr at a nitrate-to-chloride ion ratio of 1.0. This treatment is *conservative* because, at a given temperature and chloride-ion concentration, Ecrev increases markedly with nitrate-ion concentration, while Ecorr is less sensitive than Ecrev to nitrate-ion concentration at lower pH values where crevice corrosion is more likely to initiate ) (emphasis added). Additionally, the description of the “Abstracted Model for Localized Corrosion” provides that “[e]ach of the above chemical limits [the nitrate-to-chloride ion ratio, the molality of chloride ion, the molality of chloride ion and the pH in the environment] has been determined to result in a *conservative* application of the localized corrosion model ...” See SAR§ 2.3.6.4.4.1 at 2.3.6-40 to-41 (emphasis added).

Nevada next alleges that since the corrosion models for C-22 are, assertedly, inappropriate, and that consequently “these subsections” (presumably, SAR 2.3.5.3.2.2.1, 2.3.6.4.4.1, and 2.3.6.4.2 and the nonspecific “similar subsections” noted above) do not comply with 10 C.F.R. § 63.114(f), which “requires that any performance assessment used to demonstrate compliance with Section 63.113 must evaluate in detail degradation, deterioration, or alteration processes of engineered barriers, if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.” Petition at 485. Importantly, as discussed in paragraph d., above, Nevada fails to even allege that resultant dose rates will evidence an increase in the mean dose *above regulatory limits*.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed.

**90. NEV-SAFETY-90 - Effects Of Rock Bolt On C-22 And Ti-7 Corrosion Reactions**

SAR Subsections 1.3.4.4, 2.3.6, and similar subsections, which describe the use, design, and corrosion of Super Swellex-type stainless steel rock bolts in the ground support system and the corrosion of C-22, fail to consider that debris from rock bolt corrosion will accumulate on the drip shield and on the C-22 canister and will be deleterious to both EBS-barrier components.

**RESPONSE**

In this contention, Nevada alleges that in SAR Subsections 1.3.4.4, 2.3.6 and similar subsections, which describe the use, design and corrosion of Super Swellex-type stainless steel rock bolts in the ground support system and the corrosion of C-22, DOE failed to account for the supposed deleterious effects of debris from rock bolt corrosion accumulating on the drip shield and C-22 canister surfaces. In short, Nevada contends that DOE has not sufficiently studied a *possible* cause of corrosion on drip shields and waste canisters.

In addition to its pleading deficiencies discussed herein, Nevada fails to provide a reasoned basis to substantiate its conclusions. Moreover, even if Nevada could show that DOE underestimated the possible causes of corrosion, Nevada fails to demonstrate that the drip shields or waste packages will be compromised as a result or that the alleged deficiency would have any impact on DOE's ability to limit radiological exposures and releases. Consequently, this contention fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Additionally, although Nevada has alleged an error on DOE’s part, Nevada has failed to establish that the error is material to DOE’s compliance with any Part 63 requirement.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or

cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Nevada has merely hypothesized a scenario in which debris from corrosion of rock bolts in the waste containment drifts may accumulate on the drip shield and on the C-22 canister (Petition at 489-90) that, at most, indicates that there is a possibility, given a series of events, that corrosion of the drips shields and C-22 surfaces of the waste package could result. Nevada’s assertions are significant for what they do not contain – Nevada does not assert that the hypothetical scenarios are certain to occur, or even that they are probable, or likely, or even significantly plausible. Nevada does not refer to any experiments or scholarly study of this issue and evidently has not conducted its own analysis to substantiate its hypothesis.

Although not referenced in this contention, four affidavits attached to Nevada’s Petition to Intervene as a Full Party states that the affiant “adopt[s]” the discussion in paragraphs 5 and 6

of this contention. *See* Petition at Attachments 3, 9, 17, and 18. As discussed in more detail in Section V.A.3 of this Answer, such affidavits are not sufficient to satisfy the requirements of Section 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation. Indeed, because the contention itself does not even refer to the affidavits, it is unclear which statements are facts or opinions belonging to the technical experts as opposed to legal argument that cannot be ascribed to those experts.

Even if this contention were construed to have been sponsored by an expert, Nevada still fails to properly support its assertions. “[T]he Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26. As detailed below, Nevada’s claims are mere speculation and should be ruled inadmissible.

Nevada premises this contention on its speculation that red rust deposits observed during a drift scale heater test were derived from the degradation of the Super Swellex-type stainless steel rock bolts, which form part of the ground support system for the emplacement drifts. Petition at 489. It then asserts that such rust deposits are evidence “suggesting that the claim to a 100-year lifetime for the rock bolts is likely to be an overestimate, or at least cannot be relied upon for safety assessment purposes without additional evidence.” *Id.* The ground support system, however, is “classified as non-ITS because it is not relied on to prevent or mitigate a Category 1 or Category 2 event sequence, and it is not ITWI because the total system performance assessment (TSPA) does not take credit for ground support during the postclosure performance period.” SAR at 1.3.4-8.

Furthermore, Nevada points to no study or analysis to dispute DOE's conclusion that the "stainless steel rock bolts and perforated stainless steel sheets are expected to fulfill their functions during the preclosure period without excessive corrosion." SAR at 1.3.4-11 (citing BSC 2003c. Longevity of Emplacement Drift Ground Support Materials for LA. 800-K0C-TEG0-01200-000-00A. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20030922.0004 [hereinafter, "Longevity Study"]). Indeed, the Longevity Study took a "conservative approach" in estimating corrosion rates. Longevity Study at 36. Nevada does not attempt to address that study and thus has not substantiated its claim that DOE underestimated rock bolt corrosion.

Although it has not quantified the amount rock bolt corrosion debris that may accumulate, Nevada alleges that such debris will have some "deleterious" effect on the alloy surfaces of the drip shields and waste canisters. Petition at 489. Nevada suggests two manners in which the corrosion debris, in theory, could enhance corrosion of the waste package alloys. Both theories, however, lack any substantial support.

First, Nevada suggests that the "physical debris field" from rock bolt corrosion could contribute to the creation of crevices, which Nevada alleges promote stress corrosion cracking (SCC). Petition at 489. Nevada elaborates that dust and debris fields can trap vapors, "some of which are acidic and can promote chloride brine corrosion of both Ti-7 and C-22." *Id.* at 489-90. But Nevada provides no relevant support such as scholarly references or studies to substantiate those claims. Moreover, it does not attempt to quantify the vapors that allegedly *could* be formed or how they would affect corrosion rates of the relevant alloys. Nor does Nevada appear to consider whether the addition of some unspecified quantity of rock bolt debris would have any material effect on DOE's corrosion model, which was designed to be

conservative in its approach (SAR at 2.3.6-37 to -38), and which Nevada concedes already considered rock fall and salt deposits (alternative sources of vapor-trapping debris) as sources for promoting SCC. *See* Petition at 489 (citing SAR Section 2.3.6.4.3.1.3). Nevada also speculates that the spatial location of rock bolts provide “relatively ideal conditions for C-22 and Ti-7 corrosion” (Petition at 490), but it offers zero explanation or support for that statement.

Second, Nevada asserts, again without support or reference, that rock bolt corrosion debris has “potential concentrations” of trace elements (lead and sulfur), which Nevada contends are known to cause corrosion failure in C-22. Petition at 490. Conspicuously, Nevada does not say what concentrations levels are required to cause corrosion, or whether the unspecified levels would have any material effect in this particular environment. Nevada hedges, contending that “very small amounts of lead are sufficient, because these are sequestered at the C-22 surface and accumulate to substantial concentrations in short periods of time.” *Id.* Not surprisingly, Nevada offers no support for that all-important factor. In any event, Nevada concedes that the supposed corrosion debris presents an “unknown and untested mixture of ions.” *Id.* Thus, Nevada’s conclusion that “this mixture may cause both SCC and localized corrosion of C-22 and Ti-7” (*id.*) is demonstrably nothing more than hypothesis and speculation.

Nevada concludes that “DOE has not studied the mobilization of trace elements from the corrosion of” the rock bolts or the “deleterious affects of these corrosion products on the lifetime of C-22 or Ti-7.” Petition at 491. The scenarios postulated by Nevada leading up to this conclusion depend on multiple independent events of causation, and Nevada merely asserts their theoretical possibility and does not demonstrate – and does not even assert – that the causation described, much less the asserted result of corrosion of the drip shields and waste packages, is either certain or even likely. The Board should not accept such hypothetical, unsupported

assertions. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (holding that conclusory statements cannot provide “sufficient” support for a contention).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(1)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada first attempts to demonstrate a genuine dispute with DOE by repeating the assertions, discussed above, that DOE failed to consider whether accumulation of debris from rock bolt corrosion in the waste containment drifts *possibly* could result in corrosion of the surfaces of the Ti-7 drip shields and C-22 waste packages. As explained above, these assertions do not give rise to a material deficiency. Nevada has not stated what radiological impact the supposed accumulated debris would have on the corrosion modeling. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 (1990).

Even if Nevada had substantiated its claim that corrosion from rock bolts could contribute to SCC in the drip shields and waste packages, Nevada fails to demonstrate any significance for DOE’s corrosion analysis. Nevada has not shown that DOE failed to account for that corrosion source or that it would materially change DOE’s analysis. In fact, Nevada’s postulated source of crevice corrosion is not material because DOE’s models for both the drip shield and waste package localized corrosion are based on crevice data, *i.e.*, the entire waste

package or drip shield surface already is assumed to be a crevice. *See, e.g.*, SAR at 2.3.6-31 (stating that once localized corrosion initiates, “it is presumed that there is a crevice tight enough for initiation on all waste package surfaces”); SAR at 2.3.6-38 (explaining that crevice repassivation potential model for initiation of localized corrosion conservatively assumes the entire waste package surface will be subjected to crevice-like conditions). Furthermore, DOE already “conservatively assumed that, regardless of the environment, the waste package will undergo stress corrosion cracking if stress conditions are met.” SAR at 2.3.6-45-46. Accordingly, there would be no need to evaluate the likelihood of crevice corrosion initiation caused by falling debris from deteriorating rock bolts because the entire surface already is modeled to assume significantly more severe crevices have formed than Nevada postulates.

Moreover, the regulations require evaluation of degradation processes in detail only “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that possible presence of rock bolt corrosion debris would increase those risks at all, let alone that they would be “significantly changed by their omission.”

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. Nevada asserts, without foundation or reference to relevant scholarship, that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Petition at 492, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *Id.* at 491-92. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed

Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, Nevada essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**91. NEV-SAFETY-91 - Representativeness Of C-22 And Ti-7 Corrosion Testing Methods**

SAR Subsection 2.3.6.1.2 and similar subsections, which deal with corrosion test environments and in-drift chemical environments, fail to utilize testing methods and hydrogeochemical compositions that capture the conditions and chemistries to which C-22 and Ti-7 are expected to be exposed in the emplacement drifts of the proposed repository.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsection 2.3.6.1.2 and similar subsections, which deal with corrosion test environments and in-drift chemical environments, fail to utilize testing methods and hydrogeochemical compositions that capture the conditions and chemistries to which C-22 and Ti-7 are expected to be exposed in the emplacement drifts of the proposed repository.” Petition at 493.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or adequate documentary materials in support of its position. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference adequate documentary materials; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Maurice E. Morgenstein and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In an attempt to present support for its proffered contention, Nevada alleges a series of unsupported assertions that do not provide adequate support for its contention. Nevada first asserts, without support or reference to any relevant scholarship, that "DOE's corrosion program

for Ti-7 and C-22 has ignored key physical and chemical characteristics of the environment in the waste emplacement drifts” and lists a number of aspects of the program that “remain unmodeled and un-treated with respect to corrosion in the DOE License Application.” Petition at 494-95.

Nevada further alleges, again without support or reference to any relevant scholarship, that “much of the DOE corrosion program as portrayed in SAR Subsection 2.3.6 and similar subsections is based on experimental strategy that is not related to the dynamic properties of the waste emplacement drift environment.” Petition at 495. In this regard, Nevada does not meet the pleading specificity requirements. SAR Section 2.3.6 is 192 pages in length; Nevada fails to identify the portion of SAR Section 2.3.6 that is allegedly deficient, and does not further identify the assertedly “similar” deficient subsections of the SAR. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). For this reason alone, this contention is inadmissible.

Nevada next asserts, without support or reference to any relevant scholarship, that in order to “adequately determine the lifetime of the C-22 layer around packages and thereby assess the performance of the EBS ... [t]he experimental apparatus should ... adequately model or mimic the repository environment.” Petition at 495. Nevada also asserts that “[i]n doing so, *one may argue* for validity by using a well-corroborated theory based upon sound calibrated laboratory models that are shown to be valid representations of the environment of interest” and that “this has not been achieved by DOE.” Petition at 495 (emphasis added). Nevada offers no support or reference to relevant scholarship in making it this assertion. Nevada then alleges, without support or reference to scholarly research, that “[s]pecifically, it is not possible to

exclude the [key physical and chemical characteristics omitted from the LA] ... from consideration and to focus solely on bath experimentation, as there is no correlation between the laboratory bath environment and conditions under which C-22 and Ti-7 are proposed for use.”

Petition at 495.

Nevada further asserts that:

1. “To justify claims about the correspondence between the Yucca Mountain environment and the laboratory models, DOE would have to show that the bath model environment provides the same environmental-chemical-thermal-spatial conditions as would arise due to the omitted un-modeled environmental parameters” ;
2. With respect to DOE’s existing experiments, “... there is little evidence to show that bounding unsaturated zone water compositions have been captured within the DOE laboratory testing program or will be captured in the future, as there is no compelling evidence to show that porewater is similar to fracture flow water” ;
3. “SAR Subsections 2.3.5 and 2.3.6 demonstrate that the corrosion modeling undertaken by DOE has been based upon unsupported claims that their laboratory models are valid representations of the waste emplacement drift environment” ;
4. “It is suggested, for example, that the nitrate/chloride ratio will provide adequate protection to the passivating film on C-22 because experimentation in simulated water bath conditions provide compelling evidence to this effect, ... [y]et, it is known that this ratio does not exert the control that DOE claims under the conditions of low pH that commonly occur during unsaturated zone dripping and evaporation” ;
5. “By not addressing the wide range of expected environmental conditions, the DOE model for corrosion behavior is unsupported and unjustified, and cannot be used to underpin arguments relating to drip shield and waste package lifetime [and consequently] ... no credence can be placed in DOE estimates of radionuclide releases from the EBS or assessed radiation doses to the RMEI.”

Petition at 495-96.

Nevada's wide-ranging and diverse allegations noted above have one thing in common: they are all made with utterly no support from any documentary supporting references or expert opinion. In fact, all of these many and varied assertions contained in Nevada's Statement of Alleged Facts or Expert Opinion described above amount to merely unsupported assertions of counsel. Nevada makes one additional assertion, alleging that "DOE recognizes that its existing work is inappropriate and/or inadequate as it has proposed a long-term corrosion testing program ...." which considers many of the items that are listed above that are totally absent from the discussion in SAR Subsection 2.3.6." Petition at 496 (citing "Long-Term Corrosion Testing Plan" (Aug. 1, 2008) (LSN# DEN001600862). Nevada fails to meet the pleading specificity requirements related to this assertion; the cited document is 100 pages long, and Nevada fails to specify the section or page of the document upon which it purports to rely. Such vague references to documents are not permissible; a petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). For this reason alone, this contention is inadmissible.

To the extent that Nevada asserts that DOE's corrosion testing has not adequately represented the various environment scenarios postulated above, Nevada's assertions fail to provide any support for its contention. The goal of the DOE testing program was to produce data that are reasonably bounding for modeling of corrosion in anticipated repository environments, and this goal does not require testing in every conceivable postulated environment. The corrosion models used in performance assessment implement several conservatisms to ensure that corrosion rates are not underestimated, including:

- General corrosion rates for C-22 used in TSPA are weighted towards the highest rates from the most aggressive exposure conditions. *See* SAR § 2.4.2.3.2.1.5 at 2.4-147.
- General corrosion rates for Ti-7 on the outer surfaces of the drip shields are modeled using only the fastest corrosion rates from the most aggressive environments. *See* SAR § 2.3.6.8.1.2.1 at 2.3.6-73.
- For interpreting polarization tests, the condition where localized corrosion cannot be sustained is conservatively used as the threshold for localized corrosion initiation. *See* SAR § 2.3.6.4.2.2 at 2.3.6-33.
- Stress corrosion cracking is modeled to occur whenever a stress threshold is reached independent of the chemical environment; this is very conservative in view of the fact that only aggressive environments support stress corrosion cracking. *See* SAR § 2.3.6.5.1 at 2.3.6-46.

Additionally, Nevada alleges, incorrectly, that the DOE model predicts that nitrate will continue to protect C-22 from corrosion under very low-pH conditions. Rather, the model does not give inappropriate credit to the influence of nitrate to chloride ratio on the propensity for localized corrosion initiation. As noted in SAR Figure 2.3.6-27, as the pH decreases, the model predicts a higher probability of localized corrosion initiation even with significant nitrate concentration. *See* Figure 2.3.6-27 at 2.3.6-171. Additionally, as discussed in SAR Section 2.3.6.4.4.1, for pH less than 1.9, the model predicts localized corrosion initiation for all chemical compositions, independent of the levels of chloride and nitrate. *See* SAR § 2.3.6.4.4.1 at 2.3.6 - 41.

The speculative, conclusory and unsupported assertions above do not provide adequate support for the admission of this contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). Even if these claims were construed to have been submitted by an expert, they would not be

sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

In an attempt to demonstrate a genuine dispute in subsection 6 of the contention, Nevada merely concludes that “SAR Subsection 2.3.6.1.2 and similar subsections, which deal with corrosion test environments and in-drift chemical environments, fail to utilize testing methods and hydrogeochemical compositions that capture the conditions and chemistries to which C-22 and Ti-7 are expected to be exposed in the emplacement drifts of the proposed repository.” Petition at 497. As in subsection 5, Nevada fails to identify any supporting references or expert opinion relating to this conclusory assertion and thus fails to offer any support to demonstrate a genuine dispute. An allegation that some aspect of a license application is inadequate or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 n.12 (1990).

Nevada next alleges that SAR Subsection 2.3.6.1.2 and similar subsections “do not comply with 10 C.F.R. § 63.114(f), which requires that any performance assessment used to

demonstrate compliance with Section 63.113 must provide the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment” and that “ ... degradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.” Petition at 497.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**92. NEV-SAFETY-92 - Impacts Of Fluoride Due To Breach Of HLW Containers**

SAR Subsection 2.3.5 and similar subsections, which deal with the in-drift physical and chemical environment, fail to take account of releases of chemicals by early degraded EBS components in overall calculations of radionuclide containment.

**RESPONSE**

In this contention, Nevada claims that in connection with the overall calculations of radionuclide containment, SAR subsections 2.3.5 and “similar” (although unspecified) subsections fail to take into account chemicals released by early degraded EBS components.

**a. Statement of Issue of Law or Fact to be Controverted**

This contention does not provide a sufficiently specific statement of the issue. In section 5 of the contention, Nevada discusses whether, assuming a breach of a HLW container, DOE’s calculation of overall corrosion and radionuclide release within the emplacement drift takes into account the fluoride concentrations that would result from the breach. Nevada argues that it does not sufficiently take the breach into account because the effects of the breach were not coupled with analysis of the “geochemical behavior of all or most other EBS components.” Petition at 500. Then, however, Nevada states that “[t]he fluoride issue is only one of many geochemical issues where the failure of one EBS component needs to be coupled to the geochemical behavior of all or most other EBS components in the in-drift environment.” *Id.* Nevada does not identify any other “geochemical issues” that it is raising in this contention. Nevada repeats this broad assertion in section 6 of the contention by referring to “coupled processes” generically, but then, again, only discusses the “fluoride issue.”

The Commission requires that a contention “explain, with specificity, particular safety or legal reasons requiring rejection of the contested [application].” *Dominion Nuclear*

*Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 359-60 (2001). As written, the contention fails to give DOE sufficient notice of the issues of law or fact that Nevada seeks to dispute. Based on the information Nevada has provided, this contention lacks the specificity required by 10 C.F.R. § 63.309(f)(1)(v) and, therefore, must be rejected.

**b. Brief Explanation of Basis**

For the reasons discussed below, DOE does not believe that a sufficient basis has been provided for this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 498, section 4. Nevada concludes this general description of various sections in 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . .,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific

citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention claims that flouride concentrations *can* evolve from a single breached HLW glass waste package, and, in turn, *can* result in an increase in flouride ion concentrations in the emplacement drift. Petition at 498. Nevada concludes that this “potentially” increases the corrosion of the Ti-7 drip shield and other waste containers. *Id.* Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section IV.A.3, above, discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to

be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed in the specific response below: (1) the contention does not reference any documents, other than the license application; (2) the contention mainly contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Michael C. Thorne, Maurice E. Morgenstein, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, as further discussed below, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" these otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada's contention is filled with speculation, unsubstantiated assertions, and a lack of specificity about the basis for the contention. Nevada claims that increased flouride concentrations "can" become aggressive towards Ti-7 drip shields and the C-22 outer layer of the remaining canisters, and this "can" affect the dissolution of the in-package waste forms. This is mere speculation about what possibly "can" happen, which is unsubstantiated by citation to a single scientific or factual source. The contention also fails to explain how elevated flouride concentrations in late phase brine formation could become more aggressive than already contemplated in DOE's model. Nor does it explain how more aggressive flouride concentrations would affect the dissolution of the in-package waste form.

Nevada rolls these assertions into an argument that the increased flouride concentrations must be "coupled to" the geochemical behavior of other, unspecified EBS components. According to Nevada, because DOE did not take into account these couplings, the geochemical

“complexity” of the entire in-drift and near-field environment is underestimated and insufficiently examined by DOE because there is a “potential for enhanced rates of release of radionuclides to the accessible environment.” Petition at 500. The contention lacks any description of the other EBS components that it claims must be coupled to the increased flouride concentration and hypothesizes about a “potential” result. And, again, Nevada cites no scientific authority for these broad conclusions.

Even more vague is Nevada’s passing comment that “[t]he flouride issue is only one of many geochemical issues” that requires coupling. *Id.* Nevada does not even hint at what other “geochemical issues” it seeks to raise in this contention. Nevada cites no scientific references or expert opinions for this overbroad assertion.

Nevada is required to substantiate all these assertions with expert opinion or citations to scholarly authority. Nevada’s Petition concedes this much. *See* Petition at 499 (heading 5 stating, “A concise statement of the facts or expert opinions supporting the contention, *along* with appropriate citation to supporting scientific or factual materials”). Here, however, in the entire contention, Nevada cites only the SAR and then only for background purposes. Thus, instead of meeting the requirement to cite scientific or factual materials, Nevada relies only on attorney argument. A contention is “inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

The three boilerplate expert affidavits that “adopt” the contention do not change the conclusion that the contention must be dismissed. These one-page affidavits are wholly inadequate support for Nevada’s challenge. *See* Petition Attachment Nos. 3, 17, & 18. They

contain no reasoning or substantive discussion of the specific contention issues. An expert affidavit, no less than any other purported factual basis for a contention, must be grounded in fact and reasoned explanation. *USEC, CLI-06-10, 63 NRC at 472*. Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel, CLI-03-13, 58 NRC at 203*. The inadequacy of these affidavits is underscored by the fact that the contention itself does not mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be cured by these inadequate affidavits. *See USEC, CLI-06-10, 63 NRC at 472*.

In summary, the contention fails to identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section IV.A.3, above, contentions that allege errors, omissions, uncertainties or alternative approaches--without specifying the ramifications or results of such alleged deficiencies--fail to raise a genuine dispute on a material issue of fact or law and are, therefore, inadmissible. Nevada provides no quantitative or even qualitative information regarding whether and to what extent DOE’s conclusions in the TSPA would change if DOE had coupled the processes. Indeed, the regulations require evaluation of degradation processes in detail only “*if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Here, Nevada fails to allege—let alone provide scientific or factual support for an allegation—that the coupling the processes would cause the RMEI to be “significantly changed.”

Additionally, the contention describes a scenario involving flouride that would be

encompassed by DOE's conservative model. Dissolved fluoride inside of a breached co-disposal package would not lead to higher radionuclide releases than presently predicted in the TSPA. This is because the fluoride effects on radionuclide solubilities are taken into account in the existing radionuclide solubility model in SAR Section 2.3.7.10.3. The SAR explains that:

Uncertainty associated with the effects of  $F^-$  concentration is captured by the uncertainty term  $\epsilon_2$ . The source of fluoride for commercial SNF waste packages is groundwater, but in codisposal waste packages, HLW glass releases fluoride as it dissolves. *To evaluate the effects of fluoride content on solubilities, calculations for a range of pH values at a single  $fCO_2$  were made at higher fluoride contents for each type of waste and water influx condition.* Maximum fluoride levels are calculated by concentrating fluoride-containing seepage fluids; the highest fluoride level is 10 mM. In general, increased fluoride concentration is associated with increased radionuclide solubility, as shown in Figure 2.3.7-34 for thorium. For each element, the largest difference between the base-case solubility and the solubility associated with increased fluoride concentration was used to establish the uncertainty distribution for  $\epsilon_2$ . This difference is the maximum and least likely value of the triangular distribution of  $\epsilon_2$  that has a minimum and most probable value of zero (SNL 2007h, Section 6.5.3.4.3). This was done because only the relatively high fluoride concentrations significantly increase actinide solubility levels. In the TSPA, the sampled values for the  $\epsilon_2$  term for each actinide should be perfectly correlated, since the uncertainty represented is epistemic uncertainty in the fluoride concentrations in seepage waters.

SAR at 2.3.7-55 (emphasis added).

*See also* "Dissolved Concentration Limits on Radioactive Elements," (July 2005), LSN#: DN2002463266 at 6-58 & 8-2 to 8-3. In addition, DOE's model for inside-out general corrosion of C-22 implicitly includes the effect of fluoride since the model was calibrated using corrosion measurements conducted in solutions that contained high levels of fluoride. *See* SAR at 2.3.6-105 (Table 2.3.6.1).

Nevada's claim does not dispute this analysis. A contention that does not directly controvert a position taken by the applicant in the application does not raise a genuine dispute of material issue of law or fact and thus is subject to dismissal. *See Tex. Utils. Elec. Co.*, LBP-92-37, 36 N.R.C. at 384. Thus, the contention must be dismissed. Moreover, Nevada does not explain why the conservatism in this model is not sufficient to address the fluoride issue described in the contention. Nevada provides no quantitative or even qualitative information regarding whether and the extent to which possible elevated levels of fluoride would materially change DOE's corrosion analysis, let alone what impact it would have on the overall safety case for the repository.

A more fundamental problem with the contention is that it is premised on an assumption that dissolved fluoride issuing from a breached codisposal package would alter the ambient chemistry of the in-drift environment to the point where the drip shield and/or adjacent waste packages are breached. Nevada does not explain how this would occur and Nevada provides no authority for that proposition. In fact, the maximum fluoride level predicted to leave the waste package is 47.5 ppm (= 2.5 mM), *see* SAR Section 2.3.7.5.3.1 at 2.3.7-33, which is substantially lower than the fluoride-rich solutions used to develop the C-22 and dripshield corrosion models, *see* SAR 2.3.6.-105 (Table 2.3.6-1). Consequently, any impact of breach fluoride on adjacent packages would fall within the existing range of predicted corrosion behavior.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Petition at 501, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that

its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**93. NEV-SAFETY-93 - Natural Lead Reactions On C-22**

SAR Subsection 2.3.6 and similar subsections, which deal with waste package and drip shield corrosion, fail to account for deleterious effects of natural lead remobilized and/or newly mineralized as coronadite  $[Pb(Mn_{4+}Mn_{2+})_8O_{16}]$  and/or lead carbonates in unsaturated zone fracture system seepage onto C-22 surfaces.

**RESPONSE**

In this contention, Nevada alleges that in SAR 2.3.6 and “similar subsections,” DOE “fail[s] to account for the deleterious effects of natural lead remobilized and/or newly mineralized as coronadite ... and/or lead carbonates in unsaturated zone fracture system seepage onto C-22 surfaces.” Petition at 502. For the reasons discussed below, this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention fails to state, with requisite specificity, an issue of law or fact justifying its admissibility in this proceeding.

**b. Brief Explanation of Basis**

For the many reasons discussed below, this contention lacks adequate factual or legal bases, and must be dismissed for that reason.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 508. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be

met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any relevant supporting documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Don L. Shettel, Jr., Maurice E. Morgenstein and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Further, Nevada cites to a single document in the contention as the supporting scientific or factual material-- "Effects of Lead, Mercury, and Reduced Sulfur Species on the Corrosion of Alloy 22 in Concentrated Groundwaters as a Function of pH and Temperature," Scientific Basis

for Nuclear Waste Management XXV, Symposium held 11/26-29/2001, Boston, Massachusetts, (2002), LSN# NEV000002753 (hereafter, "LSN# NEV000002753"). Petition at 504. Yet, this document is cited simply to support the proposition that "[i]f coronadite were to enter or form in the emplacement drifts and were to be deposited on the surface of C-22 outer container barrier, there is reasonable evidence that the lead would react with C-22 to cause corrosion." *Id.* This document consists of a series of slides discussing corrosion testing of C-22. However, the materials make clear that the corrosion at issue therein occurred only under the most aggressive (accelerated) conditions, and the state has made no showing that such conditions would be found at Yucca Mountain. *See* LSN#: NEV000002753 at 9. Moreover, even so, the research concluded that these unrealistically aggressive conditions merely "enhanced" corrosion. *Id.* at 9. As discussed below, with regard to the other assertions in the contention hypotheses, the contention is devoid of any scientific support.

In this regard, Nevada has merely hypothesized a scenario involving coronadite, a manganese lead oxide, and lead carbonate that, at most, indicates that there is a mere possibility, given a series of events, that corrosion of the C-22 surfaces of the waste package could result. Nevada's assertions are important for what they do not contain – Nevada does not assert that the hypothetical scenarios that it alleges are certain to occur, or even that they are probable, or likely, or even significantly plausible at Yucca Mountain. Nevada's claims are mere speculation, and as such should be ruled inadmissible as detailed below.

With respect to the assertion that corrosion could potentially result from coronadite, Nevada admits that coronadite "has been well characterized in the DOE program." Petition at 504. Nevada also acknowledges that "in the present day Yucca Mountain most of the lead-loaded manganese oxides are located below the repository." *Id.* But Nevada asserts, without

support or reference to relevant scholarship, only that “it is *possible* that the elevated repository temperatures in the near field and with the normally high degree of oxidation in the transporting fluids, new mineralization of similar manganese oxides will occur.” *Id.* (emphasis added). Nevada then asserts that it is possible that these newly-formed manganese oxides could be transported to the emplacement drifts, asserting that “the appearance of lead-manganese oxides at Yucca Mountain also *suggests the potential* of lead-bearing colloid transport to and from the near field.” *Id.* (emphasis added). Next, Nevada hypothesizes that “*If coronadite were to enter or form in the emplacement drifts and were to be deposited on the surface of C-22 outer container barrier*” then “there is reasonable evidence that the lead would react with the C-22 to cause corrosion.” *Id.* (emphasis added).

With respect to the lead carbonate, Nevada asserts, again without support or reference to relevant scholarship, that “[l]ead-containing carbonate is also present in fractures and faults in Yucca Mountain” and that “trace lead concentrations *have the potential* to cause deleterious reactions in C-22 *if the dust is deposited on the C-22 surface.*” *Id.* at 504-05 (emphasis added). It concludes that “[t]he potential for these deleterious reactions to occur should have been investigated by DOE.” *Id.* at 505.

The scenarios postulated by Nevada leading up to this conclusion depend on multiple independent events of causation, and Nevada merely asserts their theoretical possibility and does not demonstrate – nor does it even assert – that the causation described, much less the asserted result of corrosion of the C-22 material, is either certain or likely at Yucca Mountain. The Board should not accept such hypothetical, unsupported assertions. Even if this claim were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board

is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Nevada’s unsupported conclusion, that “the potential for these deleterious reactions should have been investigated by DOE,” should likewise not be accepted by the Board. Conclusory statements cannot provide “sufficient” support for a contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006).

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada first attempts to demonstrate a genuine dispute with DOE by repeating the assertions, discussed above, that DOE failed to consider the potential effects of coronadite and lead carbonates that could possibly result in corrosion of the C-22 surfaces of the waste package. As noted above, the contention is replete with nonspecific, vague, and indefinite assertions that do not give rise to a material deficiency. For instance, Nevada acknowledges that most of the type of materials containing lead at Yucca Mountain that it asserts could possibly cause corrosion exist below the repository. Petition at 504. Because the mechanism by which possibly corrosive material will come into contact with a waste package is via seepage, such materials below the repository would not appear in seepage above the repository.

Nevada also acknowledges that there is only a trace amount of such materials above the repository horizon. *Id.* at 504. To avoid the obvious conclusion that Yucca Mountain does not contain sufficient amounts of such material above the repository to cause concern, Nevada

hypothesizes that new material could be created in the future. However, this too is sheer speculation. Indeed, the contention is silent as to the probability that such new mineralization would occur or over what time frames.

Moreover, Nevada's mere assertion that DOE's SAR erred, does not, in and of itself, support a finding that there is a genuine dispute on a material issue of law or fact. An allegation that some aspect of a license application is "inadequate" or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

For all of the reasons set forth above, this contention should be dismissed in its entirety.

**94. NEV-SAFETY-94 - Significance Of Mineral Crusts In C-22 Corrosion**

SAR Subsections 2.3.6.4, 2.6.3.5 and similar subsections, which deal with localized and SCC waste package corrosion, fail to give adequate consideration to the role of mineral precipitates in forming crevices and facilitating corrosion on C-22 surfaces.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsections 2.3.6.4, 2.6.3.5 (*sic*) and similar subsections, which deal with localized and SCC waste package corrosion, fail to give adequate consideration to the role of mineral precipitates in forming crevices and facilitating corrosion on C-22 surfaces.” Petition at 507.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue.” Petition at 508. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention references no expert opinion and no documentary materials, other than the LA, in support of its position. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. §

2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any supporting documentary materials; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Maurice E. Morgenstein, Robert A. Cottis, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if the claims are construed to have been submitted by an expert, they still would not be sufficient to support admission of this contention. In an attempt to present support for its proffered contention, Nevada alleges a series of statements and unsupported assertions that do not provide adequate support for its contention. Nevada first asserts, without support or reference to any relevant scholarship, that as seepage water evaporates, mineral precipitates will begin to form, resulting first in the formation of "calcite, gypsum (selenite) and opal ... followed by chloride and nitrate salts" and that "[s]ome of the chloride and nitrate salts are hygroscopic." Petition at 508. Nevada next asserts, again without support or reference to any relevant scholarship, that "[s]alt scales and frothy caps ... will be dominated by calcite and gypsum with minor concentrations of opal," and that the "chlorides and nitrate salts will generally form in the 'pockets,' where brines have accumulated during the later stages of evaporation." Petition at 508-09. Nevada next asserts, again without support or reference to any relevant scholarship, that "[s]ome of the chloride and nitrate brines will become trapped against the C-22 surface." Petition at 509.

Nevada acknowledges that the SAR discusses the issue of scale or salt precipitation “as a crevice former” (*see* Petition at 509, citing SAR Subsection 2.3.6.4.3.1.3), but disputes the adequacy of DOE’s analysis. In this regard, Nevada asserts that:

1. “DOE provides no direct experimental evidence of the behavior of these crevices with respect to C-22 corrosion, and all DOE experimentation with respect to crevice and localized corrosion is based upon immersion studies” ;
2. “Consequently, the crevice repassivation potential that DOE utilizes is not justified or appropriate for use in radiological impact assessment as none of the experimentation offered to support the DOE model is based on the conditions expected to prevail on waste package surfaces”;
3. “The salt-based scale or evaporite deposits formed on the C-22 surface will initiate during the formation of brines [and this] evaporation can go to complete dryout and can be rewetted upon initiation of new seepage” ; and
4. “It is unlikely that these salt deposits will form only under continuous wet conditions. Thus, their structure and the compositions of included brines will be very variable and heterogeneous.”  
Petition at 509.

These four assertions indicate that Nevada has ignored the SAR discussion that summarizes the waste package outer barrier localized corrosion initiation model. *See* SAR § 2.3.6.4.1 at 2.3.6-31. This summary notes that “ ... mineral deposits could potentially form on the [waste package] surface due to evaporative concentration of solutions contacting the waste package” and that [c]orrosion rates may be enhanced where creviced geometries form on the waste package surface.” *Id.* The discussion also provides that [t]he data used to develop the critical potential model were obtained from samples with extremely tight crevices” and that the

“... results are conservative in that these crevices are more severe than those that may potentially occur where the waste package contacts the emplacement pallet or *in areas where mineral deposits form due to evaporative concentration*. *Id.* (emphasis added). This approach is “conservative because the initiation thresholds for crevice corrosion of Alloy 22 in terms of water chemistry and temperature are lower than for pitting corrosion.” *Id.* (internal citation omitted).

Nevada’s next assertion, made, as with all of the other allegations above, without support or reference to any relevant scholarship or expert opinion, is that “DOE’s [corrosion] model “is unrealistic” because it “treats corrosion propagation as occurring at a rate that does not depend on the conditions of chemical exposure” and because “... in some of the conditions that are likely to occur the corrosion will likely stifle; whereas, in other conditions such as salt crusting, pitting can lead to channeling that can then lead to SCC with very rapid failure.” Petition at 509. Nevada further alleges, again without support or reference to any relevant scholarship or expert opinion that, in this regard, DOE’s “... use of a constant [corrosion] rate is inappropriate and has the potential to underestimate the degree of penetration of the waste package,” and thus “the localized corrosion propagation model ... is not applicable to the environment in the waste emplacement drifts nor does it provide an appropriate conceptual model for the corrosion behavior of C-22.” Petition at 509-10.

Further, Nevada asserts, once again without support or reference to any relevant scholarship or expert opinion, that “DOE also utilized a time-dependent propagation rate model in which the rate slows with time . . . [and that ] this model is not supported by any experimentation relevant to the environments likely to be encountered in the waste emplacement drifts, and is extremely unlikely to accurately describe C-22 corrosion under a salt cap.” Petition

at 510. In this regard, Nevada ignores the provisions of SAR section 6.3.4.1 which provides that “[o]nce localized corrosion initiates, the rate of propagation is conservatively modeled at a constant rate.” See SAR §6.34.1 at 2.3.6-31. Lastly, Nevada alleges, without support or reference to any relevant scholarship or expert opinion, that “[t]he localized corrosion propagation rates ... in SAR Subsection 2.3.6.4.3.2.1 are not based upon corrosion rates obtained from relevant environment-specific experimentation...” but [r]ather ... are apparently based upon a DOE literature review of experiments that ... are not directly applicable to estimating the actual corrosion rates that would occur under a salt cap on a waste package surface.” Petition at 510.

Nevada’s wide-ranging and diverse allegations noted above have one thing in common; they all are made with utterly no support from any documentary supporting reference or expert opinion. In fact, the many and varied assertions contained in Nevada’s Statement of Alleged Facts or Expert Opinion set forth in subsection 5 of Nevada’s contention amount to merely unsupported assertions of counsel. As such, they cannot provide adequate support for a contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Even if these claims were construed to have been submitted by an expert, they would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.”

*Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

In an attempt to demonstrate a genuine dispute in paragraph 6 of the contention, Nevada first asserts that “SAR Subsection 2.3.6 and other similar subsections fail to provide adequate consideration of the role of mineral precipitates in forming crevices and the accompanying corrosion on C-22 surfaces.” Petition at 510. SAR Section 2.3.6 is 192 pages in length; Nevada fails to identify the portion of SAR Section 2.3.6 that is allegedly deficient and does not further identify the assertedly “similar” deficient subsections of the SAR. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). For this reason alone, this contention is inadmissible.

Next, Nevada merely repeats its unsupported, conclusory and speculative claims from its “Statement of Alleged Facts or Expert Opinion” in paragraph 5 of the contention, concluding that “[t]here are strong scientific arguments that this mode of corrosion will be extremely significant, but its extent and significance cannot be assessed on the basis of the information provided and models developed by DOE.” Petition at 510-11. As in subsection 5, Nevada fails to identify any supporting references or expert opinion relating to these purportedly “strong scientific arguments,” and thus fails to offer any support to demonstrate a genuine dispute. An allegation that some aspect of a license application is inadequate or unacceptable does not give

rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 n.12 (1990).

Nevada next alleges that SAR Subsection 2.3.6 and similar subsections “do not comply with 10 C.F.R. § 63.114(f), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must provide the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment ...” and that “degradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.” Petition at 511.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**95. NEV-SAFETY-95 - Peak Thermal Period Seepage And Corrosion**

SAR Subsections 2.3.3, 2.3.5 and 2.3.6 and similar subsections dealing with water seepage and corrosion, fail to account for corrosion of C-22 and Ti-7 during the thermal period.

**RESPONSE**

Nevada argues that SAR Subsections 2.3.3, 2.3.5, and 2.3.6 and “similar subsections,” which state or assume that thermal seepage into emplacement drifts will not occur during the thermal period, are incorrect and thereby fail to consider the capacity of water seepage to cause C-22 and Ti-7 corrosion.

**a. Statement of Issue of Law or Fact to be Controverted**

Paragraph 1 of this contention states that “SAR Subsections 2.3.3, 2.3.5., and 2.3.6, and similar subsections dealing with water seepage and corrosion” fail to consider corrosion of C-22 and Ti-7 during the thermal period. Petition at 513. Nevada, however, raises for the first time in paragraph 5, SAR Subsections 2.3.2.1, 2.3.2.2.2.4., and 2.3.2.4.1.2.4.4, in the context of discussing the possible formation of “perched water zones.” Petition at 514.

It is impossible to discern what precisely the focus of this contention is and which section of the LA it is that Nevada seeks to challenge. 10 CFR § 2.309(f)(1)(i) requires that “a specific statement of the issue of law or fact to be raised or controverted.” The June 20, 2008 Case Management Order further notes that “this [§ 2.309(f)(1)(i)] statement shall set forth petitioner’s contention in precisely the form it wishes the contention to be considered.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6). Nevada’s inconsistent statements regarding the specific SAR sections that it wishes to challenge make it clear that Nevada has not met the pleading specificity requirements of 10 CFR § 2.309(f)(1)(i) and its related obligations of the June 20, 2008 Case Management Order. Accordingly, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada alleges that seepage into the emplacement drifts is possible during the thermal period and that such seepage has “the capacity to cause C-22 and Ti-17 corrosion.” Petition at 513. In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.102(h), 10 C.F.R. §63.113, and 10 C.F.R. §63.115. *See* Petition at 513-14. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3. *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the impact of thermal seepage on corrosion of the engineered barrier system (EBS) is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada claims that “[s]eepage into the emplacement drifts is possible during the thermal period and brines and deliquescent salts formed during this seepage have the capacity to cause C-22 and Ti-7 corrosion.” Petition at 513. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Stephan K. Matthai, and Don L. Shettel), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada argues that the SAR fails to analyze that drift seepage into emplacement drifts during the thermal period has the capacity to cause C-22 and Ti-7 corrosion. As fully explained below, this contention, however, ignores the features and processes that reduce or prevent drift seepage during the thermal period, fails to recognize that the SAR identifies that the EBS will demonstrate corrosion resistance to a wide range of solutions and temperatures, and fails to allege how thermal seepage will have deleterious effects on the EBS. Accordingly, this contention fails to raise a genuine dispute of material fact or law and must be dismissed.

First, while Nevada claims that "[b]reakdown of [capillary] barriers could lead to non-equilibrium seepage events that are not limited by a wall rock temperature of 100 (degrees) C" (Petition at 514), Nevada does not show how this alleged seepage will affect the waste package or other aspects of the EBS, and how, if at all, this would affect radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a

genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Next, this contention ignores DOE's extensive discussion of thermal drift seepage. As explained in SAR §§ 2.3.3.1 and 2.3.3.3, thermal features, events, and processes prevent or significantly reduce drift seepage during the first few hundred years after closure when temperatures are high enough to cause boiling conditions. The heat from waste decay impedes seepage by "thermal perturbation caus[ing] additional diversion of water around repository drifts." SAR § 2.3.3.1 at 2.3.3-6. Thus, the "[p]artial or complete diversion of water around the emplacement drifts due to capillary diversion, in combination with vaporization during the thermal period, reduces or prevents seepage into the emplacement drifts." SAR § 2.3.3.2.1.1 at 2.3.3-10. Accordingly, seepage "is not expected to occur as long as boiling temperatures and dryout conditions prevail in the rock above the repository." SAR § 2.3.3.1 at 2.3.3-6. Seepage would only be possible during this period if "both the vaporization barrier in the boiling zone and the capillary barrier at the drift ceiling would be breached. Results from the thermal-hydrological seepage model demonstrate that this scenario is not expected." SAR 2.3.3.3.1 at 2.3.3-58.

Nevada argues, however, "that it is possible to generate seepage into the containment drifts during the thermal period in conceptual models and for a range of realistic parameter values that have not been addressed by DOE." Petition at 515. Nevada's unsupported assertion challenging the thermal-hydrologic seepage model and claiming that DOE has only considered conditions in which non-equilibrium seepage does not occur is simply not a sufficient basis for rejecting the model. Nevada fails to demonstrate that its claims, even if accepted, would have any material effect on seepage into emplacement drifts during the thermal period. In particular,

the contention does not allege or demonstrate that the use of a different method would result in more accurate modeling of thermal drift seepage, or is inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Nevada further alleges that “[s]eepage into the emplacement drifts is possible during the thermal period and brines and deliquescent salts formed during this seepage have the capacity to cause C-22 and Ti-7 corrosion” (Petition at 516) and that DOE “ignores all corrosive reactions on EBS materials during the thermal period.” Petition 515.

To the extent Nevada alleges that DOE has failed to address corrosion of the waste package and drip shield as a result of deliquescence, Nevada fails to recognize that DOE has considered such occurrences and excluded them from the TSPA on the basis of low consequence and low probability, respectively. FEP 2.1.09.28.0A, *Localized Corrosion on Waste Package Outer Surface Due to Deliquescence*, states that “[d]uring [the thermal period] and for as long as the drip shields perform their function, the only aqueous phase that could potentially contact the waste package outer surface is brine that originates by deliquescence of soluble salts in dust residing on the waste package. The potential for brines formed by dust deliquescence to initiate and sustain localized corrosion that results in failure of the waste package outer corrosion barrier has been evaluated” and has been screened as low consequence. FEP 2.1.09.28.0A, “Localized

Corrosion on Waste Package Outer Surface Due to Deliquescence”, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824 at 6-705 (Mar. 6, 2008).

FEPs excluded on the basis of low consequence are those whose omission would not result in significantly adverse changes in radiological exposures to the RMEI, or radionuclide releases to the accessible environment. *Id.* at 6-1. FEP 2.1.09.28.0B, “Localized Corrosion on Drip Shield Surface Due to Deliquescence,” has been excluded due to low probability. *Id.* at 6-711. FEPs excluded on the basis of low probability are those having less than one chance in 10,000 of occurring within 10,000 years of disposal. *Id.* at 6-1. Clearly, DOE has satisfied its obligation consistent with 10 C.F.R. Part 63 to examine the effect of deliquescence on EBS corrosion. Significantly, Nevada has provided no analysis countering DOE’s exclusion of these FEPs on the basis of low consequence and low probability. Consequently, Nevada fails to raise a genuine dispute of material fact or law.

The possibility of seepage redissolving salts precipitated in the near-field host rock during the thermal period is considered by FEP 2.2.08.04.0A, and is excluded on the basis of low consequence. FEPs 2.2.08.04.0A, Re-Dissolution of Precipitates Directs More Corrosive Fluids to Waste Packages, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, 6-995 (Mar. 6, 2008). As stated in this FEP, the process of “redissolution of mineral precipitates is examined in the drift-scale thermal-hydrologic-chemical (THC) seepage model,” which is used to evaluate the significance of THC processes on the chemistry of seepage waters. *Id.* Additionally, DOE has conducted a sensitivity study that integrates the features of the seepage model with the drift-scale THC model to evaluate potential changes in seepage composition. The results of these studies shows that

precipitates that may form in the host rock during the thermal period consist primarily of “silica and calcite, but also including halite, anhydrite, and minor amounts of sulfate, carbonate, and nitrate salts.” *Id.* These precipitates redissolve when moisture returns to the dryout zone, with “small amounts of concentrated brine” forming when rewetting first occurs approximately 1,000 years after repository closure. *Id.* Furthermore, when seepage does occur, seepage composition is dilute because “large local percolation flux is required to produce seepage, and the small amounts of brine that can be produced are insufficient to impact seepage chemistry.” *Id.* In addition, in order for the transient changes in the composition of seepage that occurs immediately after rewetting to be significant, the drip shield must fail during, or prior to, rewetting.. *Id.* at 6-996.

As shown above, DOE has analyzed the potential effect of seepage on corrosion of EBS materials, finding that in the unlikely event of a transient pulse of early seepage containing redissolved salts, the solution will be dilute, and corrosion to the waste package will be impeded by the drip shield.

Furthermore, Nevada ignores further discussion demonstrating that seepage during the thermal period would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, “Waste Package and Drip Shield Corrosion”:

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at § 2.3.6-6.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using conservatively high estimates of the likely failure rates. As a result, even if the TSPA did not account for all of the possible effects of corrosion of C-22 and Ti-7 from seepage into emplacement drifts during the thermal period, the effect on TSPA results would likely be insignificant. Petitioner does not dispute or even address the discussion in SAR § 2.3.6.

In fact, paragraph 6 of this contention essentially admits that Nevada does not know whether this contention raises a genuine dispute of a material issue: allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Petition at 517, Nevada has not indicated whether it has attempted to determine what effect the contention would have on the doses. Petition at 358. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed. Nevada’s position constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and this contention must be dismissed.

**96. NEV-SAFETY-96 - Salt Production and C-22 Corrosion Due To Heatpipe Conditions**

SAR Subsections 2.3.2.2.2.6, and 2.3.6 and similar subsections, which describe unsaturated zone heat-pipe thermal processes and corrosion, give a description of those processes that is inadequate for safety assessment, because it fails to recognize that convection cells can produce extensive deposits of evaporites that can result in a “pressure cooker” effect, can affect water delivery to the drip shield and waste package, and can provide large quantities of deliquescent salts to the in-drift environment affecting the lifetime calculations for C-22 and Ti-7.

**RESPONSE**

Nevada argues that SAR Subsections 2.3.2.2.2.6 and 2.3.6 “and similar subsections” which describe the “heat-pipe” process, in which Nevada alleges that convection cells can produce extensive deposits of evaporates that can result in a “pressure cooker” effect, are inadequate because they fail to address various factors affecting water delivery to the EBS during heat-pipe conditions and fail to address the effect of deliquescent salts on C-22 and Ti-7.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada argues that convection cells formed during heat-pipe conditions can produce evaporites that may affect water delivery to the EBS and “can provide large quantities of deliquescent salts to the in-drift environment affecting the lifetime calculations of C-22 and Ti-7.” Petition at 520-21. But Nevada is silent as to how any purported effect of heat-pipe conditions on C-22 and Ti-7 would result in DOE failing to comply with 10 C.F.R. Part 63. Therefore, Nevada has not demonstrated why this proposed contention – even if true – would be material to the findings the NRC must make in this proceeding.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations that apply to this contention (including 10 C.F.R. §63.21(a)(2), 10 C.F.R. §63.31(a)(3), 10 C.F.R. §63.21, 10 C.F.R. §63.21(c)(3)(ii), 10 C.F.R. §63.21(c)(14), 10 C.F.R. §63.102(h), 10 C.F.R. §63.113, 10 C.F.R. §63.115, and 10 C.F.R. §63.114(f). *See* Petition at 518-19. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3. *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the impact of the heat-pipe effect on EBS components is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Nevada alleges that heat-pipe conditions can affect the hydrogeology and hydrogeochemistry of emplacement drift conditions, consequently affecting the corrosion resistance of C-22 and Ti-7. Nevada, however, does not provide the requisite supporting facts, expert opinion, or references in support of its contention. Accordingly, this contention must be dismissed.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the LA and DOE’s

supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach two affidavits (by Maurice E. Morgenstein and Stephan K. Matthai), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada argues that DOE inadequately analyzes the effect of heat-pipe conditions, failing to recognize that "convection cells formed during . . . heat-pipe conditions can produce extensive deposits of evaporites that can affect water delivery to the drip shield and waste package and can provide large quantities of deliquescent salts to the in-drift environment affecting the lifetime calculations of C-22 and Ti-7." Petition at 520-21.

As more fully discussed below, this contention, however, fails to recognize that the TSPA accounts for heat-pipe conditions, as discussed in the LA, and fails to recognize that the SAR explains that the EBS will demonstrate corrosion resistance to a wide range of solutions and temperatures. Accordingly, this contention fails to raise a genuine dispute of material fact or law and must be dismissed.

First, while Nevada makes vague assertions that the hydrogeochemistry of unsaturated zone water "affected by heat-pipe conditions has the potential to be very different" from DOE's

assessment, can “greatly affect the stability and corrosion resistance of C-22 and Ti-7,” and is of “major potential importance in determining the lifetime of EBS components” (Petition at 520), Nevada does not demonstrate how, if at all, this would affect radiological dose results. Petition at 520-21. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Nevada argues that the heat-pipe processes that create hydrogeochemical conditions that will accelerate corrosion of C-22 and Ti-7 are not discussed in the LA. Nevada, however, fails to recognize that the TSPA accounts for heat-pipe conditions and its effect on corrosion of the EBS. FEP 2.2.10.10.0A states that:

The coupled processes causing heat-pipe behavior are simulated with the TH seepage model described in *Drift-Scale Coupled Process Models*. . . Using this model, the impact of heat-pipe behavior on seepage is assessed for several simulation cases in which percolation fluxes and rock properties are varied. Thus, the TH-seepage modeling results include the effect of heat pipes and the resulting uncertainties in the conditions under which seepage occurs and in the volume of seepage. The TH seepage model results are used to develop an appropriate thermal-seepage methodology in the seepage abstraction . . . The effect of heat pipes on predicted in-drift thermal-hydrological conditions is taken into account in the drift-scale submodels of *Multiscale Thermohydrologic Model*.

FEP 2.2.10.10.0A, “Two-Phase Buoyant Flow/Heat Pipes,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824 at 6-1086 (Mar. 6, 2008).

These factors are addressed in the SAR in, for example, § 2.3.3.1, § 2.3.3.3.1, and §2.3.3.3.3.2, which discuss the thermal-hydrologic processes and associated models.

Accordingly, Nevada's assertions that DOE has failed to adequately consider heat-pipe conditions and their effect on corrosion of EBS components is incorrect. As stated above, DOE has analyzed these factors and their effect on repository performance. Nevada's bare assertions to the contrary fail to adequately challenge these analyses, thereby failing to raise a genuine dispute of material fact or law. Accordingly, this contention must be dismissed.

Nevada next alleges that the "eventual failure of salt plugs as a consequence of overburden weight" can create conditions beyond those considered by DOE. Petition at 520.

Next, Nevada claims that the effects of deliquescent salts on the in-drift environment "are of major potential importance in determining the lifetime of EBS components and are not addressed in the license application." Petition at 521. In doing so, Nevada fails to recognize, however, that localized corrosion of EBS components due to deliquescence has been considered and is excluded from the TSPA.

FEP 2.1.09.28.0A, "Localized Corrosion on Waste Package Outer Surface Due to Deliquescence," states that "for as long as the drip shields perform their function, the only aqueous phase that could potentially contact the waste package outer surface is brine that originates by deliquescence of soluble salts in dust residing on the waste package. The potential for brines formed by dust deliquescence to initiate and sustain localized corrosion that results in failure of the waste package outer corrosion barrier has been evaluated" and has been screened on the basis of low consequence. FEPs 2.1.09.28.0A, Localized Corrosion on Waste Package Outer Surface Due to Deliquescence, Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824 at 6-705 (Mar. 6, 2008). FEPs excluded on the basis of low consequence are those whose omission would not result in significantly adverse changes in radiological exposures to the RMEI, or radionuclide releases to

the accessible environment. FEP 2.1.09.28.0B, “Localized Corrosion on Drip Shield Surface Due to Deliquescence,” has been excluded due to low probability. *Id.* at 6-711. FEPs excluded on the basis of low probability are those having less than one chance in 10,000 of occurring within 10,000 years of disposal.

Clearly, DOE has satisfied its obligation consistent with 10 C.F.R. Part 63 to examine the effect of deliquescent salts on corrosion of EBS components. Significantly, Nevada has provided no analysis countering DOE’s exclusion of these FEPs on the basis of low consequence and low probability. Consequently, Nevada’s claim that heat-pipe conditions will affect water delivery and provide deliquescent salts to emplacement drifts fails to raise a genuine dispute of material fact or law.

Nevada also ignores the LA’s discussion demonstrating that the conditions alleged by Nevada, even if true, would not have a significant impact on TSPA results. For example, as explained in SAR § 2.3.6, “Waste Package and Drip Shield Corrosion”:

The alloys used to fabricate the waste packages and drip shields have excellent corrosion resistance over a wide range of aqueous solution compositions and temperatures. Based upon measurements of corrosion rates of the passive metals that comprise the waste package and drip shield, the waste packages and drip shields can remain intact with no penetrations due to general corrosion for durations of tens of thousands and even hundreds of thousands of years.

SAR at § 2.3.6-6.

SAR section 2.3.6 goes on to discuss the modeling of waste package corrosion in the TSPA, including generalized corrosion, localized corrosion, stress corrosion cracking, early failure due to manufacturing or handling-induced defects, and long-term thermal aging, and explains why the models are conservative (i.e., overestimate the likelihood of penetration of the

waste package corrosion barrier). SAR Subsection 2.3.6.2.2, “Waste Package Degradation Processes.” Overall, this discussion shows that the waste packages are highly resistant to corrosion, and that the TSPA has taken into account numerous potential causes of corrosion and waste package failure, using conservatively high estimates of the likely failure rates. As a result, even if the TSPA did not adequately account for the heat-pipe condition’s impact on the EBS, the effect on the TSPA results would likely be insignificant. Nevada does not dispute or even address the discussion in SAR § 2.3.6.

In fact, paragraph 6 of this contention essentially admits that Nevada does not know whether this contention raises a genuine dispute of a material issue. Allegedly due to the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions” (Petition at 522), Nevada has not attempted to determine what effect the contention would have on the doses. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises a genuine dispute of an issue material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed. Nevada’s position constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

For the reasons stated above, there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and this contention must be dismissed.

**97. NEV-SAFETY-97 - Crevice Corrosion On C-22 Due To Drip Shield Corrosion Debris**

SAR Subsection 2.3.6 and similar subsections, which describe the DOE model for drip shield corrosion, fail to recognize that the degradation of the drip shield will cause a debris field that collects on the surface of the waste canisters and that this debris field can accelerate C-22 corrosion resulting in degraded performance of the EBS.

**RESPONSE**

This contention alleges that SAR subsection 2.3.6 and similar subsections fail to recognize that the degradation of the drip shield will cause a debris field that collects on the surface of the waste canisters. According to Nevada, this debris field can accelerate C-22 corrosion, resulting in degraded performance of the EBS.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.113, 63.114, and 63.115. Petition at 523-24. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the

mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 524. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Nevada alleges an error in DOE’s analysis regarding the EBS, and claims that “coupled drip shield and waste canister degradation ... would have significant deleterious effects on the overall performance of the disposal system,” Petitioner has not alleged an increase in the mean dose *above regulatory limits*. Petition at 526.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere,

and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing corrosion of the drip shield is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Robert A. Cottis, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Although Nevada makes copious technical assertions regarding the alleged need to consider the debris field formed by drip shield failure, it does not provide *any* scholarly support. Therefore, this contention does not comply with 10 C.F.R. 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention urges that, based on various FEPs that have been inappropriately excluded from consideration, DOE has overestimated the performance of the drip shield and underestimated the resulting corrosion from the debris field, resulting in “deleterious effects on the overall performance of the disposal system.” Petition at 523. For several reasons, this contention does not establish a genuine dispute of material fact.

First, this contention is premised on the unsupported assertion that DOE has inappropriately excluded four FEPs (regarding drip shield corrosion) from consideration. Nevada maintains, without foundation or explanation, that “[a]ll of these [FEP] exclusions and the associated credit taken for the drip shield performance are based upon experimentation that either utilizes immersion in J-13 saturated water zone, or immersion in waters of simulated composition such as BSW-12 (basic saturated water) or contain a variety of salts.” Petition at 525.

Nevada ignores the extensive screening justification for each of the FEPs that it cites. As the screening justification explains, each FEP was excluded based on either low consequence or low probability. *See* FEP 2.1.03.02.0B, “Stress Corrosion Cracking (SCC) of Drip Shields,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, 6-396 (Mar. 6, 2008) (justifying DOE’s screening due to “low consequence”); FEP 2.1.03.03.0B, “Localized Corrosion of Drip Shields,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, 6-405 (Mar. 6, 2008), as amended “Scientific Analysis/Calculation Administrative Change Notice for Features, Events, and Processes for the Total System Performance Assessment: Analyses (C),” LSN#: DEN001585821, p.2 (Apr. 3, 2008) (justifying DOE’s screening due to “low consequence”);

FEP 2.1.06.07.0A, “Chemical Effects of EBS Component Interfaces,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, 6-538 (Mar. 6, 2008) (justifying DOE’s screening due to “low consequence”); FEP 2.1.09.28.0B, “Localized Corrosion on Drip Shield Surfaces Due to Deliquescence,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, 6-711 (Mar. 6, 2008) (justifying DOE’s screening due to “low probability”). With regard to its contention, Nevada does not even allege, much less specify, why, how, and to what extent DOE’s screening justifications are somehow incorrect. Moreover, Nevada fails to demonstrate that the magnitude or timing of either the radiological exposure to the RMEI, or the radionuclide releases to the accessible environment would be significantly changed by the omission of these FEPS. *See* 10 C.F.R. § 63.114(e). Thus, Nevada fails to raise a genuine dispute.

Second, this contention is with speculation and conjecture. Nevada asserts, again without foundation or citation to relevant scholarship, that “dripping conditions on the ‘drip shield’ will result in ... environmental conditions that are not taken into account in the DOE analysis” (*e.g.*, “Drip Shield corrosion will take place under rock and rock bolt dust deposits that act as crevice formers.”). Petition at 525-26. In addition, Nevada alleges the following: (1) “[a]s it is *anticipated* that the degradation of the drip shield will be more rapid and extensive than assumed by DOE, consideration needs to be given to the debris field formed by this drip shield failure:” (2) “[o]nce the drip shield fails, percolation will reach the C-22 surface;” and (3) “[t]he debris field that forms from the degradation of the drip shield will contribute to the corrosion of the waste canister.” Petition at 526 (emphasis added).

The scenarios postulated by Nevada leading up to this conclusion depend on multiple independent events of causation, and Nevada merely asserts their theoretical possibility and does

not demonstrate – nor does it even assert – that the causation described, much less the asserted result of corrosion of the waste canister, is either certain or likely at Yucca Mountain. The Board should not accept such hypothetical, unsupported assertions. Even if this claim were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26.

Third, Nevada asserts that DOE underestimated the rate of corrosion caused by debris fields that would “have significant deleterious effects on the overall performance of the disposal system.” Petition at 526. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. Petitioner provides no quantitative or even qualitative information regarding whether and the extent to which this corrosion would impact the disposal system. Thus, Petitioner fails to demonstrate a genuine dispute.

With respect to Nevada’s assertion regarding 10 C.F.R. § 63.114(f), its allegation is false. As discussed in detail above, DOE’s exclusion of FEP 2.1.03.02.0B, 2.1.03.03.0B, 2.1.06.07.0A, and 2.1.09.28.0B is well documented in “Features, Events and Processes for the Total System Performance Assessment: Analyses,” (March 6, 2008) (LSN# DEN001584824). Since Nevada has made no attempt to contravene DOE’s analysis, it has failed to raise a genuine dispute.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 527. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**98. NEV-SAFETY-98 - Rate Of Drip Shield Interconnection Corrosion**

SAR Subsections 1.3.4, Figures 1.3.4-14 and 1.3.4-15, and similar subsections which describe the drip shield, fail to recognize that the connector plate and plate sections, due to the interlocking design, form crevices that have the potential to provide a locus for SCC driven by the concentrations of chloride and fluoride in unsaturated zone waters.

**RESPONSE**

This contention asserts that DOE did not adequately consider that there will be crevices at the intersections between drip shield plates, and that the crevices are likely to intercept drips and provide environments in which Stress Corrosion Cracking (SCC) would occur.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention seeks to raise an issue that is outside the scope of this proceeding, because it argues for the application of a stricter standard than NRC regulations require. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001). Petitioner alleges that DOE failed to comply with 10 C.F.R. § 63.114(f), because it failed to consider the possible impact of SCC caused by the interception of drips at the intersections between drip shield plates. Nevertheless, 10 C.F.R. § 63.114(f) only requires the inclusion of a degradation, deterioration, or alteration process, such

as SCC “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly* changed by their omission.” (emphasis added). As discussed below, DOE excluded SCC of the drip shields from its TSPA based on DOE’s conclusion that SCC would not have a significant effect. Petitioner does not allege that the omission of SCC would have the requisite *significant* impact.

In effect, Petitioner appears to argue that 10 C.F.R. § 63.114(f) requires DOE to demonstrate through a performance assessment, such as its TSPA analysis, that inclusion of SCC as described in this contention, would not significantly change the results of the TSPA analysis. Petition at 531. Moreover, Petitioner appears to argue that such a confirmatory performance assessment must include every identified feature, event or process (FEP) to verify that including the combination of all such low probability and low consequence FEPs would not significantly change the TSPA results. Acceptance of this argument would be tantamount to requiring DOE to include in its TSPA every known FEP, regardless of its likelihood of occurrence or potential consequences. This obviously asks the Board to impose a stricter requirement than what 10 C.F.R. § 63.114 requires, which Petitioner is not permitted to do. *See Fla. Power & Light Co., supra.*

Similarly, Petitioner also claims that no one but DOE is capable of performing the modeling referenced in this contention. Petition at 530-1. By urging the admissibility of this contention while conceding that it does not know whether the alleged deficiency would impact the TSPA results or cause the dose to exceed the regulatory limits, Petitioner essentially argues that DOE must show that the contention does not raise a genuine dispute of a material issue of

fact. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not identify any legal requirement that directly addresses the consideration of drip shield SCC. Although Petitioner points out that 10 C.F.R. § 63.114(f) provides that “[d]egradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail *if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly* changed by their omission,” Petition at 529 (emphasis added), Petitioner does not argue that the omission of drip shield SCC would have a *significant* impact on radiological exposures or radionuclide releases.

Specifically, Petitioner implies that there would be a change in the TSPA results by its assertion that “[t]his omission means that the rate and degree of degradation of the EBS is underestimated, with *implications* for radionuclide releases and assessed doses to the reasonably maximally exposed individual.” Petition at 530 (emphasis added). But this falls far short of demonstrating that the omission is material because, as stated above, Nevada does not argue that the “implications” are significant. Nor has Nevada provided the basis for such an argument, as described below.

As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this flaw. Nevada has made no attempt to determine or estimate what effect, if any, acceptance of their contention would have

on its TSPA results. In fact, Nevada actually admits that it has no idea whether this contention raises a material issue because it is allegedly beyond its “practical ability” to determine what effect the contention would have. Petition at 531. Yet Nevada bears the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), including showing that the contention raises an issue that is material to this proceeding. *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Because it has not done so, the contention should be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

The legal standards that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 of this Answer. This contention fails to meet those standards because it presents only unsupported arguments of counsel. It should also be noted that, although not referenced in the body of this contention, attachments to three of the affidavits included with Nevada’s Petition reference this contention, albeit broadly.

Nevertheless, these references do not somehow save this contention from being dismissed for failure to provide an adequate statement of alleged facts or expert opinion. As discussed in Section V.A.3 above, the referenced expert affidavit(s) fall far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Ultimately, Petitioner cites two figures in SAR Section 1.3.4 in alleging that there will be crevices at the intersections between drip shield plates and that the crevices are likely to intercept drips and provide environments in which SCC would occur. Petition at 529. Based on nothing more than these figures, Petitioner then argues that:

- 1) DOE has excluded SCC on the basis of immersion experiments, but has not experimented with crevices in drip-dryout conditions using fracture flow unsaturated zone water;
- 2) The omission of drip shield SCC means the rate and degree of degradation of the EBS is underestimated; and
- 3) That this asserted underestimation has implications for radionuclide releases and assessed doses to the RMEI.

*Id.* at 529-30. These arguments lack any basis in fact whatsoever.

With respect to Petitioner's first claim involving exclusion of SCC based on immersion experiments, Petitioner is simply wrong. The DOE does not rely on immersion experiments and as the LA states, exclusion of drip shield SCC is based on the determination that any such cracking would not have significant consequences. Specifically, the LA states, and Petitioner does not dispute, that:

Stress corrosion cracking is modeled to be independent of the environment although the environments to support stress corrosion may not occur within the repository. The presence of cracks will not affect the performance of the drip shield in preventing or substantially reducing the amount of water that could directly contact the waste package, and is excluded from TSPA.

SAR Subsection 2.3.6.9.1, "Summary of Significant Processes for EBS Barrier Capability," at 2.3.6-86 (citation omitted). Thus, DOE excluded drip shield SCC from the TSPA on the basis of the low consequence, not on a determination that SCC is unlikely to occur.

The SAR also shows that DOE did testing of drip shield SCC under conditions that are expected to exist in the drifts. The SAR states that:

. . . [a]vailable literature indicates Titanium Grade 7 is extremely resistant (or immune) to stress corrosion cracking initiation in repository-relevant brine environments.... Consistent with the

literature, DOE-conducted testing confirmed that no stress corrosion cracking initiation is observed over the full range of primary (constant-load) (Figure 2.3.6-28) and secondary (U-bend) stresses that were evaluated.

SAR Subsection 2.3.6.8.3 “Stress Corrosion Cracking of Drip Shield,” at 2.3.6-79 (citation omitted). As a result, Petitioner’s unsupported criticisms of DOE’s testing also miss the mark.<sup>64</sup>

With respect to Petitioner’s second claim, which relates to “the rate and degree of degradation of the EBS,” that claim apparently is nothing more than unsubstantiated speculation, based on Petitioner’s mistaken and unsupported belief that DOE’s basis for excluding drip shield SCC was inadequate testing. In any event, as discussed above, the Petition does not dispute DOE’s conclusion that the presence of cracks due to SCC will not affect the performance of the drip shields.

As for Petitioner’s third claim, it is nothing more than the culmination of Petitioner’s preceding unsupported claims. As a result, this claim is unsupported as well. Consequently, the Petition fails to demonstrate that the issue raised in this contention is material to the findings that the NRC must make to support issuance of construction authorization.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this flaw.

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<sup>64</sup> The LA also shows that DOE’s testing did consider the potential for corrosion in drip shield crevices. In summarizing the results of long-term corrosion tests on titanium alloys to provide the technical basis for models for drip shield degradation, the SAR notes that “[r]esults from testing in repository-relevant environments show that creviced specimens exhibit slightly lower corrosion rates than weight-loss specimens; only the weight-loss data were used in the model.” SAR at 2.1-104.

As discussed above, the only specific portions of the LA cited in connection with this contention are two figures in the SAR that the Petitioner does not dispute, but rather relies upon as support for its position that there will be drip shield crevices and, as a result, SCC. Petition at 529. Petitioner does not, however, include any references to portions of the LA that Petitioner disputes and does not provide any supporting reasons for disputing any statements in the LA. More specifically, nothing in this contention indicates that the Petitioner disputes the assessment described in the LA that any SCC of the drip shields would not have a significant effect. Because Petitioner does not dispute the assessment of low consequence or otherwise claim that the TSPA results would change “significantly” if drip shield SCC was included, the Petitioner has failed to demonstrate the existence of a genuine dispute on a material issue of fact.

**99. NEV-SAFETY-99 - Boric Acid Production From HLW Dissolution**

SAR Subsection 2.3.7 (FEP 2.1.09.02.0A) and similar subsections, which describe chemical interactions with corrosion products, fail to recognize the potential corrosive role of boric acid formed from the dissolution of HLW glass waste.

**RESPONSE**

This contention alleges that SAR section 2.3.7 fails to recognize the potential corrosive role of boric acid formed from the dissolution of HLW glass waste.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.113, 63.114, and 63.115. Petition at 532-33. Petitioner's mere recitation of regulatory provisions does not satisfy its burden of demonstrating the issue raised in this contention is material to the findings that the NRC must make in this proceeding. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action

that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Nevada alleges a deficiency in DOE’s model with respect to boric acid, Petitioner has failed to establish that the error is relevant to DOE’s compliance with any Part 63 requirement. Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada claims that DOE (1) fails to consider the potential corrosive role of boric acid, (2) underestimates the potential radionuclide release from the EBS, and (3) underestimates radiation doses to the RMEI (Petition at 534). But, as stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Michael C. Thorne, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In order to support its assertion that "the role of boron in evaporative environments has not been favorable to the nuclear industry," Nevada cites – as an example – the "problems encountered at the Davis Besse nuclear reactor." Petition at 533. Nevada provides no justification for its claim that conditions for the reactor vessel head degradation at Davis-Besse are somehow applicable to potential corrosion in a high-level waste package at Yucca Mountain. As the Commission has ruled, a petitioner must explain the significance of any factual information upon which it relies. *See Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 204-05 (2003). Nevada has not done so.

In summary, this contention does not sufficiently identify any documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention states that DOE has not considered the potential for boric acid to form in the in-drift environment as a function of the degradation of the HLW glass waste form “despite the large concentration of boron in the glass and the history of boric acid caused corrosion in the nuclear industry.” Petition at 532. For several reasons, this contention does not establish a genuine dispute of material fact.

First, this contention is filled with speculation and conjecture. By way of example, Nevada asserts the following: (1) DOE fails to recognize the “*potential* corrosive role of boric acid” from HLW dissolution (Petition at 532) and (2) “The quality of boron that *can* be released from one breached canister *may* be quite *sufficient* to affect the corrosion of other canisters encapsulated in the same drift – thus a domino effect can occur.” Petition at 534 (emphasis added). The Board should not accept such causal, hypothetical, and unsupported assertions. Even if these claims were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Furthermore, Nevada’s unsupported conclusion, that DOE should have considered boric acid based on the “history of boric acid caused corrosion in the nuclear industry,” (Petition at 532), should likewise not be accepted by the Board. Conclusory statements cannot provide

“sufficient” support for a contention. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

Second, the contention alleges that because DOE did not consider boric acid corrosion, the LA is deficient and underestimates potential radionuclide release. Petition at 534. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency. Nevada provides no quantitative or even qualitative information regarding whether and the extent to which radionuclide releases and radiation dose to the RMEI would result from consideration of boric acid formation in the in-drift environment. Thus, Nevada fails to demonstrate a genuine dispute.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 535. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility)*, LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**100. NEV-SAFETY-100 - Ground Support Components and In-Drift Modeling**

SAR Subsection 1.3.4.4 describes the ground support system as including Bernold-type sheets that have the potential to degrade during heat-up, the peak thermal period, and cool down generating oxyhydroxide debris fields on drip shields (comprising dust, scale and granular debris) and waste canisters (comprising oxyhydroxide dust and scale). These debris fields will result in the formation of mineralized crevices that can trap acid vapors formed by deliquescent salts derived from dust and percolation, thereby increasing corrosion rates and adversely affecting the containment properties of the system. However, SAR Subsection 2.3.5 and similar subsections, which describe the in-drift chemical environment models, fail to take account of the ground support components in defining the chemical composition of the in-drift environment.

**RESPONSE**

In this contention, Nevada challenges SAR Subsection 2.3.5 and “similar” (though unspecified) subsections for failing to take into account the ground support components in defining the chemical composition of the in-drift environment. Petition at 536.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 537-38, section 4. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 538. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 333-34 (1999).*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere,

and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

The contention argues DOE did not consider that ground support systems could degrade and generate debris fields and in turn, the corrosion “potential” of the critical EBS components, including the C-22 canister surface, will be “affect[ed].” Petition at 536. Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section IV.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and as discussed in the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach three affidavits (by Michael C. Thorne, Maurice E. Morgenstein, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” these otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In this contention, Nevada claims that DOE neglected to consider the “potential” of the ground support components to degrade and thus produce oxyhydroxide debris fields on the drip shields and waste canisters. Petition at 538. According to Nevada, this has two implications: the oxyhydroxide dust can (a) sorb transition metals, and (b) “physically promote” the crevice

formation, which “can” harbor acid vapors. Petition at 536, 538-39. Although Nevada claims that the debris fields will have a “deleterious chemical effect” and can “harbor acid vapors,” *id.*, Nevada fails to quantify the amount of debris fields that supposedly will result from the degradation of the ground support components or suggest what amount of debris that could cause these effects. Nor does Nevada state that the debris fields would have a material effect on DOE’s corrosion model. In short, all of the assertions in the contention are nothing more than broad speculation about what might happen, and, moreover, they are wholly unsupported by any scholarly authority.

Without proper support, Nevada asserts that DOE was deficient for not taking these debris fields into account in developing the in-drift chemical environmental models, which in turn (Nevada claims) would affect DOE’s corrosion model. Petition at 536. The Board should not accept these hypothetical, unsupported assertions. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 N.R.C. 451, 472 (2006). Nevada is required to back up its assertions with a citation to scholarly authority. Nevada does not do so.

If a petitioner, like Nevada, “has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation,’” the contention must be dismissed. *Fansteel, Inc. (Muskogee, Oklahoma Site)* CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc. (Oyster Creek Nuclear Generating Station)*, CLI-00-06, 51 NRC 193, 208 (2000)). The three boilerplate expert affidavits that “adopt” the contention do not change that outcome here. These affidavits are wholly inadequate support for Nevada’s argument that DOE should have considered these coupled processes. *See* Petition at Attachment Nos. 3, 17, and 18. These one-page affidavits contain no reasoning or substantive discussion of the specific contention issues. An expert affidavit, no less than any other purported factual basis

for a contention, must be grounded in fact and reasoned explanation. *USEC*, CLI-06-10, 63 NRC at 472. Absent any tangible information or substance—let alone a “reasoned basis or explanation”—these affidavits offer no support for this contention, rendering it inadmissible. *Fansteel, Inc.* CLI-03-13, 58 NRC at 203. The inadequacy of these affidavits is underscored by the fact that the contention itself does not even mention them. Nevada’s failure to cite supporting scientific or factual materials in the contention cannot be salvaged by these paltry affidavits. *See USEC*, CLI-06-10, 63 NRC at 472.

In summary, the contention fails to explain the basis for its challenges, much less identify any documents or expert opinion to support the contention. The contention therefore must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that flaw.

Nevada is simply wrong that DOE failed to take into account the ground support components in defining the chemical composition of the in-drift environment. Even if true, it would not raise a genuine dispute of material issue of law or fact

First, in SAR 2.3.5.5.3.3.2, DOE presented a sensitivity analysis examining the effect of interactions with ground support system components on the in-drift chemical environment:

A process-level sensitivity analysis was conducted to examine the effect of interactions with introduced materials, such as components of the ground support system and invert and *their corrosion products*, on in-drift water chemistry. The results indicated that interactions with steel ground support materials will

not have a significant effect on the predicted chemistry of aqueous solutions in the drift (SNL 2007b, Section 6.8). Metal ion solubilities are low under oxidizing conditions, *and the corrosion of steel to oxides/oxyhydroxides had no effect on pH, ionic strength, or other compositional parameters.* The potential for reduction of nitrate in seepage water by interactions with metal in the drift was also evaluated. However, metal oxidation reactions greatly favor free oxygen, and this selectivity, as well as the greater abundance of oxygen relative to nitrate in the drift environment, will inhibit reduction of nitrate in seepage water.

SAR at 2.3.5-132. The details of this sensitivity analysis can be found in Section 6.8 (Steel Interactions with Seepage Water) of the “Engineered Barrier System: Physical and Chemical Environment” (“Engineered Barrier System”) (Aug. 2007), ANL-EBS-MD-000033 REV 06, LSN#: DN2002452948 at 6-132.

Nevada does not discuss or even acknowledge these analyses. Thus, Nevada clearly fails to raise a genuine dispute of material issue of fact as to whether DOE took into account the ground support components in the in-drift environment.

Second, even if DOE had failed to consider the debris fields, there would be no impact on DOE’s model because although brines associated with the existence of deliquescent salts may generate small pressures of acid-gas species, the amounts of these species will be insignificant for several reasons. In particular, there are limited amounts of deliquescent salts in the repository because they are derived from dust and seepage, with seepage occurring only after the temperature at the drift falls below 100° degrees C (at this time, the waste package would be slightly above that temperature). Further, such seepage waters will be very dilute. *See* SAR at 2.3.5.-143. In addition, as discussed in Section 6.2 (*If Brines form at Elevated Temperatures, will they Persist*) of “Analysis of Dust Deliquescence for FEP Screening”, as brine releases acid species, it becomes more alkaline, which in turn limits further release of these species. *See* Analysis of Dust Deliquescence for FEP Screening (“Analysis of Dust Deliquescence”) (Aug.

2005), ANL-EBS-MD-000074 REV 01 AD 01, LSN#: DN2002478854 at 6-22, 6-23, & 6-43.

The same report further pointed out that even small amounts of degassing (1% or less of the total chloride) result in large increases in pH (in other words, large reductions in acidity). LSN#: DN2002478854 at 6-26 & 6-43. This indicates that either only a small fraction of the total amount of nitrate or chloride in dust or seepage can be released as acid vapor as the process limits itself, *id.* at 6-43, or that the acid gases would continue to form because the gas convection down the drift removes the acid gas species to a liquid sink at lower temperature at the drift ends (condensation), *id.* at 6-40, or water in the host rock, *id.* at E-12.

The effect of small-amounts of acid-gas species due to deliquescent salts will also be limited because, as explained in “Analysis of Dust Deliquescence for FEP Screening,” once released from the brines, the acid vapors will be rapidly dispersed and diluted by other gases in the drift by diffusion and convective gas mixing both radially and along the drift length. *See* LSN#: DN2002478854 at Section 6.2.3. and at E-8, E-11, & E-12. Once dispersed, the acid species will redissolve either in condensate or in water films in the host rock, and this will result in a dilute solution. *See id.* at 6-31, E-8, E-9, & E-11. Neutralization reactions can also occur with rock forming minerals such as calcite, a constituent of the host rock. *See* Analysis of Dust Deliquescence, LSN#: DN2002478854 at Section 6.2 (pages 6-22 and 6-34); Section 6.3.3 (pages 6-51 to 6-55) and Addendum 01, Section 6.3.2[a] (AD01 pages 6-17 and 6-18; pages E-9, E-11, and E-12). Thus, for these reasons, the concentration of acid vapors in the drift will be insignificant. Although Nevada suggests that acid vapors would be selectively trapped by mineralized crevices, it cites no authority for this assertion and does not explain how it would change DOE’s model, much less materially impact it.

Third, the results of DOE's corrosion model would not be materially changed as a result of ground support debris allegedly forming crevices on the drip shield. DOE used an extremely aggressive creviced-sample geometry during the localized corrosion testing. Research has shown that the design of the "crevice-former" used to develop the localized corrosion model for titanium—a PTFE tape wrapped ceramic--was more severe than anything that would be formed by salt or other debris deposited on the surface of the drip shield (or waste package) surface. *See Shan, et al.*, "Comparison of Ceramic Polymer Crevice Formers on the Crevice Corrosion Behavior of Ni-Cr-Mo Alloy C-22", (2006) LSN# DN2002403435, at 13-14. Crevices formed by debris or deposits would be similar to a ceramic crevice-former lacking the PTFE tape, which was demonstrated to be insufficient to initiate localized corrosion by *Shan, et. al., Id.* at 7. Nevada has provided no scholarly authority for the proposition that crevices formed by debris could somehow "trap" or contain volatile acid-gas species in the repository environment.

Finally, the corrosion of ground support materials does not raise a genuine dispute of material issue of fact or law with respect to whether trace elements (Cd, Co, Cu, P, Pb, Sb, and Sn, among others) derived from degradation of ground support materials will adversely affect drip shields (or waste packages). *See* Petition at 539. As Nevada itself recognizes in connection with NEVADA-SAFETY-93, these elements will be present only as trace species. *See* Petition at 504. Nevada cited no authority that suggests that the trace levels of these constituents are deleterious to performance of the drip shield, and no evidence that they will be present at greater than trace concentrations.<sup>65</sup>

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<sup>65</sup> Of course, Nevada also fails to address the fact that the waste packages ("waste canister") will be protected by the drip shields from contact with that debris and that analyses have shown that the drip shields will continue to perform their function, protecting the waste packages from seepage for at least 10,000 years. *See* Total System Performance Assessment Model /Analysis for the License Application, LSN#: DEN001579005, Section 6.3.5.2.3, p. 6.3.5-29. The drip shields will similarly protect the waste canisters from ground support debris.

Thus, even assuming that DOE did not take into account the ground support components as alleged, Nevada's bare assertion that the model will "increase corrosion rates and adversely affect the containment properties of the system," Nevada Pet. at 536, does not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515 (1990). This is particularly true in light of the clear record that DOE developed showing the contrary. Nevada must demonstrate how the corrosion of the ground support components would change the results, and then tie those changes to a regulatory requirement that was not met. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 92-93 (2003), *aff'd*, CLI-03-14, 58 NRC 207 (2003). Nevada does not make any argument to counter this analysis. Therefore, no genuine dispute is raised in this contention.

Indeed, the regulations require evaluation of degradation processes in detail only "if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*" 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that the debris fields would increase those risks at all, let alone that the risks would be "significantly changed by their omission." Accordingly, Nevada fails to raise a genuine dispute of material issue of fact or law.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. Petitioner at 540. The petitioner has the burden of showing

that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, the contention fails to raise a genuine dispute of a material issue of fact or law and must be dismissed.

**101. NEV-SAFETY-101 - Sulfur Accumulation At The Metal-Passive Film Interface**

SAR Subsection 2.3.6.3 (and subsections therein), which addresses the general corrosion of the waste package outer barrier, fails to consider the possibility of sulfur accumulation at the metal-passive film interface during slow passive corrosion, which could lead to an increased rate of uniform corrosion.

**RESPONSE**

This contention alleges that SAR subsection 2.3.6.3 fails to consider the possibility of sulfur accumulation at the metal-passive film interface during slow passive corrosion, which could lead to an increased rate of uniform corrosion.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.113, and 63.114. Petition at 541-42. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 542. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, Nevada argues that DOE’s “conceptual model does not take into account ... the accumulation of trace elements in the alloy (notably sulfur) at the metal-passive film interface, which produce very high corrosive rates for nickel once the sulfur coverage reaches about one monolayer.” Petition at 541. Nevertheless, Nevada fails to establish that the error is relevant to DOE’s compliance with any Part 63 requirement.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the

uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing corrosion of the waste package outer barrier is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. To the extent this contention relies upon expert opinion, it fails to meet those standards because Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Michael C. Thorne, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention alleges that because DOE failed to consider sulfur accumulation at the metal-passive film interface during slow passive corrosion, the SAR is incomplete and inaccurate. For several reasons, this contention does not establish a genuine dispute on a material issue of fact.

First, this contention is based on speculation and conjecture. In its "Statement of the Contention Itself" in the first paragraph, Nevada acknowledges that DOE does not consider "the

*possibility* of sulfur accumulation at the metal-passive film interface during slow passive corrosion, which *could* lead to an increase rate of uniform corrosion.” Petition at 541 (emphasis added). Indeed, with respect to a DOE document, Nevada acknowledges that “no attempt is made to quantify the *possible* increase in corrosion rate that *might* be produced by the presence of sulfur. *Id.* at 543 (emphasis added).

Furthermore, Nevada’s cited references in this contention hardly amount to sound support. Regarding the proposition that “it is well-known within the corrosion community that the corrosion rate of nickel is markedly increased by the generation of a layer of sulfur at the metal-passive film interface by a process known as ‘anodic segregation’”, Nevada cites to a document on corrosion mechanism in theory and practice. Petition at 542. This document indicates, however, that the “anodic segregation rate *depends* on the sulfur content of the material and on the rate of anodic dissolution.” Marcus, P. Corrosion Mechanisms in Theory and Practice (CRC Press) (2002) at 294 (emphasis added).

Nevada speculates that Alloy 22 is more susceptible to corrosion in the presence of sulfur, but it bases that conclusion on research conducted on the passive film of nickel and Alloy 600, not Alloy 22. Petition at 542. Indeed, the same researcher Nevada used as support for this premise has acknowledged that he had “no published data on quantitative measurements of the composition of the passive film on Alloy 22 under the conditions of the Yucca Mountain repository site.” P. Marcus, “Long Term Extrapolation of Passive Behavior,” Proceedings from an International Workshop on Long-Term Extrapolation of Passive Behavior (July 19-20, 2001), United States Nuclear Waste Technical Review Board, LSN#: NEV000003496 at 56. Moreover, not only was sulfur accumulation only hypothesized as a mechanism that “may” be responsible for passivity breakdown (*id.*), but the researcher concluded that whether passivity breakdown

“could occur on Alloy 22 under repository condition is not known.” *Id.* at 59. Thus, Nevada’s reliance on this single study is unwarranted.

Nevada further speculates that “interfacial sulfur concentration approaching one monolayer” is required for passivity breakdown (Petition at 542), but it offers no support for that measurement with respect to Alloy 22. Again, it relies on research related to nickel and nickel-iron alloys, not Alloy 22 (for which the researcher had no data).

As another of Nevada’s reference sources observed, the calculations for passivity breakdown for nickel-iron alloys “may not be applicable if the sulfur-related degradation mechanism for Alloy 22 is different than that for Ni-Fe alloys.” H. Jung, *et al.*, “A Review of the Long-Term Persistence of the Passive Film on Alloy 22 in Potential Yucca Mountain Repository Environments” (Oct. 2007), LSN# NRC000029382 at 4-13 [hereinafter, “Review of Long-Term Persistence”]. In fact, Alloy 22 is based on a different composition of metals – including chromium and molybdenum – that have been shown to counteract the effects of sulfur accumulation.

Nevada attempts to minimize this fact, asserting that there is “no direct experimental evidence” to show that “molybdenum tends to counter the deleterious effect of sulfur.” Petition at 543. To the contrary, the Sandia National Labs report on which much of SAR 2.3.6.3 is based observed, on the very same page cited by Nevada, that there is a “consensus” that molybdenum reduces the rate of anodic dissolution and thus inhibits passivity breakdown. Sandia National Laboratories (2007) “General Corrosion and Localized Corrosion of Waste Package Outer Barrier,” ANL-EBS-MD-000003 Rev 03, LSN# DN2002460404 at 6-14.

Nevada simply offers no evidence that Alloy 22, as opposed to other materials, is subject to passive film breakdown in the repository environment. Indeed, Nevada ignores contrary data in its own cited references:

Based on the currently available long-term corrosion test data for Alloy 22, such as that obtained at the DOE long-term corrosion test facility, there is no evidence or any indication of sulfur-induced film breakdown for Alloy 22, suggesting that the beneficial role of alloying elements (e.g., molybdenum and chromium) overcome any potential anodic sulfur segregation.

Review of Long-Term Persistence, LSN# NRC000029382 at 4-15. Nevada's unsupported speculation to the contrary simply does not create a genuine dispute on a material issue.

Nevada also asserts that because DOE's consideration of increased uniform corrosion due to sulfur accumulation is deficient, the SAR is "materially incomplete and inaccurate." Petition at 544. With regard to its analysis regarding general corrosion of the waste package, however, DOE has incorporated substantial conservatism into its model. *See generally* SAR section 2.3.6.3. For example, DOE indicates that the "TSPA conservatively applies aqueous general corrosion degradation rates to the waste package for all repository conditions and discounts dry oxidation which is slower than aqueous corrosion." SAR at 2.3.6-18. In addition, DOE indicates the general corrosion model is "conservatively independent of relative humidity and with a time invariant corrosion rate." SAR at 2.3.6-24. Despite the fact that DOE already has incorporated conservatism in its model, Nevada fails to explain why this conservatism is not sufficient.

Moreover, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. Nevada

provides no quantitative or even qualitative information regarding whether and the extent to which this corrosion would impact the disposal system.

Furthermore, the regulations require evaluation of degradation processes in detail only *if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that the possible presence of sulfur accumulation – which is uncertain and unverified by any study – would increase those risks at all, let alone that they would be “significantly changed by their omission.” Thus, Petitioner fails to demonstrate a genuine dispute.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 545. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

## **102. NEV-SAFETY-102 - Sulfur Accumulation And Localized Corrosion**

SAR Subsection 2.3.6.4 and similar subsections fail to consider the possibility of sulfur accumulation at the metal-passive film interface during slow passive corrosion, which could lead to an increased susceptibility to localized corrosion.

### **RESPONSE**

Nevada alleges that SAR Section 2.3.6.4 and similar subsections failed to consider the possibility of sulfur accumulations at the passive film interface of Alloy 22, which Nevada contends could increase the waste package's susceptibility to localized corrosion. In short, Nevada contends that DOE has not sufficiently studied a *possible* cause of corrosion on the waste package. Nevada offers little more than speculation and conjecture, however, to demonstrate that sulfur accumulations are a problem for Alloy 22. Moreover, even if Nevada could show that DOE underestimated the possible causes of corrosion, Nevada fails to demonstrate that the waste packages will be compromised as a result or that the alleged deficiency would have any impact on DOE's ability to limit radiological exposures and releases. Consequently, this contention fails to raise a genuine dispute on a material issue of law or fact.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

#### **b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. §

63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. While Nevada contends that DOE’s tests were insufficient to account for sulfur accumulation, Nevada has not alleged an increase in the mean dose *above regulatory limits*. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a

difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The premise of Nevada’s contention is that DOE allegedly failed to adequately account for the “*possibility*” sulfur accumulations at the passive film interface of Alloy 22, which Nevada contends could increase the chance of localized corrosion on the waste package. Petition at 549. As explained above, these assertions do not give rise to a material deficiency. As such, they do not support a finding that there is a genuine dispute on a material issue of law or fact. An allegation that some aspect of a license application is “inadequate” or unacceptable does not give rise to a genuine dispute unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

While Nevada speculates that sulfur accumulation “could” increase rates of localized corrosion (Petition at 548), Nevada fails to demonstrate any significance for DOE’s corrosion analysis. DOE already has incorporated numerous cautious but reasonable assumptions. *See*

SAR 2.3.6.4.3.1.3. Nevada does not explain why that approach is not consistent with the reasonable expectation standard and is not sufficient. Nevada provides no quantitative or even qualitative information regarding whether and the extent to which possible sulfur accumulation would materially change DOE's corrosion analysis, let alone what impact it would have on DOE's ability to limit radiological exposures and releases.

Nevada's own cited references hardly amount to sound support for this contention, much less do they establish a genuine dispute of a material issue. For example, referencing "Corrosion Mechanisms in Theory and Practice," Nevada asserts that "it is well-known within the corrosion community that the corrosion rate of nickel is markedly increased by the generation of a layer of sulfur at the metal-passive film interface by a process known as "anodic segregation." Petition at 542. This same document, however, notes that the "anodic segregation rate *depends* on the sulfur content of the material and on the rate of anodic dissolution." Marcus, P. (2002), Corrosion Mechanisms in Theory and Practice, ISBN 0824706668, 9780824706661 (CRC Press) at 294 (emphasis added). Nevada speculates that Alloy 22 is more susceptible to corrosion in the presence of sulfur, but it bases that conclusion on research conducted on the passive film of nickel and Alloy 600, not Alloy 22. Petition at 547. Indeed, the same researcher acknowledged that he had "no published data on quantitative measurements of the composition of the passive film on Alloy 22 under the conditions of the Yucca Mountain repository site." P. Marcus, "Long Term Extrapolation of Passive Behavior," Proceedings from an International Workshop on Long-Term Extrapolation of Passive Behavior (July 19-20, 2001), United States Nuclear Waste Technical Review Board, LSN#: NEV000003496 at 56. Moreover, not only was sulfur accumulation only hypothesized as a mechanism that "may" be responsible for passivity breakdown (*id.*), but the researcher concluded that whether passivity breakdown "could occur on

Alloy 22 under repository condition is not known.” *Id.* at 59. Thus, Nevada’s reliance on this that single study is unwarranted.

Nevada also speculates that “interfacial sulfur concentration approaching one monolayer” is required for passivity breakdown (Petition at 547-48), but it offers no support for that measurement with respect to Alloy 22. Again, it relies on research related to nickel and nickel-iron alloys, not Alloy 22 (for which the researcher had no data). Nevada hedges by asserting that sulfur can aid initiation of localized corrosion, which it says “does not appear to be subject to a critical potential requirement” (Petition at 548), but it offers no support for that statement.

As another of Nevada’s reference sources observed, the calculations for passivity breakdown for nickel-iron alloys “may not be applicable if the sulfur-related degradation mechanism for Alloy 22 is different than that for Ni-Fe alloys.” H. Jung, et al., “A Review of the Long-Term Persistence of the Passive Film on Alloy 22 in Potential Yucca Mountain Repository Environments” (Oct. 2007), LSN# NRC000029382 at 4-13 [hereinafter, “Review of Long-Term Persistence”]. In fact, Alloy 22 is based on a different composition of metals – including chromium and molybdenum – that have been shown to counteract the effects of sulfur accumulation.

Nevada tries to downplay or ignore this fact, insisting that there is “no direct experimental evidence” to show that “molybdenum tends to counter the deleterious effect of sulfur.” Petition at 548. To the contrary, the Sandia National Labs report on which much of SAR 2.3.6.4 is based observed, on the very same page cited by Nevada, that there is a “consensus” that molybdenum reduce the rate of anodic dissolution and thus inhibits passivity breakdown. Sandia National Laboratories (2007) “General Corrosion and Localized Corrosion

of Waste Package Outer Barrier,” ANL-EBS-MD-000003 Rev 03, LSN# DN2002460404 at 6-14.

Nevada simply offers no evidence that Alloy 22, as opposed to other materials, is subject to passive film breakdown in the repository environment. Indeed, Nevada ignores contrary DOE test data cited by Nevada’s own cited references:

Based on the currently available long-term corrosion test data for Alloy 22, such as that obtained at the DOE long-term corrosion test facility, there is no evidence or any indication of sulfur-induced film breakdown for Alloy 22, suggesting that the beneficial role of alloying elements (e.g., molybdenum and chromium) overcome any potential anodic sulfur segregation.

Review of Long-Term Persistence, LSN# NRC000029382 at 4-15. Nevada’s unsupported speculation to the contrary simply does not create a genuine dispute on a material issue.

Furthermore, the regulations require evaluation of degradation processes in detail only “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that possible presence of sulfur accumulation – which is uncertain and unverified by any study – would increase those risks at all, let alone that they would be “significantly changed by their omission.”

Nevada essentially admits in paragraph 6 of its contention that it does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 570. The petitioner has the burden of showing that its proposed

contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**103. NEV-SAFETY-103 - Sulfur Accumulation And Stress Corrosion Initiation**

SAR Subsection 2.3.6.5 and similar subsections fail to consider the possibility of sulfur accumulation at the metal-passive film interface and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature, which would create a strong susceptibility to stress corrosion crack initiation.

**RESPONSE**

This contention alleges that SAR subsection 2.3.6.5 and similar subsections fail to consider the possibility of sulfur accumulation at the metal-passive film interface and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature, which would create a strong susceptibility to stress corrosion crack initiation.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.113, 63.114, and 63.115. Petition at 551-52. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 552. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Nevada alleges that DOE failed to consider the possibility of sulfur accumulation at the metal-passive film interface and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature (Petition at 554), Nevada fails to establish that the alleged error is relevant to DOE’s compliance with any Part 63 requirement.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the

uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing stress corrosion cracking is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. To the extent this contention relies upon expert opinion, it fails to meet those standards because Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Michael C. Thorne, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

According to Nevada, the SAR fails to consider the possibility of sulfur accumulation at the metal-passive film interface and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature, which would create a strong susceptibility to stress corrosion crack initiation. For several reasons, this contention does not establish a genuine dispute of material fact.

First, this contention is filled with speculation and conjecture. In its “Brief Summary of the Contention” in the second paragraph, Nevada acknowledges that “sulfur accumulation at the alloy-passive film interface, coupled with sulfur segregation to grain boundaries, *may be expected to facilitate* crack initiation ....” Petition at 551 (emphasis added). Indeed, Nevada indicates that [s]ulfur *is expected* to accumulate under the passive film ... and it *can be expected* to surface diffuse to grain boundaries during the high temperature phase of repository life.” Petition at 553.

Nevada’s own cited references hardly amount to sound support for this contention, much less do they establish a genuine dispute on a material issue. For example, as indicated above, Nevada alleges that sulfur is expected to accumulate under passive film as sulfur in the alloy is left behind during the slow passive corrosion. Petition at 553. The same researcher Nevada used as support for this premise has acknowledged, however, that he had “no published data on quantitative measurements of the composition of the passive film on Alloy 22 under the conditions of the Yucca Mountain repository site.” P. Marcus, “Long Term Extrapolation of Passive Behavior,” Proceedings from an International Workshop on Long-Term Extrapolation of Passive Behavior (July 19-20, 2001), United States Nuclear Waste Technical Review Board, LSN#: NEV000003496 at 56. Moreover, not only was sulfur accumulation only hypothesized as a mechanism that “may” be responsible for passivity breakdown (*id.*), but the researcher concluded that whether passivity breakdown “could occur on Alloy 22 under repository condition is not known.” *Id.* at 59. Thus, Nevada’s reliance on this single study is unwarranted.

As another of Nevada’s reference sources observed, the calculations for passivity breakdown for nickel-iron alloys “may not be applicable if the sulfur-related degradation mechanism for Alloy 22 is different than that for Ni-Fe alloys.” H. Jung, et al., “A Review of the

Long-Term Persistence of the Passive Film on Alloy 22 in Potential Yucca Mountain Repository Environments” (Oct. 2007), LSN# NRC000029382 at 4-13 [hereinafter, “Review of Long-Term Persistence”]. In fact, Alloy 22 is based on a different composition of metals – including chromium and molybdenum – that have been shown to counteract the effects of sulfur accumulation.

Nevada attempts to minimize this fact, asserting that there is “no direct experimental evidence” to show that “molybdenum tends to counter the deleterious effect of sulfur.” Petition at 553. To the contrary, the Sandia National Labs report on which much of SAR 2.3.6 is based observed, on the very same page cited by Nevada, that there is a “consensus” that molybdenum reduces the rate of anodic dissolution and thus inhibits passivity breakdown. Sandia National Laboratories (2007) “General Corrosion and Localized Corrosion of Waste Package Outer Barrier,” ANL-EBS-MD-000003 Rev 03, LSN# DN2002460404 at 6-14.

Nevada simply offers no evidence that Alloy 22, as opposed to other materials, is subject to passive film breakdown in the repository environment. Indeed, Nevada ignores contrary data in its own cited references:

Based on the currently available long-term corrosion test data for Alloy 22, such as that obtained at the DOE long-term corrosion test facility, there is no evidence or any indication of sulfur-induced film breakdown for Alloy 22, suggesting that the beneficial role of alloying elements (e.g., molybdenum and chromium) overcome any potential anodic sulfur segregation.

Review of Long-Term Persistence, LSN# NRC000029382 at 4-15. Nevada’s unsupported speculation to the contrary simply does not create a genuine dispute on a material issue.

Nevada asserts that because DOE’s consideration of stress corrosion crack initiation due to sulfur accumulation is deficient, the SAR is “non-conservative.” Petition at 553. As DOE explains in the SAR, however, “[f]or modeling purposes, it is conservatively assumed that,

regardless of the environment, the waste package will undergo stress corrosion cracking if the stress conditions are met. This is a *significant* conservatism in light of the high corrosion resistance of Alloy 22 and the fact that only aggressive environments support stress corrosion cracking.” SAR 2.3.6.5.1. Despite the fact that DOE already has incorporated conservatism in its model, Nevada fails to explain why this conservatism is not sufficient.

Moreover, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. Nevada provides no quantitative or even qualitative information regarding whether and the extent to which this corrosion would impact the disposal system.

Furthermore, the regulations require evaluation of degradation processes in detail only “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that possible presence of sulfur accumulation—which is uncertain and unverified by any study—would increase those risks at all, let alone that they would be “significantly changed by their omission.” Thus, Petitioner fails to demonstrate a genuine dispute.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 555. The petitioner has the burden of showing that its proposed contentions meets the

requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**104. NEV-SAFETY-104 - Sulfur Accumulation and Stress Corrosion Propagation**

SAR Subsection 2.3.6.5 and similar subsections fail to consider the possibility of sulfur accumulation at the metal-passive film interface, and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature, which could lead to an increased susceptibility to stress corrosion crack propagation.

**RESPONSE**

This contention alleges that SAR subsection 2.3.6.5 and similar subsections fail to consider the possibility of sulfur accumulation at the metal-passive film interface and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature, which would lead to an increased susceptibility to stress corrosion crack propagation.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.113, 63.114, and 63.115. Petition at 556-57.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 557. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Nevada alleges that “sulfur accumulation at the alloy-passive film interface, coupled with sulfur segregation to grain boundaries, may be expected to lead to a reduced value of  $K_{ISCC}$  and more parid crack growth” (Petition at 556), Nevada fails to establish that the alleged error is relevant to DOE’s compliance with any Part 63 requirement.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere,

and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing stress corrosion cracking is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. To the extent this contention relies upon expert opinion, it fails to meet those standards because Nevada’s Petition does attach several affidavits (by Maurice E. Morgenstein, Michael C. Thorne, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

According to Nevada, the SAR fails to consider the possibility of sulfur accumulation at the metal-passive film interface and at grain boundaries in the alloy during a combination of slow passive corrosion and exposure at relatively high temperature, which could lead to an increased susceptibility to stress corrosion crack propagation. For several reasons, this contention does not establish a genuine dispute on a material issue of fact.

First, this contention is filled with speculation and conjecture. In its “Brief Summary of the Contention” in the second paragraph, Nevada acknowledges that “sulfur accumulation at the alloy-passive film interface, coupled with sulfur segregation to grain boundaries, *may be*

*expected* to lead to a reduced value of  $K_{ISCC}$  and more rapid crack growth.” Petition at 556 (emphasis added). Indeed, Nevada indicates that [s]ulfur *is expected* to accumulate under the passive film ... and it *can be expected* to surface diffuse to grain boundaries during the high temperature phase of repository life.” *Id.* at 558 (emphasis added).

Nevada’s cited references do not support for this contention, nor do they establish a genuine dispute on a material issue of fact. For example, as discussed above, Nevada alleges that sulfur is expected to accumulate under passive film as sulfur in the alloy is left behind during the slow passive corrosion. *Id.* at 558. The same researcher Nevada used as support for this premise has acknowledged, however, that he had “no published data on quantitative measurements of the composition of the passive film on Alloy 22 under the conditions of the Yucca Mountain repository site.” P. Marcus, “Long Term Extrapolation of Passive Behavior,” Proceedings from an International Workshop on Long-Term Extrapolation of Passive Behavior (July 19-20, 2001), United States Nuclear Waste Technical Review Board, LSN#: NEV000003496 at 56. Moreover, not only was sulfur accumulation only hypothesized as a mechanism that “may” be responsible for passivity breakdown (*id.*), but the researcher concluded that whether passivity breakdown “could occur on Alloy 22 under repository condition is not known.” *Id.* at 59. Thus, Nevada’s reliance on this single study is unwarranted.

As another of Nevada’s reference sources observed, the calculations for passivity breakdown for nickel-iron alloys “may not be applicable if the sulfur-related degradation mechanism for Alloy 22 is different than that for Ni-Fe alloys.” H. Jung, *et al.*, “A Review of the Long-Term Persistence of the Passive Film on Alloy 22 in Potential Yucca Mountain Repository Environments” (Oct. 2007), LSN# NRC000029382 at 4-13 [hereinafter, “Review of Long-Term Persistence”]. In fact, Alloy 22 is based on a different composition of metals –

including chromium and molybdenum – that have been shown to counteract the effects of sulfur accumulation.

Nevada attempts to minimize this fact, asserting that there is “no direct experimental evidence” to show that “molybdenum tends to counter the deleterious effect of sulfur.” Petition at 559. To the contrary, the Sandia National Labs report, on which much of SAR 2.3.6 is based observed, on the very same page cited by Nevada, that there is a “consensus” that molybdenum reduce the rate of anodic dissolution and thus inhibits passivity breakdown. Sandia National Laboratories (2007) “General Corrosion and Localized Corrosion of Waste Package Outer Barrier,” ANL-EBS-MD-000003 Rev 03, LSN# DN2002460404 at 6-14.

Nevada simply offers no evidence that Alloy 22, as opposed to other materials, is subject to passive film breakdown in the repository environment. Indeed, Nevada ignores contrary data cited in its own references:

Based on the currently available long-term corrosion test data for Alloy 22, such as that obtained at the DOE long-term corrosion test facility, there is no evidence or any indication of sulfur-induced film breakdown for Alloy 22, suggesting that the beneficial role of alloying elements (e.g., molybdenum and chromium) overcome any potential anodic sulfur segregation.

Review of Long-Term Persistence, LSN# NRC000029382 at 4-15. Nevada’s unsupported speculation to the contrary simply does not create a genuine dispute on a material issue.

Nevada also asserts that because DOE’s consideration of stress corrosion propagation due to sulfur accumulation is deficient, the SAR is “non-conservative.” Petition at 558. As DOE explains in the SAR, however, “[f]or modeling purposes, it is conservatively assumed that, regardless of the environment, the waste package will undergo stress corrosion cracking if the stress conditions are met. This is a *significant* conservatism in light of the high corrosion

resistance of Alloy 22 and the fact that only aggressive environments support stress corrosion cracking.” SAR 2.3.6.5.1. Despite the fact that DOE already has incorporated conservatism in its model, Nevada fails to explain why this conservatism is not sufficient.

Moreover, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. Nevada provides no quantitative or even qualitative information regarding whether and the extent to which this corrosion would impact the disposal system.

Furthermore, the regulations require evaluation of degradation processes in detail only “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that possible presence of sulfur accumulation—which is uncertain and unverified by any study – would increase those risks at all, let alone that they would be “*significantly changed by their omission.*” Thus, Petitioner fails to demonstrate a genuine dispute.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 560. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is

Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine dispute on a material issue of fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**105. NEV-SAFETY-105 - Drip Shield Corrosion Environment**

SAR Subsection 2.3.6.8 and similar subsections, fail to provide a realistic model of the corrosion behavior of the drip shield because they are based on inappropriate test conditions.

**RESPONSE**

In this contention, Nevada alleges that DOE's model of the drip shields' corrosion behavior, which is discussed in SAR Section 2.3.6.8, is based on unrealistic test conditions. In addition to its pleading deficiencies discussed herein, Nevada fails to provide a reasoned basis to substantiate its conclusions. Moreover, even if Nevada could show that DOE underestimated the rate of corrosion, Nevada fails to demonstrate that the drip shields will be compromised as a result or that the alleged deficiency would have any impact on DOE's ability to limit radiological exposures and releases. Consequently, this contention fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” Petition at 562. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic

setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Although Nevada quarrels with the test conditions DOE used to model corrosion behavior of the drip shields (Petition at 562-64), Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative

analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

While Nevada asserts that DOE's test conditions have the *potential* to underestimate the rate of corrosion, which it contends has the *potential* to underestimate dose exposure to the reasonably maximally exposed individual (Petition at 563), Nevada has not alleged an actual increase in the mean dose *above regulatory limits*. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Although not referenced in this contention, three affidavits attached to Nevada's Petition to Intervene as a Full Party states that the affiant "adopts" the discussion in paragraphs 5 and 6 of this contention. *See* Petition at Attachments 3, 17, and 18. As discussed in more detail in Section V.A.3 of this Answer, such affidavits are not sufficient to satisfy the requirements of Section 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation. Indeed, because the contention itself does not even refer to the affidavits, it is unclear which statements are facts or opinions belonging to the technical experts as opposed to legal argument that cannot be ascribed to those experts.

Even if this contention were construed to have been written by those expert, Nevada still fails to provide any support for the proposition that DOE's model for assessing the corrosion behavior of the titanium drip shields is "unrealistic." Petition at 561. Nevada asserts that DOE should have used "drop evaporation tests" to model the corrosion properties of the drip shields.

But Nevada's references do not purport to evaluate DOE's model or to quantify what effect using the alternative tests postulated by Nevada would have on DOE's model. Thus, they do not demonstrate that DOE's model is "unrealistic."

Nevada references two studies that it says support its contention (Petition at 563), but those studies do not evaluate DOE's model, nor do they provide information showing that DOE's model is unrealistic. "[T]he Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention." *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26.

Neither of Nevada's referenced studies involved the titanium alloy proposed for use in the drip shields. While the drip shields will be composed of the titanium alloy Ti-7 (SAR 2.3.6-70), the tests reported by Nevada's consultants involved only the C-22 Alloy proposed for the waste packages. See "Final Results for C22 Corrosion Test" (04/16/08), LSN# NEV000005219; "Effects of Concentrated Hydrochloric and Nitric Acids and NaF on the Corrosion of C-22 Alloy at 25 and 90C; a Model for Rapid Penetration of C-22" (12/30/1995), LSN# NEV000004183. Neither report even mentions titanium, let alone attempts to calculate the rate of corrosion for that alloy.

Nevada also suggests that DOE should have followed a Scientific Investigation Plan (prepared by the University and Community College System of Nevada) that proposed using a "heated electrode approach" to study the corrosion behavior of the C-22 Alloy. Petition at 563 (citing "Environmental Effects on Corrosion Properties of Alloy 22" (11/10/2004), LSN# DN2002246302 [hereinafter, "Environmental Effects"]). But that document likewise has nothing to say about Ti-7 or the drip shields. Furthermore, as with the two studies discussed

above, the Environmental Effects report does not discuss DOE's actual testing model, nor does it say that DOE's model is inadequate or unreliable. Indeed, the report makes clear that there "isn't a significant amount of work addressing wet-dry environments in detail" and it is "not known" how Alloy-22 would perform under these conditions (Environmental Effects at 22), much less could that report predict whether cyclic wet-dry testing would make any difference to DOE's corrosion modeling with respect to Ti-7 drip shields, which it never considered.

Nor does Nevada suggest any means for extrapolating relevant data from its C-22 tests to apply to Ti-7. Given that Ti-7 is composed of different elements and has corrosion properties distinct from those of C-22,<sup>66</sup> it is not evident that test results concerning C-22 would have any application to Ti-7. Nevada provides no reference to any tests, scholarly references, or expert opinion to even suggest that its "drop evaporation tests" have any application to the titanium alloy used in the drip shields.

Equally unhelpful, Nevada refers to another test of C-22 "in the particular context of SCC," which Nevada says shows that drop evaporation provides "rather severe test conditions for stainless alloys exposed to chloride solutions." Petition at 563 (citing "Corrosion of Metals and Alloys – Evaluation of Stress Corrosion Cracking by the Drop Evaporation Test," ISBN 978 0 580 60538 3). Again, Nevada does not offers no support for relating that study's supposed finding to the titanium alloy used for drip shields. Moreover, DOE excluded stress corrosion cracking (SCC) from the TSPA because "the presence of cracks will not affect the performance of the drip shield in preventing or substantially reducing the amount of water that could directly

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<sup>66</sup> The properties of Ti-7 are described in the SAR at 2.3.6-71 and 2.3.6-144 (Table 2.3.6-23). The outer barrier of the waste package is made from C-22 Alloy, which is a nickel-chromium-molybdenum alloy, as further described in §§ 1.5.2.1, 2.3.6.7, and at 1.5.2-26 (Table 1.5.2-4).

contact the wastes package . . . .” SAR 2.3.6-86. Nevada fails to explain why a test related to SCC has any relevance in the context of drip shields.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada fundamentally complains that DOE’s model for assessing the corrosion behavior of the drip shield’s titanium alloy has the *potential* to underestimate the degree and rate of corrosion. Petition at 563. As explained above, these assertions do not give rise to a material deficiency. Nevada has not stated what radiological impact its proposed alternative test conditions would have on the corrosion modeling. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

Nevada has not attempted to quantify the supposed accelerated corrosion (if any) that it contends would be shown under “drop evaporation conditions.” Petition at 563. Indeed, Nevada concedes that its proposed alternative model, at best, may suggest that DOE’s model has the “*potential* to underestimate” the rate and degree of corrosion, which has the “*potential* to result in significant under-estimate” of the potential dose to the reasonably maximally exposed individual. *Id.* Thus, Nevada offers nothing more than speculation, which simply does not create a genuine dispute on a material issue.

Nevada provides no support for questioning DOE's use of "bulk liquid environments in isothermal conditions." Petition at 562. Indeed, the DOE's TSPA model "conservatively applies aqueous general corrosion of the drip shield for all repository conditions, even when the drip shield is dry." SAR at 2.3.6-71. Nevada does not explain why that conservatism is insufficient to account for Nevada's concerns.

Furthermore, the regulations require evaluation of degradation processes in detail only "if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission." 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that DOE in fact underestimated the rate of corrosion for the titanium drip shields or that it failed to account for any relevant degradation process that would have any material effect on radiological releases, much less has Nevada shown that DOE's model would be "significantly changed" by omission of the test conditions proposed by Nevada.

Nevada essentially admits in paragraph 6 of its contention that it does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 565. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's

contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**106. NEV-SAFETY-106 - Waste Container Corrosion Environment**

SAR Subsection 2.3.6.3 and similar subsections fail to provide a realistic model of the corrosion behavior of the canister because they are based on inappropriate test conditions.

**RESPONSE**

In this contention, Nevada alleges that DOE's model of the waste container's corrosion behavior, which is discussed in SAR Section 2.3.6.3, is based on unrealistic test conditions. In addition to its pleading deficiencies discussed herein, Nevada fails to provide a reasoned basis to substantiate its conclusions. Moreover, even if Nevada could show that DOE underestimated the rate of corrosion, Nevada fails to demonstrate that the waste containers will be compromised as a result or that the alleged deficiency would have any impact on DOE's ability to limit radiological exposures and releases. Consequently, this contention fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 566-67. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue . . . .” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Although Nevada objects to the test conditions DOE used to model corrosion behavior of the waste containers (Petition at 567-69), Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. Petition at 567. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to

provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Although Nevada references several studies that it says support its contention (Petition at 568), “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26.

Nevada's references do not offer substantial support for this contention, as shown below.

Nevada fundamentally contends that DOE's does not use a “realistic model” for assessing the corrosion behavior of the C-22 Alloy waste canisters. Petition at 566. None of its references, however, suggest that DOE's model is unrealistic. Nevada asserts that DOE should have used a “drop evaporation test” to model the C-22 Alloy's corrosion behavior. Petition at 568. But Nevada's references on this point fail to provide any information to indicate that Nevada's supposed alternative model would tend to show that DOE's model is “unrealistic.”

Referring to ISO Standard ISO 15324:2008, Nevada asserts that “drop evaporation tests” have been shown to “provide severe test conditions for stainless alloys exposed to chloride solutions.” Petition at 568 (citing ISO Standard ISO 15324:2008, “Corrosion of Metal and Alloys – Evaluations of Stress Corrosion Cracking by the Drop Evaporation Test,” ISBN 978 0 580 605383). Evidently recognizing that C-22's corrosion behavior cannot be directly inferred

from findings reported with respect to stainless alloys, Nevada indicates that it commissioned its own experiments.

Nevada references the two reports from its experiments that it says support its theory that dry-wet cycling will “modify the severity of the corrosion conditions.” Petition at 567. Neither of the referenced reports, however, makes any comparison to the actual model used by DOE. *See* “C-22 Corrosion in Dripped Pore Water. Final Report for Phase II A & B” (2008), LSN# NEV000005216; “Experiments Devised to Studying Temperature and Geometry Effect of Corrosion of C-22 Alloy, Final Report for Phase II C & D” (2008), LSN# NEV000005235. Indeed, neither report mentions the DOE model. Nor do those reports discuss whether DOE’s conservative assumptions (*see, e.g.,* SAR at 2.3.6-18, 30, 37-38, 45-46) are sufficient to account for the effects that Nevada’s studies attempt to analyze. Thus, the reports do not support the conclusion that DOE’s model is unrealistic or unreliable.

Nevada also suggests that DOE should have followed a Scientific Investigation Plan (prepared by the University and Community College System of Nevada) that proposed using a “heated electrode approach” to study the corrosion behavior of the C-22 Alloy. Petition at 568 (citing “Environmental Effects on Corrosion Properties of Alloy 22” (11/10/2004), LSN# DN2002246302 [hereinafter, “Environmental Effects”]). As with the two reports discussed above, however, the Environmental Effects report does not discuss DOE’s actual testing model, nor does it say that DOE’s model is inadequate or unreliable. While the report’s authors postulate that cyclic wet-dry testing may better approximate repository conditions than a test involving “continuous exposure to aqueous environments” (Environmental Effects at 22), the report does not endeavor to evaluate DOE’s model, nor does it discuss whether DOE’s conservative assumptions (*see, e.g.,* SAR at 2.3.6-18, 30, 37-38, 45-46) are sufficient to account

for the effects of the authors' hypotheses. Indeed, the report makes clear that there "isn't a significant amount of work addressing wet-dry environments in detail" and it is "not known" how Alloy-22 would perform under these conditions (Environmental Effects at 22), thus it offers at most speculation that cyclic wet-dry testing would make any difference to DOE's corrosion modeling.

Although not referenced in this contention, Nevada also attaches three affidavits to its Petition that each state that the affiant "adopts" the discussion in paragraphs 5 and 6 of this contention. *See* Petition at Attachments 3, 17, and 18. As discussed in more detail in Section V.A.3 of this Answer, such affidavits are not sufficient to satisfy the requirements of Section 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation. Indeed, because the contention itself does not even refer to the affidavits, it is unclear which statements are facts or opinions from the technical experts as opposed to legal argument that cannot be ascribed to those experts. Even if this contention were construed to have been written by those experts, the three affidavits fail to provide any support for the proposition that "drop evaporation tests" should have been used to measure the corrosion properties of the waste canisters. Petition at 567-69. Moreover, Nevada offers no support with reference to scholarly sources, expert opinion, or test reports to show that DOE's actual model, including its conservative assumptions, is "unrealistic" or in any way inadequate.

Significantly, Nevada's theory of more aggressive corrosion than DOE has predicted depends on a mistaken premise: that the "real exposure will predominantly involve cooler liquids dripping onto [the canister's] relatively hot metal surface and evaporating." Petition at 567. This premise is mistaken for at least two reasons.

First, Nevada ignores the function of the drip shield, which will prevent water seepage from dripping onto the Alloy 22 waste canister during the period when the waste canister's surface will be "relatively hot" as postulated in Nevada's experiments. In fact, in the Nominal Modeling Case, initial breaches of the drip shield will not occur until approximately 230,000 years postclosure. *See* SNL (Sandia National Laboratories) 2008. Total System Performance Assessment Model /Analysis for the License Application. MDL-WIS-PA-000005 REV 00 AD 01. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080312.0001; LLR.20080414.0037; LLR.20080507.0002; LLR.20080522.0113; DOC.20080724.0005; DOC.20080106.0001. DIRS 183478. LSN#: DEN001579005. Participant # DOC.20080312.0001. [hereinafter, TSPA Analysis] at 6.3.5-17. Even in case of seismic hazards, the drip shield are estimated to preclude seepage for at least 10,000 years. *Id.* at 7.3.2-7 and Fig. 7.3.2-16. The high temperature regime during which Alloy 22 is most susceptible to localized corrosion, however, will have been over well before 10,000 years. *Id.* at Figs. 6.3.2-5 and 6.3.2-6. Accordingly, even if there were seepage during the high temperature period, it would not drip onto the waste canister in virtually all cases because of the drip shield. Accordingly, the cyclic dripping and dryout process Nevada postulates is rendered irrelevant by the drip shield.

Second, even if the drip shield were to fail, DOE's TSPA model either simultaneously accounts for waste canister failures in those circumstances, or it evaluates the environmental conditions and assumes the waste package fails where salts may precipitate on it and evolve into corrosive brines (*see* SAR 2.3.5.5.1 (discussing salt separation process)). Thus, any additional corrosion caused by cyclic dripping and dryout would be irrelevant because the waste canister already is predicted to have failed in all relevant circumstances. For example, in the Drip Shield

Early Failure Modeling Case, DOE has conservatively assumed that any Alloy 22 waste canister underneath an early-failed drip shield will be beached. *Id.* at 6.4-4. Likewise, the Igneous Intrusion Modeling Case assumes that all canisters will fail during an igneous event (at the same time the drip shields cease functioning). *Id.* at 6.5-4. And DOE conservatively assumed that the waste package and its drip shield fail at the same time by fault displacement. *Id.* at 6.6-17. Therefore, in each case of drip shield failure, any supposed effect from cyclic dripping and dryout already will be irrelevant because the TSPA model already assumes that the waste canister has failed in those circumstances.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention, and it is based on a faulty premise in any event. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Although Nevada questions whether DOE has used a “realistic” model of the corrosion behavior of the waste containers (Petition at 569), it has not alleged, much less shown, a deficiency that would have any impact on DOE’s ability to limit radiological exposures and releases. As explained above, Nevada’s assertions do not give rise to a material deficiency. Nevada has not stated what radiological impact its proposed alternative test conditions would have on the corrosion modeling. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 (1990).

This contention is notable for what it does not say. It does not say that the waste canisters cannot perform their function. Indeed, Nevada has not indicated that it has quantified the presumed accelerated corrosion (if any) that it suggests would be shown under its proposed “drop evaporation conditions.” Petition at 569. Furthermore, DOE’s TSPA model “conservatively applies aqueous general corrosion of the drip shield for all repository conditions, even when the drip shield is dry.” SAR at 2.3.6-71. Nevada does not explain why that conservatism is insufficient to account for Nevada’s concerns.

Nor do Nevada’s cited experiments (Petition at 568) establish any genuine dispute on a material issue. As discussed above, the two reports cited by Nevada do not discuss DOE’s model or any implications that cyclic dry-wet testing would have on DOE’s model for demonstrating the reliability of the waste canisters. While Nevada’s experiments may reflect alternative test considerations, they do not show any material significance with respect to the waste canister’s ability to limit radiological releases and exposures.

Nevada asserts that its experiments “suggest” three findings (Petition at 568-69), but it does not explain how those conclusions have any bearing on DOE’s model or on the waste canister’s ability to limit radiological exposures and releases. First, Nevada asserts that its experiments “suggest” that “[s]ignificant localized corrosion was observed in the form of intergranular corrosion tunnels” (Petition at 568), but it does not establish what caused that corrosion or whether such corrosion was materially different than anything observed after DOE’s testing.

Nevada also reports observing “no differences between the corrosion reactions in the vapor and salt submersion portions of test samples. *Id.* at 569. But Nevada does not explain the

significance of that finding or how it could even suggest that DOE's tests could not be relied upon.

Finally, Nevada states that “[a] significant amount of SCC [stress corrosion cracking] was observed at the bottom of re-nucleating intergranular corrosion tunnels.” *Id.* The cited references, however, make no such explicit observation. In fact, they do not even mention “re-nucleating intergranular corrosion tunnels. Furthermore, Nevada does not explain what significance that fact would have for DOE's model. Indeed, DOE already “conservatively assumed that, regardless of the environment, the waste package will undergo stress corrosion cracking if stress conditions are met.” SAR at 2.3.6-45-46. Nevada has not shown – nor do its reported experiments purport to evaluate – whether the supposed “significant amount of SCC” its researchers observed is any more (or less) than DOE's model contemplates (*see* SAR Figure 2.3.6-29 at SAR at 2.3.6-173).

Even accepting Nevada's alleged findings, they simply do not demonstrate that the waste canister's ability to limit radiological releases and exposures has been compromised in any way. Furthermore, the regulations require evaluation of degradation processes in detail only “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that DOE underestimated the rate of corrosion for the waste canisters or that it failed to account for any relevant degradation process that would have any material effect on radiological releases, or that DOE's model would be “significantly changed” by omission of the test conditions proposed by Nevada. The mere speculation that a different test would show different results does not create a genuine dispute on a material issue.

Nevada essentially admits in paragraph 6 of its contention that it does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 569. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**107. NEV-SAFETY-107 - Electrochemical Reduction Of Nitrate**

SAR Subsection 2.3.6.4.3.1.1 and similar subsections, which assert that nitrate is an inhibitor of corrosion, fail to take account of the loss of nitrate by electrochemical reaction.

**RESPONSE**

Nevada alleges that DOE's model of localized corrosion of Alloy 22, which is discussed in SAR Section 2.3.6.4.3.1.1, underestimates the degree of localized corrosion by allegedly failing to account for the loss of nitrate (which inhibits corrosion) caused by electrochemical reactions. In addition to its pleading deficiencies discussed herein, Nevada fails to provide a reasoned basis to substantiate its conclusions. Moreover, even if Nevada could show that DOE underestimated the rate of localized corrosion, Nevada fails to demonstrate that the waste containers will be compromised as a result or that the alleged deficiency would have any impact on DOE's ability to limit radiological exposures and releases. Consequently, this contention fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 571-72. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue . . . .” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Although Nevada objects to DOE’s model for assessing the localized corrosion behavior of the waste containers (Petition at 571-72), Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. Petition at 567. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to

provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references in support of its contention. Fundamentally, Nevada contends that DOE uses an “unreliable” model for studying localized corrosion (Petition at 573), but it offers no evidence to substantiate that assessment. “[T]he Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff'd on other grounds*, CLI-98-13, 48 NRC 26.

Although not referenced in this contention, Nevada attaches three affidavits to its Petition that each state that the affiant “adopts” the discussion in paragraphs 5 and 6 of this contention. *See* Petition at Attachments 3, 17, and 18. As discussed in more detail in Section V.A.3 of this Answer, such affidavits are not sufficient to satisfy the requirements of Section 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation. Indeed, because the contention itself does not even refer to the affidavits, it is unclear which statements are facts or opinions from the technical experts as opposed to legal argument that cannot be ascribed to those experts. Even if this contention were construed to have been written by those experts, the three affidavits fail to provide any support for the proposition that DOE's corrosion model is unrealistic.

Nevada contends that that DOE's “bulk immersion tests” would underestimate the rate of nitrate depletion (Petition at 573), but it does not identify or describe any alternative test that would be more accurate. Nevada postulates that nitrate depletion may be greater in what Nevada

describes as “more realistic thin liquid films resulting from seepage or salt deliquescence” (*Id.*), but Nevada does not refer to or describe any alternative test replicating such “thin [thin] liquid films” to measure the rate of nitrate depletion. Even when trying to explain the effects of seepage on nitrate levels, Nevada says nothing more than it “seems likely” – without reference to scholarly sources, expert opinion, or test reports – that seepage will “replenish” nitrate in some locations but not others. *Id.* That unsupported assertion is nothing more than unsubstantiated speculation.

Nevada purports to compare the rates of consumption of nitrate by electrochemical reactions in bulk immersions versus “thin liquid films resulting from seepage or salt deliquescence” (Petition at 573), but again it does not point to a single test or scholarly reference in support of its supposition. Nor does it attempt to quantify or supply any data to make sense of what Nevada describes as a “slow” reaction as opposed to a “very long reaction,” or what it means by “more aggressive solutions.” *Id.*

In sum, Nevada offers no more than speculation that (a) DOE has underestimated the rate of nitrate depletion, and (b) the supposed nitrate depletion postulated by Nevada would make any material difference to DOE’s corrosion modeling to deem it unrealistic. Not having referenced any documents, test data, or even scholarly references to support the contention, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Although Nevada deems DOE’s localized corrosion model “unreliable” (Petition at 573), it has not alleged, much less shown, that any actual impact on DOE’s ability to limit radiological exposures and releases. As explained above, Nevada’s assertions do not give rise to a material deficiency. Nevada has not stated what radiological impact its proposed alternative test

conditions would have on the corrosion modeling. Accordingly, it is impossible to assess what effect, if any, Nevada's claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521 (1990).

This contention is notable for what it does not say. It does not say that the waste canisters cannot perform their function. Indeed, Nevada has not attempted to quantify the supposed “more severe localized corrosion” that it speculates would be shown by taking account of supposed nitrate losses. Petition at 571. Thus, Nevada cannot say that the supposed increased corrosion would have any material effect on the waste canisters' performance.

Nevada has not shown – nor does it identify any experiments, tests, or scholarly reference to explain – whether the supposed loss of nitrates in a “thin liquid films” (Petition at 573) would in fact cause any more localized corrosion than DOE's model predicts (*see* SAR at 2.3.6-163 to -171) (Figures 2.3.6-19 to- 27). Nor has Nevada shown that any *material* deficiency in DOE's model.

DOE's model in fact addressed the possibility of studying thin water films to assess corrosion. DOE instead assumed that localized corrosion “generated in fully immersed conditions” is “applicable to the localized corrosion process of the waste package in contact with thin water films resulting from seepage that have the same water chemistry as the fully immersed condition.” Sandia National Laboratories, “General Corrosion and Localized Corrosion of Waste Package Outer Barrier” (2007), ANL-EBS-MD000003 Rev. 3, Las Vegas, NV. (LSN# DN2002460404 at 5-2 [hereinafter, “General Corrosion”], at 5-2. That assumption is based on

the fact that a “similar stagnant boundary layer is formed in the creviced region in both” thin film and fully immersed cases and, moreover, “under inundated conditions, the metal is in contact with a practically unlimited reservoir of corrosive solution.” General Corrosion at 5-3. “In addition, without a bulk environment, the cathodic area outside the crevice will be limited, leading to a decrease in the ability to sustain the crevice corrosion.” *Id.* In short, DOE’s model is more conservative, which Nevada overlooks.

Furthermore, Nevada ignores numerous other conservative assumptions in DOE’s model that should negate the effect that Nevada describes. For example, DOE’s model treats all localized corrosion as crevice corrosion, which requires less aggressive conditions to initiate than pitting corrosion. SAR at 2.3.6-30. It also assumes a constant rate of propagation once corrosion starts, thus not taking credit for “changing conditions that would cause the propagation rate to slow or stop completely.” SAR at 2.3.6-31. DOE also assumed that crevice corrosion would occur at a constant rate “regardless of changes in the bulk chemical exposure environment.” General Corrosion at 6-102.

DOE also used laboratory solutions that contained nitrate ions but “did not contain other potentially inhibitive ions such as carbonate and sulfate. The presence of other inhibitive ions would be expected to result in a more benign environment than that which would be predicted by the localized corrosion model.” SAR at 2.3.6-36. Nevada does not explain why that conservatism, as well as other conservative assumptions (*see* SAR 2.3.6.4.3.1.3 at 2.3.6-37 to 2.3.6-38), is insufficient to account for Nevada’s concerns.

Even accepting as true Nevada’s unsubstantiated assertion that nitrate loss results in “more severe localized corrosion” than DOE has predicted (Petition at 571), that does not demonstrate that the waste canister’s ability to limit radiological releases and exposures has been

compromised in any way. The regulations require evaluation of degradation processes in detail only “*if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.*” 10 C.F.R. § 63.114(f) (emphasis added). Nevada has not shown that DOE underestimated the rate of localized corrosion for the waste canisters or that it failed to account for any relevant degradation process that would have any material effect on radiological releases, much less has Nevada shown that DOE’s model would be “significantly changed” by omission of possible nitrate loss by electrochemical reaction as Nevada suggests. The mere speculation that this consideration would cause the model to have different results does not create a genuine dispute on a *material* issue.

Nevada essentially admits in paragraph 6 of its contention that it does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 574. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For this reason and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**108. NEV-SAFETY-108 - Molten Salt Corrosion Of The Canister**

SAR Subsection 2.3.6 and similar subsections, which treat the corrosion of the Alloy 22 canister, fail to consider molten salt corrosion.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsection 2.3.6 and similar subsections, which treat the corrosion of the Alloy 22 canister, fail to consider molten salt corrosion.” Petition at 575.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support

the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system

performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also, as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or adequate documentary materials in support of its position. Therefore, it does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any relevant supporting documents -- the one document cited by Nevada appears to only offer background information relating to its assertion; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Maurice E. Morgenstein and Robert A. Cottis), which purportedly provide expert opinions to support this contention. Petition, Attachments 3, 17, and 18. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Even if the claims were construed to have been submitted by an expert, they still would not be sufficient to support admission of this contention.

First, Nevada asserts, without support or reference to any relevant scholarship, that "[i]t is well known in the corrosion community that molten salts *may be* significantly more corrosive than aqueous solutions, both because the temperature tends to be higher, and because of the

potential for fluxing oxides that are protective in aqueous solutions.” Petition at 577. Nevada also asserts that “[h]owever, there is no attempt to consider the possibility of molten salt corrosion in the SAR despite this clear evidence that molten salt mixtures can form with species that are expected to be available from the unsaturated zone water.” Petition at 577. Nevada concludes that “[t]he inclusion of molten salt corrosion *may* significantly degrade the performance of the waste package and the performance of the waste package is linked to the predicted dose to the RMEI.” Petition at 577 (emphasis added). However, Nevada fails to assert that the hypothetical circumstance it describes is certain to occur, or that it is probable, or even plausible. Nevada’s claims in this regard are conclusory and mere speculation, and cannot serve as adequate support for the admission of a contention.

Even if these claims were construed to have been submitted by an expert, they would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26.

With respect to Nevada’s broad assertion that DOE failed to consider the possibility of corrosion due to the effects of molten salt, Nevada’s assertions provide no support to sustain the admissibility of the contention. In this regard, Nevada ignores the discussion provided in “Analysis of Dust Deliquescence for FEP Screening” (September 5, 2007), ANL-EBS-MD-000074 REV 001 AD 001, LSN# DN2002478854, relating to the potential occurrence of molten salts. In pertinent part, the discussion provides that there are thermal limitations for the formation of potential salt melts and that “... it appears that there is essentially no ‘temperature

limit' to deliquescent activity that can be applied to either [of the two assemblages of molten salts] as they both transition to salt melts at approximately 300°C and > 400°C, respectively.”

*See* “Analysis of Dust Deliquescence for FEP Screening (September 5, 2007), ANL-EBS-MD-000074 REV 001 AD 001, LSN# DN2002478854, in section 6.1.1[a] at 6.1.

As shown in Table 2.3.5-7 (“Peak Drift Wall and Waste Package Temperatures Over All Waste Packages Summarized for Seven Uncertainty Cases”), the peak waste package surface temperature will not go above 211°C even considering all of the uncertainty and variability. *See* SAR § 2.3.5 at 2.3.5-175. In the case of seismically induced drift collapse, if it occurs early some waste package peak surface temperatures will be higher, but the mean peak waste package surface temperature will still be less than 300°C. *See* SAR Figure 2.3.4-98 at 2.3.4-354. Further, SAR 2.3.5.6 provides that “[f]or seismically-induced drift collapse, a number of FEPs are thermally sensitive, but the likelihood for the peak temperature of any waste package to exceed 300°C is insignificant, considering the probability of a seismic event sufficient to cause drift collapse during the 90 years immediately after repository closure....” *See* SAR § 2.3.5.6 at 2.3.5-146.

Given the above analyses, there is negligible potential for the formation of even minor amounts of molten salt on the drip shield surface, and therefore potential corrosion effects from them are insignificant. In summary, the mass and conditional constraints on even the existence of molten salts on the drip shield in the post-closure system are more limited than those for the extensively evaluated process of dust deliquescence effects on corrosion of the drip shield, and therefore, this molten salt corrosion process is of no material consequence.

Thus, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

In an attempt to demonstrate a genuine dispute in subsection 6 of the contention, Nevada states that its “... contention challenges SAR Subsection 2.3.6 and similar subsections, which treat the corrosion of the Alloy 22 canister, because they fail to consider molten salt corrosion.” Petition at 577. In this regard, Nevada merely repeats its unsupported, conclusory and speculative claim from its purported “Statement of the Facts or Expert Opinions” discussed above. This bare assertion cannot provide adequate support for a contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc. (Oyster Creek Nuclear Generating Station)*, CLI-00-06, 51 NRC 193, 208 (2000)).

Nevada states that SAR Subsection 2.3.6 and similar subsections “do not comply with 10 C.F.R. § 63.114(f), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must provide the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment . . . and that . . . degradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.” Petition at 577.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**109. NEV-SAFETY-109 - Molten Salt Corrosion Of The Drip Shield**

SAR Subsection 2.3.6.8 and similar subsections, which treat the corrosion of the drip shield, fail to consider molten salt corrosion.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsection 2.3.6 and similar subsections, which treat the corrosion of the drip shield, fail to consider molten salt corrosion.” Petition at 579.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies a number of regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support

the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the effects of corrosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system

performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada has failed to provide the requisite supporting facts, expert opinion, or references to justify admission of its proffered contention. In particular, this contention does not reference any expert opinion or adequate documentary materials in support of its position. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any relevant supporting documents -- the one document cited by Nevada appears to only offer background information relating to its assertion; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Maurice E. Morgenstein, Robert A. Cottis, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

First, Nevada asserts, without support or reference to any relevant scholarship, that "[i]t is well known in the corrosion community that molten salts may be significantly more corrosive than aqueous solutions, both because the temperature tends to be higher, and because of the *potential* for fluxing of oxides that are protective in aqueous solutions." Petition at 580 (emphasis added). Nevada also asserts that "[h]owever, there is no attempt to consider the

*possibility* of molten salt corrosion of the drip shield, which if considered *may* significantly degrade the performance of the drip shield and the performance of the drip shield is linked to the predicted dose to the RMEI.” Petition at 581 (emphasis added). However, Nevada fails to assert that the hypothetical circumstance it describes is certain to occur, or that it is probable, or even plausible. Nevada’s claims in this regard are conclusory and mere speculation, and cannot serve as adequate support for the admission of a contention.

Even if these claims were construed to have been submitted by an expert, they would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26.

With respect to Nevada’s broad assertion that DOE failed to consider the possibility of corrosion due to the effects of molten salt, Nevada’s assertions provide no support to sustain the admissibility of the contention. In this regard, Nevada ignores the discussion provided in “Analysis of Dust Deliquescence for FEP Screening (September 5, 2007), ANL-EBS-MD-000074 REV 001 AD 001, LSN# DN2002478854, relating to the potential occurrence of molten salts. In pertinent part, the discussion provides that there are thermal limitations for the formation of potential salt melts and that “it appears that there is essentially no ‘temperature limit’ to deliquescent activity that can be applied to either [of the two assemblages of molten salts] as they both transition to salt melts at approximately 300°C and > 400°C, respectively.” See “Analysis of Dust Deliquescence for FEP Screening” (September 5, 2007), ANL-EBS-MD-000074 REV 001 AD 001, LSN# DN2002478854, in section 6.1.1[a] at 6.1.

The temperature of the drip shield is not ever expected to reach these values, even during the peak thermal period, because the drip shields will be at slightly lower temperatures than the waste packages, which are not expected to reach these values even at peak temperature. As shown in Table 2.3.5-7 (“Peak Drift Wall and Waste Package Temperatures Over All Waste Packages Summarized for Seven Uncertainty Cases”), the peak waste package surface temperature will not go above 211°C even considering all of the uncertainty and variability. *See* SAR § 2.3.5 at 2.3.5-175. In the case of seismically induced drift collapse, if it occurs early some waste package peak surface temperatures will be higher, but the mean peak waste package surface temperature will still be less than 300°C. *See* SAR Figure 2.3.4-98 at 2.3.4-354. Further, SAR § 2.3.5.6 provides that “[f]or seismically-induced drift collapse, a number of FEPs are thermally sensitive, but the likelihood for the peak temperature of any waste package to exceed 300°C is insignificant, considering the probability of a seismic event sufficient to cause drift collapse during the 90 years immediately after repository closure....” *See* SAR § 2.3.5.6 at 2.3.5-146.

Given the above analyses, there is negligible potential for the formation of even minor amounts of molten salt on the drip shield surface, and therefore potential corrosion effects from them are insignificant. In summary, the mass and conditional constraints on even the existence of molten salts on the drip shield in the post-closure system are more limited than those for the extensively evaluated process of dust deliquescence effects on corrosion of the drip shield, and therefore, this molten salt corrosion process is of no material consequence.

Thus, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy the requirements of 10 C.F.R. § 2.309(f)(v) and must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

In an attempt to demonstrate a genuine dispute in subsection 6 of the contention, Nevada states notes that its “... contention challenges SAR Subsection 2.3.6.8 and similar subsections, which treat the corrosion of the drip shield, because they fail to consider molten salt corrosion.” Petition at 581. In this regard, Nevada merely repeats its unsupported, conclusory and speculative claim from its purported “Statement of Alleged Facts or Expert Opinion” discussed above. This bare assertion cannot provide adequate support for a contention. A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc. (Oyster Creek Nuclear Generating Station)*, CLI-00-06, 51 NRC 193, 208 (2000)).

Nevada next states that SAR Subsection 2.3.6.8 and similar subsections “do not comply with 10 C.F.R. § 63.114(f), which requires that any performance assessment used to demonstrate compliance with Section 63.113 must provide the technical basis for either inclusion or exclusion of degradation, deterioration, or alteration processes of engineered barriers in the performance assessment ...” and that “... degradation, deterioration, or alteration processes of engineered barriers must be evaluated in detail if the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be significantly changed by their omission.” Petition at 581.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its

contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

For these reasons and for the reasons noted above in paragraphs d. and e., there is no genuine dispute on any material issue of law or fact contrary to 10 C.F.R. § 2.309(f)(1)(vi), and the contention must therefore be dismissed.

**110. NEV-SAFETY-110 - Rock Bolt Corrosion**

SAR Subsection 1.3.4.4.1 and similar subsections, which claim that the corrosion performance of the rock bolts will be satisfactory in the 100-year preclosure period, fail to consider realistic environments or modern understanding of corrosion processes.

**RESPONSE**

This contention asserts that the stainless steel rock bolts planned for the ground support system are likely to corrode and fail sooner than the 100 year design objective stated in SAR Subsection 1.3.4.4.1, that the failure of the bolts may allow drift collapse before permanent closure, preventing drip shield installation, and that because this is not considered in the TSPA, the TSPA is insufficient.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention seeks to raise an issue that is outside the scope of this proceeding, because it argues for the application of a stricter standard than NRC regulations require. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001). Nevada alleges that DOE failed to comply with 10 C.F.R. § 63.114(f), because it failed to consider the possible impact of corrosion of ground support system rock bolts during preclosure. Nevertheless, 10 C.F.R. § 63.114(f) only requires

the inclusion of a degradation, deterioration, or alteration process, such as corrosion of ground support system rock bolts “*if* the magnitude and time of the resulting radiological exposures to the reasonably maximally exposed individual, or radionuclide releases to the accessible environment, would be *significantly* changed by their omission.” (emphasis added). Nevada does not allege that the omission of corrosion of ground support system rock bolts would have the requisite *significant* effect, yet argues that DOE should have considered it.

In effect, Nevada argues that 10 C.F.R. § 63.114(f) requires DOE to demonstrate through a performance assessment, such as its TSPA analysis, that inclusion of rock bolt corrosion, as described in this contention, would not significantly change the results of the TSPA analysis. Petition at 586. Moreover, Nevada appears to argue that such a confirmatory performance assessment must include every identified feature, event or process (FEP) to verify that including the combination of all such low probability and low consequence FEPs would not significantly change the TSPA results. Acceptance of this argument, however, would be tantamount to requiring DOE to include in its TSPA every known FEP, regardless of its likelihood of occurrence or potential consequences. This obviously asks the Board to impose a stricter requirement than what 10 C.F.R. § 63.114 requires, which Nevada is not permitted to do. *See Fla. Power & Light Co., supra.*

Similarly, the fact that Nevada also claims that no one but DOE is capable of performing the modeling referenced in this contention, Petition at 586, is also deficient. By urging the admissibility of this contention while conceding that it does not know whether the alleged deficiency in the corrosion performance of the rock bolts would impact its results or cause the dose to exceed the regulatory limits, Nevada essentially argues that DOE must show that the contention does not raise a genuine dispute on a material issue of fact. This argument constitutes

an improper attempt by Nevada to shift its burden to DOE, and provides an additional basis for rejection.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Taken together, paragraphs 4, 5 and 6 of this contention assert that: the ground support system rock bolts will fail during the preclosure period due to stress corrosion cracking (SCC); and that the TSPA is deficient because it does not include SCC of the rock bolts. These assertions do not demonstrate that this issue is material, since Nevada does not claim that the dose to the RMEI would be significantly affected. In fact, statements in the LA that Nevada has not challenged show that there would be no effect on the TSPA results.

This contention concerns the ground support system, but does not cite any regulatory requirement associated with the ground support system. Paragraph 4 of this contention discusses requirements of 10 C.F.R. §§ 63.31, 63.21, 63.102, 63.113, 63.114 and 63.115, but does not cite any basis for considering the ground support system to be an engineered barrier that must be considered in the TSPA. Moreover, Petitioner does not claim that the effects of failure of the ground support system, including the rock bolts, would prevent the NRC from making any finding that the NRC must make to support issuance of construction authorization.

The LA also confirms that this contention does not raise a material issue. SAR Subsection 1.3.4.4 “Ground Support System” states that:

The emplacement drift ground support is classified as non-ITS because it is not relied on to prevent or mitigate a Category 1 or Category 2 event sequence, and it is not ITWI because the total system performance assessment (TSPA) does not take credit for ground support during the postclosure performance period.

SAR at 1.3.4-8. This classification means that failure of the entire ground support system would not affect the results of the PCSA or TPSA. Nothing in this contention disputes DOE's classification of the ground support system as non-ITS and non-ITWI.

Paragraph 5 of this contention asserts that “[r]ock bolt failure seems likely, and will potentially allow drift collapse before repository closure, leading to an inability to install the drip shields.” Petition at 585. This unsupported assertion, even if true, would not demonstrate that the issue raised in the contention is material because any pattern of rock bolt failures or the collapse of a drift would be identified during preclosure and would be subject to the regulatory requirements for corrective action, such as 10 CFR §§ 63.132(d), 63.142(q), and 63.51(a)(1). *See also* SAR Subsections 1.3.1.2.1.6, “Monitoring Activities” at 1.3.1-10 (stating that emplacement drifts will be remotely monitored to detect any indications of rockfall, drift degradation or instability) and 4.2.1.8, “Drift Inspection” at 4-24 (describing planned inspection of nonemplacement and emplacement drifts, including a thermally accelerated drift), and sections 15.0, “Nonconforming Materials, Parts, Or Components” (providing that items, including but not limited to, samples, boreholes, and services that do not conform to requirements shall be documented and reported) and 16.0, “Corrective Action” (addressing implementation of corrective actions associated with significant conditions adverse to quality) of the Office of Civilian Radioactive Waste Management (OCRWM) Quality Assurance Requirements and Description (QARD), (*See* LSN# DEN001574022), which is incorporated by reference in the SAR at page 5.1-1.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The legal standards that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet

those standards because it presents only unsupported arguments of counsel. It should also be noted that, although not referenced in the body of this contention, attachments to four of the affidavits included with Nevada's Petition reference this contention, albeit broadly.

Nevertheless, these references do not somehow save this contention from being dismissed for failure to provide an adequate statement of alleged fact or expert opinion. As discussed in Section V.A.3. above, the referenced expert affidavits fall far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Additionally, paragraph 5 of this contention consists of three basic assertions, that: (1) there is an inadequate basis for the SAR statements that the ground support system is expected to fulfill its function for at least 100 years because failure of the rock bolts is likely; (2) such failure will potentially allow drift collapse before repository closure; and (3) drift collapse would lead to the inability to install the drip shields. Petition at 584-85. None of these assertions is adequately supported.

Nevada cites two bases to support its first assertion: (a) DOE's assessment "takes no account of the deposits of concentrated salt solutions that are liable to be formed near the drift end of the rock bolts;" and (b) a published paper reported SCC of type 316 stainless "at temperatures as low as 25°C in the presence of salt deposits containing MgCl<sub>2</sub>." Petition at 585. The first of these bases is not supported by any explanation of Nevada's view on what salt solutions may be formed or specific reference to the DOE report cited by the Petition ("Longevity of Emplacement Drift Ground Support Materials for LA" (9/16/2003), LSN# DN2001087393). Indeed, the DOE report clearly *does* take into account the chemical environment in the emplacement drifts. *Id.* at section 6.2.3, "Ground Water and Air in Emplacement Drifts" (at 19); section 6.4.4.2, "Humid-Air Corrosion" (at 29-30); section 6.4.4.3,

“Aqueous Corrosion” (at 31-32); section 6.4.4.4, “Pitting and Crevice Corrosion” (at 33); section 6.4.4.5, “Stress Corrosion Cracking” (at 34). The Petition does not identify any error in DOE’s analysis of the chemical environment in the drifts and rock bolt bore holes. It also does not explain or give a basis for its vague assertion that “deposits of concentrated salt solutions... are liable to be formed.” Petition at 585. Thus, this basis is unfounded.

The second basis, that DOE relied on outdated information in stating that SCC of type 316 stainless steel does not occur below 100 °C, challenges only one of the three independent reasons given in the DOE report for concluding that “SCC will probably not occur to friction-type rock bolts during the preclosure.” (LSN# DN2001087393 at 40). The other DOE reasons are that: (1) the tensile stress in the friction type rock bolts is lower than the critical stress level to initiate cracks; and (2) for SCC to occur “it must have an aqueous environment containing chloride, which is not expected to exist for friction-type rock bolts at the emplacement drifts during the preclosure period” (*Id.* at 34). Thus, although the Petition does cite a basis for its assertion regarding the minimum temperature for SCC of type 316 stainless steel, it does not provide adequate support for challenging DOE’s conclusion that SCC probably will not occur. Consequently, the Petition does not provide adequate support for the first assertion, that rock bolt failure is likely.

As for Nevada’s two other assertions, Nevada does not attempt to support the assertions that rock bolt failure would lead to drift collapse (the second assertion) or that drift collapse could prevent installation of the drip shields (the third assertion). Indeed, the SAR indicates that the emplacement drifts are expected to be stable without any ground support (SAR at 1.3.2-17), and Nevada does not challenge that statement or cite any basis for challenging it. Moreover, as

discussed above, any significant deterioration of the ground support system or emplacement drift collapse would be identified for corrective action, and Nevada does not claim otherwise.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Ultimately, in paragraph 6, Nevada asserts that: (1) “[DOE fails] to consider realistic environments or modern understanding of corrosion process”; and (2) SAR Subsection 1.3.4 and similar subsections “do not comply with 10 C.F.R. § 63.114(f).” Petition at 585. The discussion above shows that both of these assertions are unfounded and wrong. In particular, ground support is classified as non-ITS and non-ITWI, and the TSPA does not assume that the ground support or the rock bolts remain intact during the postclosure period. The Petition does not reference or challenge the portions of the LA that deal directly with the classification of the ground support system. The Petition also does not provide any basis for concluding that corrosion of rock bolts could have any effect on compliance with any regulatory requirement.

Finally, as discussed in section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. That principle applies to this contention, since it does not specify any alleged ramifications other than the conclusory assertion that the SAR does not comply with 10 C.F.R. § 63.114(f). Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law and does not satisfy 10 C.F.R. § 2.309(f)(vi).

**111. NEV-SAFETY-111 - HLW Waste Glass Dissolution**

SAR Subsection 2.3.7.9 and similar and related subsections, which state and/or assume that HLW borosilicate waste glass degradation and radionuclide release rates can be congruently modeled with only orthosilicic acid controlling glass dissolution, are incorrect because in an advective flow regime and under acidic conditions different more rapid modes of dissolution will occur.

**RESPONSE**

This contention argues that the assumption in SAR section 2.3.7.9 that HLW borosilicate waste glass degradation and radionuclide release rates can be congruently modeled with only orthosilicic acid controlling glass dissolution is incorrect. According to the Petitioner, in an advective flow regime and under acidic conditions, different more rapid modes of dissolution will occur.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Petitioner generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.113, 63.114, and 63.115. Petition at 588-89. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 589. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Petitioner alleges an error in the DOE glass dissolution model, Petitioner has failed to establish that the error is relevant to DOE’s compliance with any Part 63 requirement. Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However,

as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing glass dissolution is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative

analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Thus, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

In order to support a limited proposition (*i.e.*, that the protective gel layer will not form in advective conditions and in lower pH environments), Petitioner references an entire article regarding hydration-rind dating of glass artifacts. Petition at 590. The contention fails to cite any particular paragraph or page of the article as support and, therefore, the reference to this document is not sufficient to satisfy Section 2.309(f)(1)(v). Vague references to documents are

not permissible. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989)*. Consistent with this requirement, the Case Management Order directs petitioners to ensure that documentary references “be as specific as reasonably possible.” Case Management Order at 7. Contrary to long standing Commission case-law and the Case Management Order, Petitioner fails to identify specify portions of the only document on which it relies.

In summary, this contention does not sufficiently identify documents or expert opinion to support the contention. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention states that DOE’s glass dissolution model is, at best, applicable only to a narrow rage of near-neutral pH, a limited temperature range, and conditions in which the reacting aqueous phases are ponded with the waste glass. According to the Petitioner, the model is not applicable to a wide range of pH values and temperatures adopted by DOE. Petition at 588. For several reasons, this contention does not establish a genuine dispute of material fact.

First, the contention alleges withouth support that glass dissolution rates will be higher than those adopted by DOE. Petition at 590. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency. Despite its capacity to run the TSPA, the Petitioner fails to identify and produce alternative TSPA results, thereby challenging DOE’s results. Indeed, Nevada makes no

attempt to provide a quantitative or qualitative assessment of the alleged errors in DOE's glass dissolution model.

Second, even if Petitioner's claims were to be accepted, it ignores significant conservatisms, such as DOE's consideration of uncertainty in the HLW glass dissolution model. As the SAR explains, uncertainty in the glass dissolution test results is accounted for by conservatively using the release rate of boron to represent the glass dissolution rate. SAR at 2.3.7-49. Because boron is the most rapidly released structural element of borosilicate waste glass, it bounds selective leaching, and the release of boron is a conservative treatment of the dissolution rate and the release rates of all radionuclides. *Id.*

As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Petition at 592, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is

Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**112. NEV-SAFETY-112 - HLW Waste Glass Degradation**

SAR Subsection 2.3.7.9.3 and similar subsections, which utilize a release rate formula for HLW glass degradation employing a glass surface area exposure factor that ranges between 4 and 17, are based upon insufficient laboratory testing and exclusion of a fundamental hydration reaction, and therefore result in an incorrect measure of radionuclide release.

**RESPONSE**

This contention argues that DOE's glass degradation model is based on insufficient laboratory testing and exclusion of a fundamental hydration reaction, and therefore results in an incorrect measure of radionuclide release.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies various regulations in support of the contention. *See* Petition at 593-94. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance

with these regulatory provisions and therefore raises a material issue.” Petition at 594. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, although Petitioner alleges deficiencies in the DOE glass degradation model, Petitioner has failed to establish that these deficiencies are relevant to DOE’s compliance with any Part 63 requirement. Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing glass degradation is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada cites to only two documents of its own, which stand for a limited proposition regarding the geometric increase in surface area of the glass log through time during the hydration process. Petition at 597. Neither of these articles specifically challenges DOE's glass degradation model. Therefore, this contention does not comply with 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention alleges that DOE's glass degradation model is flawed because it is based on insufficient laboratory testing and exclusion of a fundamental hydration reaction. Petition at 598. According to Nevada, the model results in an incorrect measure of radionuclide release.

Petition at 598. For the reasons discussed below, this contention does not establish a genuine dispute of material fact.

First, the contention alleges without support that DOE's laboratory-testing program has produced insufficient data and that DOE has not utilized all of its laboratory results. Petition at 595. Citing to a DOE document regarding the HLW glass degradation model, Nevada asserts that "[t]here does not appear to be any mechanistic rationale to support the concept that 4-17 is the correct exposure factor range based upon DOE laboratory data." Petition at 596. To the contrary, on the very next page of the DOE document to which Nevada cites, DOE indicates that it discounted the Sene et al. data because it is not representative of what would happen inside a breached package. See "Defense HLW Glass Degradation Model," LSN#: DN2001053803 at 87 (Aug. 2003). With regard to the higher values of 13 to 61, DOE indicates the following:

This was due to Sample 2 breaking into loose fragments. This leads to a "more complete exposure of all the fractured glass surfaces to the leaching solution" (Sené et al. 1999, Section 5.5.2). The Soxhlet results for Sample 2 are not representative of a canistered waste glass. The fracture ratios for the other analyses are within the range of 4 to 17 that is used in the base model.

*Id.* Contrary to Nevada's assertion, DOE does provide its rationale for using 4-17 as the correct exposure factor range. Thus, Nevada fails to demonstrate a genuine dispute.

Second, as discussed in detail in section V.A.3, *supra*, despite Nevada's capacity to produce quantitative analyses, it does not provide any concrete data to refute the DOE's glass degradation analysis. In fact, Nevada makes no attempt to provide a quantitative or qualitative assessment of the alleged errors in DOE's glass degradation model. Conclusory allegations are all that Nevada provides, and these are insufficient to establish a genuine dispute. *Duke Energy*

*Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), LBP-03-17, 58 NRC 221, 240 (2003), *aff'd*, CLI-03-17, 58 NRC 419 (2003).

Third, Nevada asserts that “[i]f DOE were to utilize a single glass log equal in size to the waste form during a long-term experiment, the results *might* be considerably different from those presented in the SAR.” Petition at 596. This argument amounts to nothing more than speculation and conjecture. Even if Nevada’s claim were to be accepted, the contention provides no basis for believing that it would have any material effect on glass degradation as calculated by DOE. In particular, the contention does not allege, even qualitatively, that the use of a different exposure factor range would result in a change to the glass degradation estimate, or is inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model.

*Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

Furthermore, Nevada claims that DOE did not consider hydration volume increases as a cause of fracturing, and, consequently, “DOE’s calculated rates of radionuclide release cannot be correct.” Petition at 597. Such bare assertions, “without any specific source of evidence concerning the importance of the alleged omission,” in the form of precise facts or “expert sources on this subject,” do not raise a valid basis for attacking the model. *Fla. Power and Light Co.*, (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515, 521 (1990). Similarly, Nevada provides no quantitative or qualitative analysis to refute DOE’s radionuclide release rate and, thus, fails to establish a genuine issue of material fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Petition at 599, Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. See Section V.A.3 of the Answer for a more detailed discussion of this position.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

### **113. NEV-SAFETY-113 - Competitive Sorption In The Unsaturated Zone**

SAR Subsection 2.3.8.3.1, and similar and related sections, assume without validation that “chromatographic effects” will limit the competitiveness of mixtures of radionuclides (and other cations and metals) for sorption sites in the unsaturated zone during transport.

#### **RESPONSE**

This contention alleges that, in “SAR Subsection 2.3.8.3.1, and similar and related sections,” DOE wrongly assumed that chromatographic effects will limit the competitiveness of mixtures of radionuclides and other cations and metals for sorption sites in the UZ. Petition at 601. Nevada also explains that competition between radionuclides and other components will decrease sorption, thereby increasing the speed of transport of radionuclides through the UZ, and increasing dose to the RMEI. *See* Petition at 603.

#### **a. Statement of Issue of Law or Fact to be Controverted**

The contention fails to define the relevant issue because, at different points in the contention, it identifies varying subjects of its dispute. In contrast to the issue raised in Paragraphs 1 and 6 of the contention that “‘chromatographic effects’ will limit the competitiveness of mixtures of radionuclides (and other cations and metals) for sorption sites in the unsaturated zone during transport,” Petition at 601 and 603, in Paragraph 5, Nevada introduces a new area of dispute, alleging that “fingering of flow and limited fracture matrix interaction in the unsaturated zone would likely reduce any residual effects.” Petition at 603. The contention makes no other reference to “fingering of flow and limited fracture matrix” and provides no support for this allegation. This amounts to another (albeit surreptitiously added) dispute, which violates the Board’s Case Management Order requiring petitioners to provide “narrow, single-issue contentions.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6).

Thus, as written, the contention fails to give DOE sufficient notice of the issues of law or fact that Nevada seeks to dispute. Moreover, the contention does not comply with the Board's Case Management Order that contentions be "narrow, single-issue contentions" that are "sufficiently specific as to define the relevant issues" and do not require the Parties or Board to exhaust extensive resources to clarify the issue. *U.S. Dep't of Energy*, LBP-08-10, 67 NRC \_\_\_ (slip op. at 6). Based on the information Petitioner has provided, this contention lacks the specificity required by 10 C.F.R. § 2.309(f)(1)(v) and, therefore, must be rejected.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 601-602. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* at 602. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in assessing radionuclide transport is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and

analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that “the assumption of limited competition for sorption sites by radionuclides (or metals, or other cations) in the [UZ] is unproven and lacks validation by DOE.” Petition at 603. Nevada also notes that competition will decrease sorption, resulting in increased transport of radionuclides and “increase doses received by the RMEI.” Petition at 603. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada alleges that DOE has not conducted experiments with combinations of radionuclides because “it has been assumed that the concentrations, for the most part, are too low, or ‘chromatographic effects’ would limit the competition for sorption sites.” Petition at 602. Nevada challenges DOE’s assumptions regarding chromatographic effects, but presents no opposition to the assumption that radionuclide concentrations are low enough to limit competition for sorption sites. Accordingly, it is unclear to what extent Nevada is challenging

DOE's assumptions regarding competition or results regarding the degree sorption in UZ transport. Accordingly, even if proven, it is unclear whether the positions alleged in this petition would entitle Nevada to relief. This omission, compounded by Nevada's failure to quantify the results of its alleged deficiency, illustrates that Nevada has failed to present a material issue.

Nevada does not allege that chromatographic effects will *not* influence radionuclide transport. It references the statement in SAR section 2.3.8.3.1 that "chromatographic effects ... will limit the influence of competitive effects *at the front* of any releases from the repository." See Petition at 601 (citing SAR Section 2.3.8.3.1 at 2.3.8-21). In this contention, Nevada admits that chromatographic effects "would increase with distance from the source," acknowledging the potential influence of chromatographic effects on radionuclide migration and effectively supporting the SAR statement cited. See Petition at 603. It appears only to question the degree to which chromatographic effects will influence transport in the UZ. Nevada does not quantify the relationship between distance and chromatographic effects, nor does it predict any measurable result for the influence of chromatographic effects. It therefore fails to establish the materiality of its position.

This contention therefore fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, (1) the contention does not reference any documents, other than the license application and DOE's

supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition attaches several affidavits (by Maurice E. Morgenstein, Don L. Shettel, Jr., Adrian H. Bath, and Michael C. Thorne) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada fails to provide *any* references or support for a number of assertions and conclusory statements in this contention, contrary to the requirement to present "claims rooted in fact, documents, or expert opinions." *Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). The crux of Nevada's argument is its statement that "any 'chromatographic effects' would increase with distance from the source and would likely be minimal in the unsaturated zone; also fingering of flow and limited fracturematrix interaction in the unsaturated zone would likely reduce any residual effects." Petition at 603. However, here and elsewhere in its contention, Nevada fails to provide any factual support or expert opinion for that assertion. Without support, Nevada's assertions amount to little more than an unsubstantiated argument of counsel, and certainly fails the requirement of 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes DOE's consideration of chromatographic effects with respect to its analysis of radionuclide sorption and transport in the UZ, and claims that "the assumption of limited competition for sorption sites by radionuclides (or metals, or other cations) in the [UZ] is

unproven and lacks validation by DOE.” Petition at 603. DOE has already demonstrated that Nevada’s contention regarding DOE’s sorption analyses presents an issue that is not material. For this reason, and because Nevada also mischaracterizes and ignores DOE’s relevant analyses and neglects to establish that its alleged deficiencies would result in increased radiological release or exposure, this contention does not establish a genuine dispute of material fact.

This contention acknowledges that chromatographic effects will be present at the repository, and challenges only the extent to which they will influence transport in the UZ. *See* Petition at 603 (“In summary, any ‘chromatographic effects’ would increase with distance from the source and would likely be minimal in the [UZ]”). However, Nevada never attempts to quantify the relationship between chromatographic effects and distance transported, or the effect on DOE’s sorption experiments. Such speculation cannot create a genuine dispute with the LA. As a result, Nevada has not established that this issue has a material effect on the results of DOE’s calculations, and this contention must be dismissed.

In addition, Nevada’s unsupported suggestions that chromatographic effects “would *likely* be minimal in the unsaturated zone” and that “fingering of flow and limited fracture matrix interaction in the unsaturated zone would *likely* reduce any residual effects” do not suffice to present a litigable issue. Petition at 603 (emphasis added). A contention that does not directly controvert a position taken by the applicant in the application is subject to dismissal. *See Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992). Nevada’s qualified submissions fail to directly challenge the LA, and therefore do not raise a material issue.

Although Nevada challenges DOE’s sorption coefficients for UZ transport, it does not challenge (and apparently did not consider) DOE’s relevant analyses. Potential competition for

sorption sites among radionuclides and various groundwater ions is addressed both experimentally and theoretically in the selection of K<sub>d</sub> values and their uncertainty distributions used in TSPA. *See* SNL 2007, “Radionuclide Transport Models Under Ambient Conditions,” LSN# DN2002466365, Table 6-1(a). Experiments on sorption in crushed tuff consider potential effects of competing ions by including both a relatively dilute groundwater (J-13) and a Ca-Mg-carbonate-rich groundwater (UE25p#1). *Id.* at Tables A-2, L-1, L-2, and L-3. In addition to using these two disparate water chemistries, natural variability in the composition of rock samples used for sorption experiments conducted over an extended time span can also be expected to add variability in K<sub>d</sub>s determined from sorption experiments, and is included in the selection of K<sub>d</sub>s and their uncertainty distributions used in TSPA-LA. *See* SAR Section 2.3.8.3.1 at 2.3.8-20.

Furthermore, TSPA considers the effects of potentially competing groundwater ions by augmenting experimentally determined K<sub>d</sub> values with results of modeling calculations by using PHREEQC Software Code: PHREEQC. V2.3. PC, LINUX, Windows 95/98/NT, Redhat 6.2. 10068-2.3-00, LSN# DN2002089680, which include variations in groundwater compositions, matrix surface areas, binding constants for the elements of interest, and thermodynamic data for solution species. LSN# DN2002466365 at 3-2. These modeling calculations provide a basis for interpolation and extrapolation of experimentally derived sorption distribution-coefficient datasets. *Id.* at Section 3 and Appendix A. Appendix A, Sections A6, A7, A8 and A1[a] of SNL 2007 describe the approach used and results obtained. *See* LSN# DN2002466365. As noted in Appendix L3 of SNL 2007, “The results of this modeling, in conjunction with the experimental data, inform the process of expert judgment to arrive at the uncertainty distributions for sorption coefficients for Am (Appendix A8.1), Np (Appendix A8.3), Pu (Appendix A8.4), and U

(Appendix A8.9).” *Id.* In nearly every case, Kd distributions selected for use in TSPA are biased towards conservative values (*i.e.*, smaller than measured values – sometimes by as much as an order of magnitude; *e.g.*, plutonium). *Id.* at Table 6-1(a). Radionuclides for which sufficiently reliable modeling calculations are not available (Cs, Pa, Ra, Se, Sr, Th, Sn), Kd distributions are consistently conservative relative to measured values by 10 to nearly 100 times compared to measured values (with the exceptions of Th, Sn, and Se sorption on zeolitized tuff). *Id.* at Appendix A2(a).

Thus, through the use of multiple experiments, thermodynamic modeling, and conservative selection of Kd values and their uncertainty ranges, the concerns addressed in this contention are, in fact, suitably addressed by DOE, with considerable margin of error accounted for by generally biasing Kd values and uncertainties to the low end of those observed experimentally. *Id.* at Sections A8 and A2[a].

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. Nevada’s contention suffers from this deficiency. Nevada ignores the relevant portions of the Application and fails to explain the materiality of the alleged defects. In short, this contention is inadmissible because “the Petitioner’s assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[].” *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff’d*, CLI-04-6, 60 NRC 631 (2004).

The above moreover supports a finding that DOE’s analyses were consistent with the reasonable expectation standard of 10 C.F.R. §§ 63.31(a)(2) and 63.101(a)(2) (“what is required is reasonable expectation, making allowance for the time period, hazards, and uncertainties

involved, that the outcome will conform with the objectives for postclosure performance for the geologic repository”).

As discussed in the applicable Legal Standards section and section (d) above, this contention alleges potential errors and omissions -- without specifying the ramifications or results of such alleged deficiencies. Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Accordingly, Nevada has failed to raise a genuine dispute of material fact or law and, therefore, this contention is inadmissible. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *See Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises genuine dispute on a material issue of fact or law in this proceeding, which it fails to do.

#### **114. NEV-SAFETY-114 - Applicability Of Sorption Data**

SAR Subsections 2.3.8.1, 2.3.9, 2.1.2.3, 2.1.4 and similar subsections, which describe sorption characteristics of the upper and lower natural barriers, are not an adequate basis for safety assessment since they evaluate the retardation potential of the host rock data from crushed tuff column experiments that do not represent *in situ* characteristics of sorption.

#### **RESPONSE**

This contention alleges that DOE incorrectly represented the *in situ* characteristics of sorption in its experiments relating to the crushed tuff column, because (1) it takes credit for the full sorbing mineral inventory in the Calico Hills formation, and (2) it incorrectly quantifies sorption based on flawed experiments. Petition at 607. Nevada concludes that, because of these alleged errors, DOE's analyses regarding the sorption characteristics of the upper and lower natural barriers constitute an inadequate basis for the performance assessments.

##### **a. Statement of Issue of Law or Fact to be Controverted**

The contention fails to define the relevant issue because it raises two separate issues. In Paragraph 5, Nevada explains that DOE properly does not take credit for sorption in fractures, and then asserts that DOE should similarly have not taken credit for sorption in the Calico Hills formation. *See* Petition at 607. Nevada then asserts that the experiments that DOE conducted to quantify sorption were flawed because they do not have the modeling capability to measure fracture flow conditions or a porous tuff matrix. *See* Petition at 608. Although both assertions challenge DOE's sorption characteristics, they represent separate and distinct challenges to DOE's methodology. This amounts to two separate disputes, which violates the Board's Case Management Order requiring petitioners to provide "narrow, single-issue contentions." *U.S. Dep't of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6). Accordingly, this contention lacks the

narrow specificity required by 10 C.F.R. § 63.309(f)(1)(v) and the Board, and therefore, must be rejected.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 605-06. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 606. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC 328, 333 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used to model sorption is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that DOE improperly evaluated sorption characteristics because it used the full sorbing mineral inventory of the Calico Hills formation and because it relied upon experiments that overly estimate sorption capacity. *See* Petition at 608-09. However, Nevada

fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada’s conclusions that the “sorption characteristics of the upper and lower natural barriers[] are not an adequate basis for a safety assessment,” Petition at 605, and that these sorption characteristics “overly estimate sorption capacity and do not represent Yucca Mountain conditions,” Petition at 609, do not suffice to present a litigable issue. A petitioner must allege not only that more accurate input data could be used in an applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339 (2006). Nevada fails to establish – or even assert – that DOE’s alleged deficiency would result in mean doses above regulatory limits, or would otherwise materially affect this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition attaches several affidavits (by Maurice E. Morgenstein, Don L. Shettel, Jr., and Adrian H. Bath) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Despite a significant number of assertions and conclusory statements provided in this contention, Nevada cites to only one reference document, and then only to support two limited statements. *See* Petition at 606 and 609 (citing Burns, R.G., *et al.*, "Reactivity of Zeolites Forming in Vitric Tufts in the Unsaturated Zone at Yucca Mountain, Nevada (1990) (LSN# NEV 000000568)). This document is an undated, apparently unpublished, 26-page paper. Moreover, Nevada fails to point to a specific page or section of that document for support. A petitioner must identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Consistent with that requirement, the Case Management Order directs petitioners to ensure that documentary

references “be as specific as reasonably possible.” Case Management Order at 7. Petitioner’s contention fails in this regard.

The first time that Nevada’s referenced document is cited, it is for the proposition that DOE does not take credit for sorption of radionuclides onto fracture walls because of the difficulty in characterizing fracture walls. *See* Petition at 606. Nevada explicitly agrees with DOE’s position in this regard, however, so even though Nevada provides a reference to support the statement, the statement itself provides no support for the contention. The second time the document is cited by Nevada, the proposition for which it stands lacks sufficient specificity. *See* Petition at 609 (“[the paper] found that uptake of long-lived ... *may be compromised* by competitive effects”) (emphasis added).

For the remainder of the document, Nevada neglects to provide *any* scientific or technical references, contrary to its obligation to present “claims rooted in fact, documents, or expert opinion.” *See also* *Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). Such unsubstantiated arguments of counsel include Nevada’s first argument that DOE erroneously took credit for the “full sorbing mineral inventory of the Calico Hills formation rather than a limited volume of sorbing minerals that actually will see transporting fluids.” Petition at 607-08. Nevada’s other argument, that DOE’s experiments to quantify sorption were flawed, *see id.* at 608-09, is equally devoid of support that meets the standards imposed by 10 C.F.R. § 2.309(f)(1)(v). Licensing boards have held that a contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-

06, 51 NRC 193, 208 (2000)). Accordingly, Nevada has not satisfied this regulation and its contention should be dismissed on that basis.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's contention, criticizing DOE's sorption characteristics of the upper and lower natural barriers, is not material. DOE has also demonstrated that Nevada has failed to proffer adequate factual support or expert opinion. For these reasons, and because it is unduly speculative and neglects to specify the ramifications of its alleged errors, Nevada's contention does not raise a genuine dispute of material fact or law.

The unsupported conclusions employed in this contention contain certain fundamental errors and omit relevant analyses conducted by DOE. For example, Nevada faults DOE's use of crushed tuff for sorption experiments, alleging that these experiments "incorrectly expose all crystal faces to transporting fluids" and "[s]pecific surface areas for reactions in crushed tuff experiments are so much greater than exposed specific surface areas for either fracture flow or matrix transport." Petition at 608. However, DOE did consider the effect of grain size and crushing of tuffaceous rock on the valuation of sorption, as extensive documentation demonstrates. SAR Section 2.3.8.2.1 notes that crushing tuff does not impact sorption because of the high surface area of the intact rock. Section 6.1.3.1 of "Radionuclide Transport Models Under Ambient Conditions" further addresses this result, discussing in more detail the numerous studies on the effects of crushing rock samples for sorption measurements. *See* "Radionuclide Transport Models Under Ambient Conditions", Bechtel SAIC, Co. LLC, (July 13, 2007), LSN# DN2002466365 at 6-12 to -13. One such study concludes that crushed tuff samples with particle sizes in the range 75 to 500 micrometers (the size fraction used for most Kd determinations used in TSPA-LA) show essentially the same sorption characteristics as does intact tuffaceous rock.

*See Yucca Mountain Site Description*, LSN# DN2002481434, Section 5.3.3.2 at 5-65, and underlying subsections.

In fact, DOE long ago addressed NRC's concern that using crushed tuff to evaluate Kd values could "inject a nonconservative bias" due to the potential presence of more active sorption sites than might be present in whole rocks. *See Summary and Synthesis Report on Radionuclide Retardation for the Yucca Mountain Site Characterization Project*, Triay et al., LSN# DEN000855121 (1997). Triay et al. noted that, in the case of tuffaceous rocks, this does not appear to be a problem. *See id.* at 250-51. They cite the work of Rundberg (1987), who found that sorption coefficients of alkali and alkaline-earth elements on crushed tuff were essentially equal to coefficients obtained for these elements on solid wafers of the same tuffaceous samples. Triay et al. suggested two explanations for this: (1) crushed rocks "pre-react" with groundwater in the experiments, and (2) crushing tuffaceous rock to a 75 – 500 micrometer grain size results mainly in separation of crystals along pre-existing grain boundaries. *See* LSN# DEN000855121 at 250. That is, no new grain boundaries are created in a fine-grained tuff, as might be expected in, for example, a coarse-grained granite.

For another example, Nevada also erroneously alleges that the crushed tuff experiments are flawed because they do not consider competing ions in aqueous solution. *See* Petition at 609. Nevada provides, as an example, the finding that the uptake of cesium into zeolite "may be compromised by competitive effects." *Id.* DOE has investigated potential competitive effects on cesium adsorption by zeolite through its experiments, and has accounted for these effects with the range of Kds selected.

Specifically, experiments on sorption in crushed tuff consider potential effects of competing ions by including both a relatively dilute groundwater (J-13) and a Ca-Mg-carbonate-

rich groundwater (p#1). In addition to using these two disparate water chemistries, natural variability in the composition of rock samples used for sorption experiments conducted over a nearly 25-year time span can also be expected to add some variability in Kds determined from sorption experiments. Furthermore, the TSPA considers the effects of potentially competing groundwater ions by augmenting experimentally determined Kd values with results of modeling calculations by using PHREEQC, *see* V2.3. PC, LINUX , Windows 95/98/NT, Redhat 6.2. 10068-2.3-00, LSN# DN2002089680, which includes variations in groundwater compositions, matrix surface areas, binding constants for the elements of interest, and thermodynamic data for solution species, *see* SNL 2007, Section 3, p. 3-2, LSN# DN2002466365. These modeling calculations provide a basis for interpolation and extrapolation of experimentally derived sorption distribution-coefficient datasets.

Appendix A, Sections A6, A7, A8 and A1[a] of LSN# DN2002466365 describe the approach used and results obtained. *See* LSN# DN2002466365. As noted in Appendix L3 of SNL 2007, “[t]he results of this modeling, in conjunction with the experimental data, inform the process of expert judgment to arrive at the uncertainty distributions for sorption coefficients for Am (Appendix A8.1), Np (Appendix A8.3), Pu (Appendix A8.4), and U (Appendix A8.9).” *Id.* at L-3. In nearly every case, Kd distributions selected for use in the TSPA are biased towards conservative values (*i.e.*, smaller than measured values – sometimes by as much as an order of magnitude; *e.g.*, plutonium). *See id.* at Table 6-1(a). For those radionuclides for which sufficiently reliable modeling calculations are not available (Cs, Pa, Ra, Se, Sr, Th, Sn), Kd distributions are consistently conservative, as they are 10 to nearly 100 times measured values (with the exceptions of Th, Sn, and Se sorption on zeolitized tuff). *See* SNL 2007, LSN# DN2002466365, Appendix A2[a].

With respect to the specific concern raised in this contention regarding Cs sorption experiments that used crushed zeolitic tuff, the range of Kds used in TSPA for modeling cesium sorption onto zeolitized tuff (425 to 20,000, mean = 5,000, *see* LSN# DN2002466365 at Table 6-1(a)) is strongly conservative compared to the range of measured values (approximately 1,000 to 75,000, *see* SNL 2007 LSN# DN2002466365 at Figure A-14b). Thus, through the use of multiple experiments, thermodynamic modeling, and conservative selection of Kd values and their uncertainty ranges, the concerns addressed in this contention are, in fact, suitably addressed by DOE, with considerable margin of error accounted for by generally biasing Kd values and uncertainties to the low end of those observed experimentally. SNL 2007, LSN# DN2002466365 at Sections A8 and A2[a].

The above two examples illustrate how Nevada not only neglects to provide any tangible support for its allegations and fails to explain how the alleged defects in the Application will significantly affect the performance assessments, but it also completely ignores the relevant portions of the Application. As discussed in the applicable Legal Standards Section V.A.3 above, a contention that mistakenly asserts that the Application fails to address an issue that the Application does address, is defective. As established here, Nevada's contention suffers from this deficiency. In short, this contention is inadmissible because "the Petitioner's assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[]." *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff'd*, CLI-04-6, 60 NRC 631 (2004).

This contention moreover fails to raise a genuine dispute of a material issue because Nevada makes no attempt to show that, if correct, the resulting dose estimate would exceed regulatory requirements or significantly change the performance assessments.

First, Nevada asserts that DOE did not comply with 10 C.F.R. § 63.114(b), which requires DOE to “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” Petition at 609. Yet, Nevada ignores the comprehensive discussions of uncertainties and variabilities in the SAR and supporting analytical reports. *See e.g.*, SAR 2.3.8, “Radionuclide Transport in Unsaturated Zone,” Subsections 2.3.8.3, “Data and Data Uncertainty,” and 2.3.8.4.5, “Impacts of Uncertainties and Variability;” *see also* “Radionuclide Transport Models Under Ambient Conditions,” Sections 6.8.3, 6.9.3, 6.10.3, LSN# DN2002466365. Nevada similarly ignores the equally extensive documentation of the technical basis for DOE’s sorption model. *See* SAR 2.3.8 and LSN# DN2002466365.

Second, Nevada also asserts that DOE’s testing process, which formed the basis for its determination of radionuclide sorption characteristics, did not adequately represent in situ characteristics. However, the fact that DOE’s tests did not exactly reproduce in situ sorption is not an adequate basis for discarding its results as used in the sorption model. Indeed, the NRC has recognized the appropriateness of using pragmatic approaches. As stated in NUREG-1804, “Yucca Mountain Review Plan,” pg. 2.2-2:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use

conservative assumptions to simplify its approaches and data collection needs.

YMRP at 2.2-2. The Commission has also noted this in the context of simplified dose calculations:

Mathematical models describing the various sequences of natural phenomena which relate releases of radioactive material to radiation dose vary in detail and complexity. This was frequently observed in the hearing. Through circumstances peculiar to his case, one applicant may be able to present to the Regulatory Staff adequate support for his proposal through the use of simple models and conservative parameter values, while another applicant cannot prove his case so easily. There is no regulatory necessity for performing the most realistic dose estimates that are technologically achievable if a less complex and less expensive analysis can be made to demonstrate compliance with licensing requirements. The use of the simpler procedure may, however, introduce a wider range of uncertainty in estimated doses than a more complicated analysis. Hence the proper choice of parameter values for a simple calculation might be more conservative than values appropriate for a more precise calculation.

*In the Matter of Rulemaking Hearing Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as Practicable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents*, CLI-75-5, 1 NRC 277, 339 (1975). Nevada has not alleged that the sorption characteristics used by DOE were not conservative.

To the contrary, the "crushed tuff column experiments," about which Nevada complains, produced conservative results:

The K<sub>d</sub> values used in the Yucca Mountain studies have been estimated from batch experiments using crushed tuffs with a particle size of 75–500  $\mu$ m under saturated conditions (Appendix A, this model report).

...

Note that the determination approach in the Yucca Mountain studies (Appendices A and B of present model report) tends to underestimate the Kd values because (a) it involves an averaging of Kd values obtained from experiments using both low and high solution concentrations, while (b) the release concentrations are expected to be low at the repository.

“Radionuclide Transport Models Under Ambient Conditions.” MDL-NBS-HS-000008 REV 02

ADD 01, 6-8, LSN# DN2002466365 at 6-8.

Similarly,

Sorption-coefficient probability distribution functions were derived for radionuclides of interest to be used in transport calculations. Experimental and modeling results were used to constrain the distributions. In general, the approach used in derivation of the distributions tended to underestimate the range and median or expected value. This was done to provide some conservatism in the derivation, given potential scaling uncertainties in the application of these distributions to transport calculations at the Yucca Mountain site.

*Id.* at A-85.

The above moreover supports a finding that DOE’s analyses were consistent with the reasonable expectation standard of 10 C.F.R. §§ 63.31(a)(2) and 63.101(a)(2) (“what is required is reasonable expectation, making allowance for the time period, hazards, and uncertainties involved, that the outcome will conform with the objectives for postclosure performance for the geologic repository”).

Nevada has not alleged an increase in the mean dose above the regulatory limit. And as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from that deficiency.

### **115. NEV-SAFETY-115 - Matrix Diffusion**

SAR Subsection 2.3.8 and similar subsections, dealing with matrix diffusion, utilize percolation fluxes that are based upon mean values rather than on individual storm events, thereby overestimating the diffusion of radionuclides during fracture-matrix interactions, even before consideration is given to additional effects due to the degree of radionuclide dilution, and authigenic mineralization along fracture wall surfaces causing matrix pore and micro-fracture plugging, which together make matrix diffusion insignificant during fracture flow transport.

#### **RESPONSE**

This contention alleges that, in “SAR Subsection 2.3.8 and similar subsections,” DOE took too much credit for matrix diffusion in the saturated (“SZ”) and unsaturated zone (“UZ”), because (1) it erroneously used percolation fluxes based upon mean values rather than individual storm events, and (2) it underplays the importance of authigenic mineralization in plugging matrix pores and micro-fractures. Petition at 610.

#### **a. Statement of Issue of Law or Fact to be Controverted**

The contention fails to define the relevant issue because it raises two separate issues. Nevada challenges the credit taken by DOE for matrix diffusion for two reasons: (1) it alleges that DOE erroneously used percolation fluxes based upon mean values rather than individual storm events, and (2) it alleges that DOE undervalued the importance of authigenic mineralization in plugging matrix pores and micro-fractures. *See generally* Petition at 610-14. Although both assertions challenge DOE’s analysis of matrix diffusion, they represent separate and distinct challenges to DOE’s methodology. Moreover, Nevada connects its second assertion to both the UZ and SZ.

This amounts to at least two separate disputes, which lacks the narrow specificity required by 10 C.F.R. § 2.309(f)(1)(v). It also violates the Board’s Case Management Order requiring petitioners to provide “narrow, single-issue contentions.” *U.S. Dep’t of Energy, LBP-08-10, 67 NRC \_\_* (slip op. at 6). Accordingly, this contention lacks the narrow specificity required by 10 C.F.R. § 2.309(f)(1)(v).

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 610-11. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 610. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp., CLI-99-11, 49 NRC at 333-34.*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific

citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in assessing matrix diffusion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Nevada asserts that DOE took too much credit for matrix diffusion in the SZ and UZ. Petition at 610. But as stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Thus, the simple conclusions presented in Paragraph 6 that “SAR Subsection 2.3.8 and similar subsections, dealing with matrix diffusion, utilize percolation fluxes that are based upon mean values rather than on individual storm events, thereby underestimating the flux of fracture flow and overestimating the diffusion of radionuclides during fracture-matrix interactions,” and “DOE underplays the importance of diagenetic mineral reactions,” do not suffice to present a litigable issue. Petition at 613.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the

contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Maurice E. Morgenstein, Adrian H. Bath, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In this regard, Nevada fails to provide references or support for the significant number of assertions and conclusory statements provided in this contention, despite its obligation to present "claims rooted in fact, documents, or expert opinions." *Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). In fact, Nevada cites to *not one* paper or supporting document. A contention "will be ruled inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits', but instead only 'bare assertions and speculation.'" *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). As written, Nevada's amalgamation of unsupported assertions amounts to little more than pure speculation by counsel.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's contention, regarding DOE's treatment of matrix diffusion, presents an issue that is not material. For this reason, and because it is unduly

speculative, fails to directly challenge the LA, and neglects to specify the ramifications of its alleged errors, this contention does not establish a genuine dispute of material fact.

Aside from the three related attachments, Nevada's only supporting references in this contention are to what it claims are the relevant portions of the LA, "SAR Subsection 2.3.8 and similar subsections." Petition at 610. Although a substantial portion of this contention relates to matrix diffusion in the SZ, it fails to reference SAR 2.3.9, "[SZ] Flow and Transport." See Petition at 612-613 ("In summary, ... [i]n the [SZ], authigenic mineralization of the fracture walls is more extensive than in the [UZ]"). The Commission has stated that the petitioner must "read the pertinent portions of the license application, . . . state the applicant's position and the petitioner's opposing view," and explain why it disagrees with the applicant. Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 358. Because Nevada references only that portion of the LA related to radionuclide transport in the UZ, it fails to raise a genuine dispute regarding matrix diffusion in the SZ.

This contention also fails to raise a genuine dispute because, in failing to provide any support for its assertions, it provides only bare arguments of counsel that contradict current understanding of flow and transport processes in fractured systems and field observations of tracer tests conducted at Yucca Mountain. The contention alleges that the TSPA overestimates matrix diffusion in both UZ and SZ, because: 1) the rock matrix is nearly saturated; 2) individual infiltration events will lead to pulsed flow in the UZ; 3) UZ flow will occur in a thin skin along fracture surfaces in between the pulsed flows; and 4) thin-skinning results in authigenic mineralization. The following sections explain why Nevada's allegations are flawed in each of those four areas.

*Matrix Saturation:* Nevada's allegation that, "if the matrix is 90 percent or more saturated, liquid diffusion from a fracture ... has to be an extremely slow process in comparison with the downward event-driven flux of fracture flow transport", Petition at 610, is not supported by any analysis or reference, and is misleading. Petition at 610. Under unsaturated conditions, the permeability (k) is a function of liquid saturation and k increases with saturation or moisture content. See *Groundwater*, Freeze, R.A. and Cherry, J.A. Englewood Cliffs, New Jersey: Prentice-Hall. TIC: 217571 at 42 (1979). In addition, matrix diffusion is positively correlated with matrix permeability and porosity. See SNL 2008, Equation 6.5.5-1, MDL-NBS-HS-000020 REV 02 AD 01 LSN# DEN001583083. Therefore, higher matrix saturation leads to increased matrix permeability, and stronger effect of matrix diffusion on radionuclide transport.

*Individual Infiltration Events:* Nevada also alleges that individual infiltration events will dominate the flow in the UZ and lead to infiltration rates that are higher than estimated by DOE. However, this allegation is not supported by any analysis or reference. The basis for DOE's infiltration estimates is described in SAR Section 2.3.1, with additional details provided in MDL-NBS-HS-000023 REV 01 AD 01 (LSN# DEN001575070). The infiltration study referenced in the latter concludes that "the infiltration estimates are reasonably conservative, based on the comparison to the other infiltration studies in Nevada and the Southwestern U.S., See MDL-NBS-HS-000023 REV 01 AD 01, Section 7.2.1.2, LSN# DEN001575070, and based on the evaluation of infiltration uncertainty using subsurface data such as temperature and porewater/perched water chloride concentrations, see MDL-NBS-HS- 000006 REV 03 AD01, Section 6.8, LSN# DEN001572665. Nevada has not provided any support that would demonstrate that DOE's infiltration rates are *not* conservative, or even alleged as much.

*Thin-Skinning/Film Flow:* Nevada claims that UZ flow will be controlled by a thin film along fracture surfaces that will remain in between pulsed infiltration events, and radionuclide concentrations within this “thin skin” “are presumed to be quite minimal so that actual radionuclide diffusion into the matrix between pulsed flows should be rather insignificant.” Petition at 612. Again, the contention provides no quantitative analysis or reference that supports this claim, and it fails to account for DOE’s analyses in this area. In particular, DOE has represented the potential effects of film flow in the seepage test data acquired in *In Situ Field Testing of Processes*, see BSC 2004, Section 6.2, LSN#2001977697, and developed by *Seepage Calibration Model and Seepage Testing Data*, see BSC 2004, Sections 6.1.2, 6.3.3, and 6.6.3, LSN#DN2001643806. Water originating from film flow seeping into the opening of test alcoves and boreholes during a liquid-release test is reflected in the corresponding seepage data point used for model calibration. Film flow is thus accounted for in the estimated seepage-related capillary-strength parameter from the seepage calibration model. See BSC 2004, Table 6-8, LSN#2001643806. In addition, uncertainty in advective transport in the UZ is addressed, in part, by sampling over a range of other transport parameters. See SAR Section 2.3.8.5.2; MDL-WIS-PA-000005 REV 00 AD 01, Section 6.3.9, LSN#DEN001579005.

*Authigenic Mineralization/Deposition of Secondary Minerals:* The contention further claims, again with no support or references, that “often the thin-skinning results in authigenic mineralization” and “[t]hese authigenics also often clog matrix pore space.” Petition at 612. This contradicts with the field observations of secondary minerals made by the USGS. The field data show that the deposits of secondary minerals occur primarily along the footwalls of open fractures and floors of lithophysal cavities. See, e.g., Whelan J.F.; Paces, J.B.; and Peterman, Z.E. 2002, “Physical and Stable-Isotope Evidence for Information of Secondary Calcite and

Silica in the Unsaturated Zone, Yucca Mountain, Nevada,” *Applied Geochemistry*, 17, ([6]), 735-750, [New York, New York]; Elsevier, TIC: 253462; SAR Section 2.3.3.5 at 2.3.3-78. Such deposits are present in less than 10% of open fractures and lithophysal cavities within the UZ. *See, e.g.*, Whelan et al. 2002 at 747. This slow deposition process has continued for thousands to millions of years, resulting in partial filling of some fractures and cavities without any significant clogging of the rock matrix. *See, e.g.*, Whelan et al. 2002 at 747. These observations are consistent with how the fractured flow system at Yucca Mountain is characterized in the SAR, because the fractures have relatively higher permeability than the matrix. *See* SAR at 2.3.2-131 to-139 (Tables 2.3.2-8 to 12), LSN# DN2002492928. The filling of fractures results in a reduction in fracture permeability, which would result in a reduction of the rate of radionuclide transport. *See* ANL-NBS-HS-000054 REV 00 ACN 01, Figure 6-12, LSN# DN2002492928. The film flow effects of cavities are also not considered in the site-scale transport model, resulting in further underestimation of the performance of the UZ, that is, more conservative results. *See* MDL-NBS-HS-000008 REV 02 AD 01, p. 7-44, LSN# DN2002466365.

In addition, the unsupported claims in this contention also fail to recognize or acknowledge field observations of tracer concentrations from the transport tests conducted at Alcove 1 and Alcove 8 – Niche 3. *See* SAR Sections 2.3.8.4.4.5 and 2.3.8.4.4.4; Liu, H-H.; Haukwa, C.B.; Ahlers, C.F.; Bodvarsson, G.S.; Flint, A.L.; and Guertal, W.B. 2003. “Modeling Flow and Transport in Unsaturated Fractured Rock: An Evaluation of the Continuum Approach.” *Journal of Contaminant Hydrology*, 62-63, 173-188; BSC 2006 ANL-NBS-HS-000056 REV 00 LSN# DN200226487. An analysis of the test results from Alcove 1 indicates that one would need to increase the effective matrix diffusion coefficient implemented in the TSPA model to match the observed tracer concentrations. Similarly, results from the Fault and Large Plot tracer

tests conducted at Alcove 8 also indicate that an enhancement to the matrix diffusion coefficient of up to a factor of 45 is required to match observed tracer concentrations at the underlying Niche 3. *See* LSN#DN2002286487, Section 6. Put another way, the treatment of matrix diffusion in the SAR is conservative when compared to the aforementioned test results.

Similar matrix diffusion enhancements also have been reported in the literature for other test sites. *See* Neretnieks I. 2002. "A Stochastic Multi-Channel Model for Solute Transport—Analysis of Tracer Tests in Fractured Rock." *Journal of Contaminant Hydrology*, 55, ([3-4]), 175-211. New York, New York: Elsevier. TIC: 253977. The test data provide direct support for the incorporation of matrix diffusion into the transport models for TSPA. Moreover, because these tests were conducted under near saturation conditions with higher than normal infiltration rates and because matrix diffusion effects tend to be more significant under lower infiltration rates, the actual matrix diffusion under repository operation conditions could be even higher than the data from other test sites indicate. The enhancement to the matrix diffusion coefficient has not been implemented for the TSPA, which therefore ensures that the current TSPA model treatment of matrix diffusion is relatively conservative for the purpose of assessing performance of the lower natural barrier.

As shown above, this contention contains certain fundamental errors, and moreover, illustrates the need for tangible support of Nevada's allegations. Such speculation cannot create a genuine dispute with the LA. As a result, Nevada has not established that this issue has a material effect on the results of DOE's calculations.

Nevada has not established a genuine issue because, as noted above, it makes no attempt to show that, if its unsupported assertions are correct, it would result in an increase in mean dose above regulatory requirements, or otherwise significantly change the performance assessments.

Nevada also neglects to demonstrate that DOE did not comply with 10 C.F.R. § 63.114(b) or the postclosure performance objectives of § 63.113. Nevada does not show that DOE did not “[a]ccount for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” 10 C.F.R. § 63.114(b). Nevada’s unsupported assertions are particularly glaring in light of the extensive analysis conducted by DOE. SAR Section 2.3.8.3.2 explains that matrix diffusion coefficients for UZ transport calculations were determined using data obtained from laboratory tests as a function of matrix porosity and matrix permeability. *See* SAR Section 2.3.8.3.2 at 2.3.8-21. Statistical analyses verified that both matrix porosity and matrix permeability make significant contributions to the regression of matrix diffusion coefficient at the 95th confidence interval. *Id.* at 2.3.8-22. Repeated lab tests with same rock wafers and different rock wafers confirmed that the uncertainty in the estimated matrix diffusion coefficient is within the acceptable range. *Id.* In addition, field tracer tests conducted at Alcove 1 and Alcove 8 – Niche 3 verified the conceptualization of matrix diffusion in the UZ transport model, and indicated that the current estimates of matrix diffusion coefficient are relatively conservative. *See* SAR Sections 2.3.8.4.4.4 and 2.3.8.4.4.5. Uncertainties in the matrix diffusion coefficient are appropriately propagated into the TSPA by sampling the tortuosity (which equals to the ratio of matrix diffusion coefficient and free-water diffusion coefficient) as a function of matrix porosity and matrix permeability. *See* SAR Section 2.3.8.5.2.4.

Moreover, the above supports a finding that DOE’s analyses were consistent with the reasonable expectation standard of 10 C.F.R. §§ 63.31(a)(2) and 63.101(a)(2) (“what is required is reasonable expectation, making allowance for the time period, hazards, and uncertainties

involved, that the outcome will conform with the objectives for postclosure performance for the geologic repository”).

Nevada has not alleged an increase in the mean dose above the regulatory limit. And as discussed in the Section V.A.3 *infra*, contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute on a material issue of fact or law and are, therefore, inadmissible. This contention suffers from that deficiency and should be dismissed.

**116. NEV-SAFETY-116 - Saturated Zone Redox Conditions**

SAR Subsection 2.4 and similar and related subsections, which state or assume that potential variations in redox conditions (reducing or anoxic conditions) in the saturated zone could enhance radionuclide adsorption, are unrealistic and invalid. Therefore, this aspect of the PMA (LSN# DN20023695678) is invalid and cannot be used in support of post-development validation of the TSPA. Petition at 616.

**RESPONSE**

This contention argues that the assumption in SAR section 2.4, and similar related subsections – that potential variations in redox conditions in the saturated zone could enhance radionuclide adsorption – is unrealistic and invalid. Nevada further alleges that this aspect of the performance margin analysis (PMA) model is invalid and cannot be used in support of post-development validation of the TSPA. Petition at 616.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, and 63.115. Petition at 616-17. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 617. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Although Nevada alleges that enhanced radionuclide sorption in the saturated zone based on redox conditions is unrealistic, Petitioner fails to demonstrate that this issue is material to the findings the NRC must make to authorize construction of the repository. Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section

V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing reducing conditions in the saturate zone is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit

being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Don L. Shettel, Jr. and Adrian H. Bath), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. The most fundamental defect in this contention is that Nevada fails to provide any support for its basic, underlying premise, *i.e.*, that no reducing zones have been delimited beneath the repository footprint. Thus, pursuant to 10 C.F.R. § 2.309(f)(1)(v), this contention must be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention states that DOE's assumption – that radionuclide adsorption would be enhanced by potential reducing conditions in the saturated zone – is without foundation; Nevada asserts that no such reducing zones have been delimited beneath the repository footprint. For several reasons, this contention does not establish a genuine dispute of material fact.

First, the contention provides no explanation or justification for its claim. Initially, Nevada concedes that redox regions in the saturated zone could enhance radionuclide adsorption, as DOE maintains. Petition at 617. Without providing any citation, however, Nevada asserts that “no such reducing regions have been delimited beneath the repository footprint.” *Id.* Nevada then speculates that “[a]lthough there are reducing regions down-gradient from the repository footprint, it is *highly unlikely* that groundwater flow bearing redox-sensitive radionuclides would enter those regions. *Id.* (emphasis added). Even if these claims were construed to have been submitted by an expert, it would not be sufficient to support admission of the contention. As the Commission has stated, “an expert opinion that merely states a conclusion (*e.g.*, the application is ‘deficient,’ ‘inadequate,’ or ‘wrong’) without providing a reasoned basis or explanation for that conclusion is inadequate because it deprived the Board of the ability to make the necessary, reflective assessment of the opinion” of the alleged basis for the contention. *USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006) (quoting *Private Fuel Storage, L.L.C.* (Independent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181 (1998), *aff'd on other grounds*, CLI-98-13, 48 NRC 26 (1998)).

Second, to the extent that Nevada is arguing that DOE has merely assumed the existence of reducing zones beneath the repository footprint, Nevada is simply incorrect. DOE neither makes this claim in the SAR or in its supporting documents. Since Nevada's imprecise reading

of a document cannot be the basis for a litigable contention, *Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995), this contention does not establish a genuine issue of material fact. Furthermore, as referenced in SAR section 2.4.2.3.2.3.2.4, DOE provides its analysis showing reducing conditions in volcanic rocks of the saturated zone along flow paths immediately to the south and east of the footprint (*See* “Impacts of Solubility and Other Geochemical Processes on Radionuclide Retardation in the Natural System,” LSN# DN2002455269 (Figure 2.1-1 and pages 2-3-2.6) (Jan. 2006)), and Nevada fails to directly contravene this analysis. Thus, the contention is subject to dismissal. *See Tex. Utils. Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

Lastly, even if Nevada’s claims were to be accepted, the contention provides no basis for believing that it would have any material effect on the PMA model or on the validation of the TSPA. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this flaw. Nevada fails to specify a different result from no enhancement to radionuclide adsorption by reducing conditions in the saturated zone, or the implications of that result with respect to the PMA or the validation of the TSPA. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

In summary, this contention does not establish a genuine dispute on a material issue of fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**117. NEV-SAFETY-117 - Radionuclide Sorption In The Saturated Zone**

SAR Subsection 2.3.9.3.2.2 and similar subsections, which address radionuclide sorption in the saturated zone, rely on distribution coefficients that are derived from invalid experimental procedures, and as a consequence, the radionuclide transport calculations in the LA cannot be relied upon.

**RESPONSE**

This contention alleges that SAR section 2.3.9.3.2.2, and similar subsections, which addresses radionuclide sorption in the saturated zone, relies on distribution coefficients that are derived from invalid experimental procedures; thus, the data cannot be used for radionuclide transport calculations used in the LA for evaluating dose to the RMEI. Petition at 619.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 619-20. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 620. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada asserts that the experimental data upon which the LA relies for its analysis of radionuclide sorption in the saturated zone is deficient. Petition at 619. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each

postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing radionuclide sorption in the saturated zone is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Specifically, although Nevada asserts that the erroneous data cannot be used in radionuclide transport calculations for evaluating dose to the RMEI, it has failed to establish that

resolution of the contention would make a difference in the outcome of the proceeding. Petition at 625.

Further, Nevada claims that DOE's data is deficient in two respects: (1) "the LA relies on experimental data from sorption experiments in which the initial concentration was above the radionuclide solubility limit in the derivation of radioelement probability density functions, without addressing potential complications arising from precipitation and surface precipitation;" and (2) "the LA does not adequately quantify or define the dissolved radionuclide concentration upon which its result depend." Petition at 619. Neither Nevada's allegation regarding experimental data that is "not *appropriate* to the determination of sorption" (Petition at 622) (emphasis added), nor its assertion that an inadequate definition of dissolved radionuclide concentration amounts to a "*shortcoming* in [DOE's] work" demonstrate that the contention's resolution would make a difference in the outcome of the proceeding. *Id.* at 623 (emphasis added).

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, contrary to 10 C.F.R. § 2.309(f)(1)(iv), and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and

(3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (by Don L. Shettel, Jr., Maurice E. Morgenstein, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Although Nevada makes copious technical assertions, it does not provide *any* scholarly support. Therefore, this contention does not comply with 10 C.F.R. 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention states that the data on which the LA relies for its analysis of radionuclide sorption in the saturated zone is deficient because (1) the LA relies on experimental data from sorption experiments in which the initial concentration was above the radionuclide solubility limit in the derivation of radioelement probability density functions, without addressing potential complications arising from precipitation and surface precipitation; and (2) the LA does not adequately quantify or define the dissolved radionuclide concentration upon which its results depend. Petition at 619. For several reasons, this contention does not establish a genuine dispute of material fact.

First, this contention contains only unsupported speculation. For example, with regard to its claims regarding the initial concentrations above the solubility limit, Nevada asserts that there are “*potential* complications arising from precipitation and surface precipitation.” Petition at 619 (emphasis added). In addition, Nevada indicates that [p]recipitation and surface-precipitation

effects can artificially increase the partitioning of the radionuclide from the solution phase to the solid phase compared to sorption alone” and acknowledges that this will “*potentially* lead to an over estimate of sorption distribution coefficients.” Petition at 622 (emphasis added). With regard to its claims regarding the definition of dissolved radionuclide concentrations, Nevada maintains that, depending on the nature and fines content of the solid phase, “the measured distribution ratio *may* be dependent on the phase separation method applied,” and [f]ine material that would be removed by a fine filter *may* pass through a coarser filter.” Petition at 622-23 (emphasis added). Nevada also alleges that because the measured distribution ratio is dependent on the phase separation method applied, “*it is often the practice* to carry out phase separation by more than one method to identify whether this may be an issue.” Petition at 624 (emphasis added).

The Board should not accept such hypothetical, and unsupported assertions. Even if these claims were construed to have been submitted by an expert, it would not be sufficient to support a contention. With respect to factual information or expert opinion proffered in support of a contention, “the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 181, *aff’d on other grounds*, CLI-98-13, 48 NRC 26. Furthermore, Nevada’s unsupported conclusion that DOE’s sorption data cannot be used in radionuclide transport calculations for evaluating dose to the RMEI should likewise not be accepted by the Board. Petition at 625. Conclusory statements cannot provide “sufficient” support for a contention. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

Second, the contention alleges that sorption data that are relied upon by DOE is not based upon sound experimental protocols and are inadequately reported. Petition at 625. As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. Nevada provides no quantitative or even qualitative information regarding the whether and the extent to which DOE's sorption data used for its radionuclide transport calculations effect its evaluation of dose to the RMEI. Thus, Nevada fails to demonstrate a genuine dispute.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**118. NEV-SAFETY-118 - Estimation of Uncertainties In Soil-To-Plant Transfer Factors**

SAR Subsection 2.3.10.3, and similar subsections, identify the source of soil to plant transfer factors used in the License Application as a number of secondary reviews of relevant literature that are not independent and do not adequately reflect the range of variability in the data reported in the primary literature, such that the performance assessments based on these soil to plant transfers do not fully account for the uncertainties and variabilities in parameter values for 10,000 years after disposal.

**RESPONSE**

This contention claims that SAR Subsection 2.3.10.3, and similar subsections, do not comply with 10 C.F.R. § 63.114(b) because DOE, in identifying the soil to plant transfer factors used in its performance assessments, relied upon “secondary reference sources” that “fail to represent the full range of uncertainty and variability recorded in the underlying primary literature.” Petition at 627. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

To the extent that Nevada argues that DOE violated 10 C.F.R. § 63.114(b) because it did not rely on primary literature in identifying soil-to-plant transfer factors, Petition at page 627, this contention presents an issue that is outside the scope of this proceeding. Neither 10 C.F.R. §

63.114(b), nor any other NRC regulation applicable to DOE in this proceeding requires DOE to base its performance assessment only on data obtained from primary sources. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that it material to the findings that the Commission must make in this proceeding. First, as noted above, the NRC imposes no requirement that DOE restrict information it may use to primary sources and, therefore, to the extent that this contention argues otherwise, it is outside the scope of this proceeding and, therefore, does not raise a material issue.

Second, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met.

This contention makes no such showing. Indeed, it merely claims that DOE’s derivation of soil-to- plant transfer factors “does not fully account for the uncertainties and variabilities ....” Petition at 627. This is not a material issue because Nevada does not assert that the mean dose limit to the RMEI would actually be exceeded if the alleged full accounting of uncertainties and variabilities of soil-to- plant transfer factors were taken into account. Nevada is required to demonstrate that the resolution of the issue would prevent the NRC from finding that there is a

reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public. 10 C.F.R. § 63.31(a)(2).

Moreover, although Nevada challenges the DOE's assessment of uncertainty and variabilities in various soil-to-plant transfer factors, it has not claimed that those factors, in the manner presented in the SAR, or the results from the biosphere model (which uses these factors as input parameters), are inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

The method the DOE used in addressing soil-to-plant transfer factors is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach one affidavit (Michael C. Thorne), which purportedly provides expert opinion to support this contention. However, rather than providing information to support the assertions in paragraph 5 and 6 of this contention, the affidavit simply “adopts” the otherwise unsupported assertions made in paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by

reasoned bases or explanation. Moreover, the contention does not reference any documentation other than DOE's own description of its biosphere model.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada's claim articulated in this contention is not material. DOE has also demonstrated that Nevada has failed to proffer adequate factual support or expert opinion. Accordingly, Nevada's claim of noncompliance with this regulation also does not raise a genuine dispute of material fact or law. The contention's arguments also raise no genuine dispute of material fact or law for the reasons set forth below.

With regard to Nevada's claim that DOE failed to fully account for uncertainty, the NRC has recognized that a substantial amount of uncertainty will exist in any model attempting to represent and predict the future of complex systems. *See* 66 Fed. Reg. 55732, 55747 (Nov. 2, 2001) ("The first-of-a-kind nature of the repository and the evaluation over a very long time period result in significant uncertainty being included in the performance assessment.") For that reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but accounted for. This is precisely what DOE has done. For instance, SAR § 2.3.10 at 2.3.10-37, fully recognized that "[m]easurements of transfer factors vary widely, mainly because of differences among soils, crops, and environmental conditions." This is also noted in one of the technical reports underlying SAR Section 2.3.10 which stated: "Because the values of transfer factors represent crop types, rather than the individual crop species, there is uncertainty associated with this parameter." "Biosphere Model Report," Rev. 02, August 2007, at 6-101 LSN# DN2002481577. Contrary to what this contention suggests, DOE took account of this uncertainty, and carried it forward through to the next model:

The dry-to-wet weight ratio was developed from measurements of reference crops and has a low degree of uncertainty. The soil-to-plant transfer factor, in contrast, was developed based on literature data for many elements and crop types and has a relatively wide distribution. This uncertainty is transferred to the biosphere model results ....

LSN# DN2002481577, at 6-394.

Moreover, the NRC has explicitly recognized the appropriateness for postclosure models to utilize simplified assumptions, and therefore, that in and of itself, is not a basis for criticizing DOE's primary reliance on secondary sources for soil to plant transfer factors. As stated in NUREG-1804, "Yucca Mountain Review Plan," p. 2.2-2:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use conservative assumptions to simplify its approaches and data collection needs.

Thus, simplified assumptions, such as any that result from using secondary sources for soil-to-plant transfer factor determinations, are appropriate provided they are conservative. Indeed, another of the DOE's technical reports underlying SAR Section 2.3.10 described each of the sources of data for the development of the soil-to-plant transfer factors, which it characterized as follows:

The documents that were used as sources of data for development of the values of TFs are mainly review reports, compendia of biosphere parameter values, and comprehensive dose assessment reports that included the descriptions of biosphere models and the selection of model input parameter values. Descriptions of the reports that were the source of the direct input are presented below. References were published by professional organizations producing technically defensible products pertinent to this analysis as indicated in the following discussion. The data from these reports are considered appropriate for the intended use.

“Environmental Transport Input Parameters for the Biosphere Model,” LSN# DN2001625960, at p. 4-15. This document’s descriptions of these sources noted too, the conservatisms inherent in many. For instance, this document noted, regarding the source Davis et al. 1993 –”The Disposal of Canada’s Nuclear Fuel Waste: The Biosphere Model, BIOTRAC, for Postclosure Assessment,” that:

The report includes a discussion of the reliability of BIOTRAC in terms of experimental validation, model and data evaluation, peer review, model intercomparisons, conservative assumptions, quality assurance procedures, and natural analogs (Chapter 11 and references within). Values for the BIOTRAC model parameters were developed based on carefully screened information and were subject to peer review (p. 334) conducted by the publishing organization.

*Id.* at 4-17.

Similarly, with regard to IAEA 2001–”IAEA Safety Reports Series No. 19, Generic Models for Use in Assessing the Impact of Discharges of Radioactive Substances to the Environment,” LSN# DN2001625960 states:

The report was developed through a series of consultant and advisory group meetings, followed by extensive technical review of the contents. The objective of the report was to provide simplified but conservative dose assessment methods. The report provides an overview of these methods and the selection of generic parameters for assessing transfers between various model

components. Because of the objective of the report, the parameter values are generally conservative and not likely to lead to underestimations of the doses.

*Id.* Accordingly, there is no legal or factual basis for Nevada’s contention that DOE’s “performance assessments based on these soil to plant transfers do not *fully account* for the uncertainties and variabilities in parameter values for 10,000 years after disposal.” Petition at 627.

As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties” in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the soil-to-plant transfer factor properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed

contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**119. NEV-SAFETY-119 - Estimation Of Uncertainties In Animal Product Transfer Coefficients**

SAR Subsection 2.3.10.3, and similar subsections, identify the source of animal product transfer coefficients used in the License Application as a number of secondary reviews of relevant literature that are not independent and do not adequately reflect the range of variability in the data reported in the primary literature, such that the performance assessments based on these animal product transfer factors do not fully account for the uncertainties and variabilities in parameter values for 10,000 years after disposal.

**RESPONSE**

This contention claims that “SAR Subsection 2.3.10.3, and similar subsections,” do not comply with 10 C.F.R. § 63.114(b) because DOE, in identifying the animal product transfer coefficients used in its performance assessments, relied upon “secondary reference sources” that “fail to represent the full range of uncertainty and variability recorded in the underlying primary literature.” Petition at 633. This contention must be dismissed for the reasons set forth below.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

To the extent that Nevada argues that DOE violated 10 C.F.R. § 63.114(b) because it did not rely on primary literature in identifying animal product transfer coefficients, Petition at 637, this contention represents an impermissible collateral attack on the NRC’s regulations, and,

accordingly is outside the scope of this proceeding. Neither 10 C.F.R. § 63.114(b), nor any other NRC regulation applicable to DOE in this proceeding requires DOE to base its performance assessment only on data obtained from primary sources. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that it material to the findings that the Commission must make in this proceeding. First, as noted above, the NRC imposes no requirement that DOE restrict information it may use to primary sources and, therefore, to the extent that this contention argues otherwise, it is outside the scope of this proceeding and, therefore, does not raise a material issue.

Second, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a

difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met.

This contention makes no such showing. Indeed, this contention merely claims that DOE’s derivation of animal product transfer coefficients “does not fully account for the uncertainties and variabilities ....” Petition at 633. This is not a material issue because Nevada does not assert that the mean dose limit to the RMEI would actually be exceeded if the alleged full accounting of uncertainties and variabilities of animal product transfer coefficients were

taken into account. Nevada is required to demonstrate that the resolution of the issue would prevent the NRC from finding that there is a reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public. 10 C.F.R. § 63.31 (a)(2).

Moreover, although Nevada challenges the DOE's assessment of uncertainty and variabilities in various animal product transfer coefficients, it has not claimed that those factors, in the manner presented in the SAR, or the results from the biosphere model which uses these factors as input parameters, are inconsistent with the reasonable expectation standard. As stated by another licensing board, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC at 514, 534-44, 550 (1985). The question is not whether uncertainties exist, but rather, whether DOE has dealt with uncertainties in a cautious but reasonable manner that is consistent with present knowledge. Accordingly, Nevada has failed to raise a genuine dispute of material law or fact by this claim.

The method the DOE used in addressing animal product transfer coefficients is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach one affidavit (Michael C. Thorne), which purportedly provides expert opinion to support this contention. However, rather than

providing information to support the assertions in paragraph 5 and 6 of this contention, the affidavit simply “adopts” the otherwise unsupported assertions made in paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

With the exception of two references, the contention does not cite to any other documentation other than DOE’s own description of its biosphere model. One of the cited documents, “Radionuclide Distribution and Transport in Terrestrial and Aquatic Ecosystems, Volume 3,” merely supports the proposition that “the transfer factor for chlorine to milk can be accurately predicted from the amount of stable chloride in the diet of the animal, varying from 0.062 d L<sup>-1</sup> at 22 g d<sup>-1</sup> to 0.0038 d L<sup>-1</sup> at 360 g d<sup>-1</sup>.” Petition at 636. However, this does not state that DOE’s overall range of transfer coefficient values for chlorine transfers to milk of 0.0029 to 0.1 d L<sup>-1</sup> is inadequate to satisfy the requirements of 10 C.F.R. § 63.114(b), and, therefore, this document provides no support the contention. Nevada cites to the other document, “Biosphere Modeling and Dose Assessment for Yucca Mountain,” simply to note that some of the sources DOE used to determine transfer factors themselves relied in part upon others. Petition at 635. This, in and of itself, is not controversial in any way, and does not lend credence to Nevada’s assertion that use of secondary sources is improper.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s claim articulated in this contention is not material. DOE has also demonstrated that Nevada has failed to proffer adequate factual support or expert opinion. Accordingly, Nevada’s claim of noncompliance with this regulation also does not raise a genuine dispute of material fact or law. The contention’s arguments also raise no genuine dispute of material fact or law for the reasons set forth below.

With regard to Nevada's claim that DOE failed to fully account for uncertainty, the NRC has recognized that a substantial amount of uncertainty will exist in any model attempting to represent and predict the future of complex systems. *See* 66 Fed. Reg. 55,732 (Nov. 2, 2001) (“The first-of-a-kind nature of the repository and the evaluation over a very long time period result in significant uncertainty being included in the performance assessment.”) For that reason, 10 C.F.R. § 63.114(b) does not require that uncertainties be eliminated or even minimized, but accounted for. This is precisely what DOE has done. For instance, SAR Section 2.3.10 at p. 41, fully recognized that “These coefficients differ among elements, chemical forms, and animal products, and uncertainty is considerable for most elements.” This is also noted in one of the technical reports underlying SAR Section 2.3.10 which stated: “[d]irect measurements of transfer coefficients are scarce. Many published values are derived from sources other than explicit experimental data . . . Therefore, uncertainty in the transfer coefficient values is considerable for most elements.” “Biosphere Model Report,” Rev. 02, August 2007, at 6-108 LSN# DN2002481577. Contrary to what this contention suggests, DOE took account of uncertainty: “[t]o incorporate uncertainty and variation in the transfer coefficients, geometric means and standard deviations were calculated for each element using values reported in the reviewed literature.” SAR Section 2.3.10, at p. 40.

Moreover, the NRC has explicitly recognized the appropriateness for postclosure models to utilize simplified assumptions, and therefore, that in and of itself, is not a basis for criticizing DOE's primary reliance on secondary sources for animal product transfer coefficients. As stated in NUREG-1804, “Yucca Mountain Review Plan,” pg. 2.2-2:

In many regulatory applications, a conservative approach can be used to decrease the need to collect additional information or to justify a simplified modeling approach. Conservative estimates for

the dose to the reasonably maximally exposed individual may be used to demonstrate that the proposed repository meets U.S. Nuclear Regulatory Commission regulations and provides adequate protection of public health and safety. Approaches designed to overestimate a specific aspect of repository performance (e.g., higher temperatures within the drifts) may be conservative with respect to temperature but could lead to nonconservative results with respect to dose. The total system performance assessment is a complex analysis with many parameters, and the U.S. Department of Energy may use conservative assumptions to simplify its approaches and data collection needs.

Thus, simplified assumptions, such as any that result from using secondary sources for animal product transfer coefficients determinations, are appropriate provided they are conservative. Indeed, another of the DOE's technical reports underlying SAR Section 2.3.10 described each of the sources of data for the development of the animal product transfer coefficients, which stated that the sources of data used for the development of transfer coefficients for animal products "are suitable for the intended use, *i.e.*, to develop distributions of TCs for the animal product types included in the biosphere model." "Environmental Transport Input Parameters for the Biosphere Model," LSN# DN2001625960, at p. 4-47. This document's descriptions of these sources noted too, the conservatisms inherent in many. For instance, this document noted, regarding the source Davis et al. 1993 –"The Disposal of Canada's Nuclear Fuel Waste: The Biosphere Model, BIOTRAC, for Postclosure Assessment," that:

The report includes a discussion of the reliability of BIOTRAC in terms of experimental validation, model and data evaluation, peer review, model intercomparisons, conservative assumptions, quality assurance procedures, and natural analogs (Chapter 11 and references within). Values for the BIOTRAC model parameters were developed based on carefully screened information and were subject to peer review (p. 334) conducted by the publishing organization.

*Id.* at 4-17.

Similarly, with regard to IAEA 2001–“IAEA Safety Reports Series No. 19, Generic Models for Use in Assessing the Impact of Discharges of Radioactive Substances to the Environment,” LSN# DN2001625960 states:

The report was developed through a series of consultant and advisory group meetings, followed by extensive technical review of the contents. The objective of the report was to provide simplified but conservative dose assessment methods. The report provides an overview of these methods and the selection of generic parameters for assessing transfers between various model components. Because of the objective of the report, the parameter values are generally conservative and not likely to lead to underestimations of the doses.

*Id.* Accordingly, there is no legal or factual basis for Nevada’s contention that DOE’s “performance assessments based on these animal product transfer factors do not *fully account* for the uncertainties and variabilities in parameter values for 10,000 years after disposal.” Petition at 633.

As discussed in Section V.A.3 above, contentions expressing only generalized “uncertainties’ in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the animal product transfer coefficient properties at the proposed repository site or to specifically state the radiological impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada’s claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to

raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada's contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

**120. NEV-SAFETY-120 - RMEI Diet**

SAR Subsection 2.3.10.2.5 and similar subsections identify the animal products included in the biosphere assessment model as meat, poultry, eggs and milk, but fail to consider other animal products such as liver that are likely to be consumed by people who reside in the Town of Amargosa Valley and that are very effective in accumulating radionuclides notably actinides.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section identifies various regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the

relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3)*, CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing animal products in the biosphere assessment model is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal

system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not

reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (Steven A. Frishman and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

As discussed in the following subsection, Petitioner mischaracterizes the Application and erroneously asserts that DOE "fail[ed] to consider other animal products such as liver that are likely to be consumed by people who reside in the Town of Amargosa Valley." Petition at 639.

Even if it is assumed for purposes of argument that DOE did omit offal consumption in its food consumption survey, Petitioner provides no evidence that locally-produced offal is part of the diet of the residents of Amargosa Valley. Petitioner cites only one study, Byrom J., Robinson, C., Simmonds, J.R., Walters, B., and Taylor, R.R., "Food Consumption Rates for Use in Generalised Radiological Dose Assessments," *J. Radiol Prot.*, Vol. 15 (1995), to show "that offal consumption can be comparable with meat consumption in high-rate consumers." Petition at 642. However, the study was based in the United Kingdom, not Amargosa Valley or even the United States. There is no evidence presented that the people of Amargosa Valley, Nevada have a diet similar to the people in the United Kingdom, nor is there any statement of alleged facts or expert opinion supporting the position that locally-produced offal, such as liver, is part of the diet of the people living in the Town of Amargosa Valley, Nevada.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Because DOE did incontrovertibly consider other animal products such as liver in its questionnaire surveying the diets of the residents of Amargosa Valley, there is no genuine dispute on any material issue of law or fact. As noted by Nevada in its contention, SAR Subsection 2.3.10.2.5 at 2.3.10-20 states that “[t]he animal products were selected based on a survey of the diet of the residents of Amargosa Valley (DOE 1997).” The reference cited is “The 1997 ‘Biosphere’ Food Consumption Survey Summary Findings and Technical Documentation,” November 1, 1997, (LSN# DEN000684324), which provides in Section 3.6 at 30 that the survey used 11 food groups and a “residual” group. This document is the same as LSN# DN2001032585 cited by Petitioner. Petitioner refers to page 10 of LSN# DN2001032585 to allege that DOE only considered the animal product food groups of meat (beef and pork), milk, poultry and eggs; thereby, neglecting other animal food products such as liver.

However, Petitioner misses DOE’s actual, explicit survey materials on the subject. Appendix A, (LSN# DN2001032585/DEN000684324), provides a “Foods Definition List.” The definition of “beef” used in the survey “includes any edible meat from cattle, foods such as steaks, hamburgers, roast beef, meatloaf, tongue, and **liver**.” *Id.* at A-7 (emphasis added). Furthermore, even if other animal products such as liver were not explicitly included in the survey, they would nevertheless be covered in the residual category of “other,” which is also explained in the Foods Definition List as, “[h]ere we want to list any other food that may not have been covered in the preceding questions.” *Id.*

Appendix B, (LSN# DN2001032585/DEN000684324), provides the questionnaire actually used by DOE in its survey. Survey question 3f1, listed on page B-6, expressly asked, “[o]ver the past year, did you eat any locally-produced beef such as **liver**, steaks, roasts, fresh or

frozen; fried, grilled, baked, roasted, boiled and so forth?” *Id.* at B-6 (emphasis added). The following three questions then asked about the consumption amount of those animal products. *Id.* at B-7. Again, even if foods such as liver were not expressly asked about in the survey, question 3m1 asked, “[o]ver the past year, did you eat any other locally-produced food, such as tomatoes, *or anything I did not already mention?*” *Id.* at B-10 (emphasis added). Therefore, Amargosa Valley residents had the opportunity to mention any other animal product, such as offal, in the survey. Because DOE did not unreasonably restrict the range of animal products and, thus, adequately estimated radiological impacts on the RMEI from consumption of animal products contaminated with radionuclides, this contention presents no genuine dispute of material fact or law. These questions formed the basis for DOE’s evaluation of the diet of the RMEI in the SAR.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the burden and complexity of showing the dose effects of acceptance of Nevada’s contentions, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged

deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990).

**121. NEV-SAFETY-121 - Host Rock Geomechanical Properties**

SAR Subsection 1.3.4.4 and similar subsections, which discuss the ground support system for the emplacement drifts, reach conclusions about the geomechanical properties of the predominant host rock units used for design based on very limited numbers of physical tests that are insufficient to demonstrate that the rocks hosting the emplacement drifts will contribute to postclosure performance by functioning as a geological barrier.

**RESPONSE**

**a. Statement of Issue of Law or Fact to be Controverted**

This contention references SAR Subsection 1.3.4.4 and similar subsections, which discuss the ground support system for the emplacement drifts, and asserts that such subsections reach conclusions about the geomechanical properties of the predominant host rock units used for design based on very limited numbers of physical tests. It then goes on to assert that those tests are insufficient to demonstrate that the rocks hosting the emplacement drifts will contribute to postclosure performance by functioning as a geological barrier. Thus, this contention appears to assert that the physical tests used by DOE to reach conclusions about the geomechanical properties of the predominant host rock for use in the design of the ground support system for the emplacement drifts are not also sufficient to demonstrate that such rock will contribute to postclosure performance by functioning as a geologic barrier.

The contention does not cite a regulation that requires the physical tests used for design of the ground support system to be the same as the tests used to demonstrate the contribution of rock to postclosure performance. It also does not assert that the Application relies solely on the results of the physical tests used for design of the ground support system to demonstrate the effectiveness of the rock as a geologic barrier. Because it does not assert that either the ground

support system will not fulfill some alleged safety function, or that the repository will not meet an applicable requirement, it does not identify an issue of law or fact. The Commission has stated that “a contention must allege, with some basis, that the licensee’s application is deficient.” *Dominion Nuclear Connecticut, Inc.*(Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 216 (2003). This contention does not do so.

**b. Brief Explanation of Basis**

Paragraph 2 of this contention is a statement of a different contention, not a statement of basis for this contention. Paragraph 2 does not even refer to the ground support system, or identify specific rock property tests that are challenged, or identify a regulatory or safety reason why those properties must be determined. While 10 C.F.R. § 2.309(f)(1)(ii) requires only a brief summary of basis for a contention, the summary must at least show that there is reason for further inquiry regarding the contention and give notice to the parties regarding the nature of the issue for litigation. As one Atomic and Safety Licensing Board has stated:

Certainly, it might be said that one cannot have both brevity and also extensive specificity. But it is not unreasonable to require enough specificity in the explanation offered in the basis for a contention, such that a matter relating to a particular facility is stated in sufficient detail that it clearly states an issue that is susceptible to litigation with regard to that facility.

*Nuclear Management Company, LLC* (Palisades Nuclear Plant), LBP-06-10, 63 NRC 314, 351 (2006), *aff’d*, CLI-06-17, 63 NRC 727, (2006). Paragraph 2 does not meet this test, because it does not identify the geomechanical properties at issue or explain how that issue is related to the ground support system and the TSPA. Moreover, as shown below, the other paragraphs of this contention also do not provide such information.

**c. Whether the Issue is Within the Scope of the Proceeding**

Because this contention does not identify an issue of law or fact to be controverted, it cannot show that the “issue” is within the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not identify an issue of law or fact to be controverted, so, therefore, it cannot show that the “issue” is material to the findings that the NRC must make. More specifically, the only portions of the LA referenced in this contention are: (1) general references to SAR Subsection 1.3.4.4 in Paragraph 1 (Petition at 646) and Paragraph 6 (Petition at 649); (2) SAR Subsection 1.3.4.4 information about repository host rock units in Paragraph 5 (Petition at 648); (3) a general reference to SAR Tables 1.3.3-2 and 1.3.3-3 in Paragraph 5 (*Id.*) and (4) a general reference to SAR Subsection 1.3.4.7 in paragraph 6 (*id.* at 650).

Neither the specific statements that Nevada challenges or an explanation for such challenges can be found in the contention’s general references to SAR Subsection 1.3.4.4 in paragraph 1 and 6. The references to SAR Subsections 1.3.4.4 in paragraphs 1 and 6 do not identify specific statements that Nevada challenges or explain the reasons for any such challenge. The references to SAR Subsection 1.3.4.4 in Paragraph 5 do not challenge any information in that subsection, but rather rely on the SAR to show that 85% of the emplacement drifts are located in the lithophysal units. The Paragraph 5 reference to SAR Tables 1.3.3-2 and 1.3.3-3 also does not challenge any information in those tables. Finally, while Paragraph 6 asserts that SAR Subsection 1.3.4.7 does not characterize rock mass properties sufficiently for assessment purposes, and therefore does not comply with 10 CFR § 63.115(b), Nevada does not specify a challenged statement in that subsection or explain the alleged inadequacy. Petition at 650. Moreover, SAR Subsection 1.3.4.7 does not purport to characterize rock mass properties; the

closest it comes to doing so is its cross-references to SAR Subsection 2.3.4.5 for information about drip shield mechanical response to rockfall. *See* SAR at 1.3.4-30.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach an affidavit (by Doug F. Hambley), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopts" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. *See Dominion Nuclear Connecticut, Inc.*, (Millstone Power Station, Unit 3), CLI-08-17, slip op. at 9 (Aug. 13, 2008); CLI-06-10, *supra*, 63 NRC at 472.

Paragraph 5 of this contention concerns some of the data listed in Table 6-62 of DOE's report entitled "Subsurface Geotechnical Parameters Report" (01/01/2007), LSN#: DN2002371133. Petition at 648. Nevada asserts that: (1) the table reports "only 13 samples of the lower lithophysal unit and 26 samples of the upper lithophysal unit having a diameter of 245 cm [sic] or larger under ambient temperature conditions and an additional two samples of the lower lithophysal unit and three samples of the upper lithophysal unit were tested under elevated

temperature (200 °C) conditions;” and (2) no [lithophysal] samples were tested in triaxial compression at elevated temperatures. *Id.* Based on assertions 1 and 2, Nevada concludes that “the characterization of the strength properties of the rock mass presented in the TSPA-LA cannot be considered as adequate to demonstrate that the geologic barrier will function as assumed.” *Id.*

Nevada’s first two assertions are directed at a subset of the data described in Table 6-62 of the DOE report, and do not reference the portion of the Application that uses that data, along with various other data and analyses, to develop the rockfall analysis that is used in the analysis of seismic disruption of engineered systems or drip shield response to rockfall. See SAR Subsection 2.3.4.4 “Rockfall Analysis” (SAR at 2.3.4-51 through 2.3.4-354). As described below, the discussion in the SAR describes detailed analyses of the effects of the sizes of the rock samples on the test data, and testing used to determine thermal effects on the rock.

Nevada’s first assertion is that of the 1208 samples represented in Table 6-62 of the DOE report, a limited number were of larger rock samples. Petition at 648-49; DOE report at 6-90. The Application describes an analysis of the effect of the sizes of the rock samples. See SAR Subsection 2.3.4.4.2.3.3.2 “Effect of Sample Size and Anisotropy” (SAR at 2.3.4-62), and SAR Figure 2.3.4-27 “Results of Size Effect Study Showing Variation in Sample Unconfined Compressive Strength as a Function of Sample Volume” (SAR at 2.3.4-285). In addition, the Application states that these laboratory tests were supplemented with larger in situ tests conducted at both ambient and elevated temperatures at scales commensurate with excavation dimensions. SAR Subsection 2.3.4.4.2.3.4. The discussions in the SAR demonstrate that the sample sizes were appropriately taken into consideration in DOE’s analyses, and that additional data also was used to characterize the rock properties. This contention does not dispute DOE’s

assessment of the effects of sample size or its use of other data, such as the results of in situ tests, and thus does not provide support for disputing the DOE analyses that utilize the results of the sample size analysis.

Nevada's second assertion is that there were no triaxial tests conducted at elevated temperatures from either lithophysal unit, and that this is unacceptable. Petition at 649. The DOE report cited by Nevada explains why there was no need for such tests:

**Effects of Temperature:** Figure 6-32 plots the compressive strength versus temperature for the Ttpmn and Ttpln rock samples tested under triaxial compressive loading conditions and indicates that temperature has little effect on the strength of the specimens. In other words, the temperature effect is well within the range of data expected at ambient conditions. Such a behavior is expected of the Ttppl and Ttpul rock samples too because of close resemblance in terms of matrix materials between nonlithophysal and lithophysal rock units. Furthermore, the temperature range to which the rock surrounding emplacement drifts will be exposed is rather low in comparison with the temperature ranges reportedly used to test rocks for temperature dependency.

LSN# DN2002371133 at 6-87. In addition, the Application provides an analysis of thermal properties of the rock in SAR Subsection 2.3.4.4.2.3.6 "Thermal Properties," which states that it is based on numerous tests, including laboratory tests of both small and large rock samples and field measurements. SAR at 2.3.4-65 through 67. Nevada does not reference or dispute any statement in the Application concerning the thermal properties of the rock, and thus this assertion does not provide support for disputing the DOE analyses of the thermal properties of the rock.

SAR Subsection 2.3.4 "Mechanical Degradation of the Engineered Barrier System" is the portion of the Application that describes how the geotechnical characteristics of the repository horizon host rock are considered in the TSPA. It explains that the repository will be located in 4 lithostratigraphic units of Yucca Mountain, denoted as Ttpul, Ttpmn, Ttppl, and Ttpln, and

that the Tptpl (lower lithophysal unit) will host approximately 80% of the emplacement drifts. SAR Subsection 1.3.4.4. In total, there are 434 laboratory tests conducted on core samples from these units as shown in Table 6-62 of Subsurface Geotechnical Parameters Report, LSN# DN2002371133 at 6-192. Of these 212 were core extracted from the lower lithophysal unit, providing an adequate measure of matrix rock properties. *Id.*

SAR Subsection 2.3.4.4.2.3.3.4 explains that the primary factor influencing variability of the unconfined compressive strength and Young's modulus (two primary inputs to predicting drift stability) is the sample porosity. SAR Figures 2.3.4-26 and 2.3.4-28 establish the relationships between porosity and these key mechanical properties. Porosity of the rock mass is quantified in SAR Figure 2.3.4-24 for all of the emplacement drift stratigraphic units, and is provided in greater detail in SAR Figure 2.3.4-25 for the lower lithophysal unit, which will host the bulk of the repository. Based on these properties then, the rock mass was modeled and validated against laboratory and field observations as explained in SAR Subsection 2.3.4.4.5.3.2.

This contention does not address any of these analyses, and thus does not provide support for Nevada's assertion that the TSPA cannot be considered adequate.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The discussion above shows that Nevada has not demonstrated that this contention raises a material issue. In particular, it has not included references to specific portions of the LA that Nevada disputes. Moreover, where it challenged SAR Subsection 1.3.4.7, it did not provide supporting reasons for that challenge.

Finally, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material

fact or law and are, therefore, inadmissible. This contention suffers from this deficiency, since it does not specify any alleged ramifications other than the conclusory assertion that the SAR does not comply with 10 C.F.R. § 63.115(b). Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

**122. NEV-SAFETY-122 - Screening Of Drift Degradation FEPS**

SAR Subsection 2.3.4.1 improperly excludes features, events and processes relating to seismic-induced rockfall damage, non-seismic rockfall and drift collapse that could occur within the first 10,000 years from consideration in the TSPA on the basis of low consequence or low probability.

**RESPONSE**

Nevada states that: (1) DOE should evaluate the alternative conceptual model presented by the Center for Nuclear Waste Regulatory Analyses (CNWRA); and (2) in light of that model, DOE may have improperly excluded FEPS from the TSPA related to seismic induced rockfall damage, non-seismic rockfall, and non-seismic drift collapse based on low consequence or low probability.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies a number of regulations in paragraph 4 of the

contention. *See* Petition at 651-52. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 652. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be

met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing rockfall and drift collapse is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository, or would otherwise make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a

likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In addition, Nevada's proposed model is not material to the extent that it focuses on the post-10,000 year postclosure period. The requirement to consider alternative conceptual models applies only to the "performance assessment used to demonstrate compliance with [the postclosure performance objectives] for 10,000 years after disposal," pursuant to proposed 10 C.F.R. § 63.114(a)(3). *See* 70 Fed. Reg. 53,313, 53,318 (Sept. 8, 2005).<sup>67</sup> Accordingly, any consideration of such a model for the post-10,000 year period is not material to the findings that the NRC must make in this proceeding.

For the aforementioned reasons, this contention fails to raise a material issue, contrary to 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention mainly contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by Doug F. Hambley and Michael C. Thorne), which purportedly provide expert opinions to support this

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<sup>67</sup> In this respect, the requirements of proposed 10 C.F.R. § 63.114 are substantively the same as existing 10 C.F.R. § 63.114. The existing rule requires consideration of alternative conceptual models for performance assessments used to demonstrate compliance with 10 C.F.R. § 63.113, and that section establishes performance objectives for the first 10,000 years after permanent closure.

contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. This contention relies almost entirely on the CNWRA’s model, which – as discussed below – does not support Nevada’s contention, is flawed in a number of respects, and provides nonspecific and imprecise generalizations.

This contention first states that 10 C.F.R. § 63.114(c) requires that DOE “[c]onsider alternative conceptual models of features and processes that are consistent with available data and current scientific understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository.” Petition at 652. The contention then asserts that DOE should consider the alternative conceptual model presented by CNWRA regarding drift collapse. Petition at 654-55. Nevada reasons that DOE should evaluate this model because the model calls into question DOE’s exclusion justifications for certain FEPs related to rockfall and drift collapse. *Id.* However, CNWRA’s model, upon which Nevada relies, is insufficient to support this contention, much less function as a legitimate alternative conceptual model.

First, Nevada claims that “DOE and CNWRA have developed very different models for the consequences of rockfall and drift degradation.” Petition at 654. This is incorrect. The CNWRA model concerns *only* drift collapse – it does not evaluate rockfall whatsoever. Accordingly, to the extent that this contention concerns the evaluation of rockfall in the LA or in FEP exclusion justifications, those concerns are inadmissible for want of “reasoned basis or explanation.” *See Fansteel*, CLI-03-13, 58 NRC at 203.

Second, the CNWRA study *assumes* events and processes, rather than weighing them based on probability of occurrence. This represents a substantial departure from DOE's FEP evaluation, which weighed analyses according to established probabilities and resulting consequence, according to the requirements of proposed 10 C.F.R. § 63.342(a):

DOE's performance assessments conducted to show compliance with §§ 63.311(a)(1), 63.321(b)(1), and 63.331 shall not include consideration of very unlikely features, events, or processes, *i.e.*, those that are estimated to have less than one chance in 10,000 of occurring within 10,000 years of disposal (less than one chance in 100,000,000 per year). In addition, DOE's performance assessments need not evaluate the impacts resulting from any features, events, and processes or sequences of events and processes with a higher chance of occurrence if the results of the performance assessments would not be changed significantly in the initial 10,000 year period after disposal.<sup>68</sup>

70 Fed. Reg. at 53,319.

For example, the CNWRA study assumes that drift degradation from thermal loading begins at the time of closure, without providing reasoned basis or support for that assumption. *See Risk Insights Derived From Analyses of Model Updates in the Total System Performance Assessment Version 5.1 Code, Section 4.1, LSN# NRC000029711 (7/31/2008) AT 34-1.* To the contrary, the exclusion justification for FEP 2.1.07.02.0A, "Drift collapse," which discusses nominal drift collapse (*i.e.*, considering thermal and time-dependent effects, but excluding seismic effects), finds only "partial collapse of the drift (such that collapsed rock blocks do not cover the drip shield) for the first 10,000-year period of postclosure." "Features, Events, and Processes for the Total System Performance Assessment: Analyses," (LSN# DEN001584824, at 6-552, 6-554) (Mar. 6, 2008). (Note that Seismic-induced drift collapse is *included* in the TSPA.

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<sup>68</sup> In this respect, the requirements of proposed 10 C.F.R. § 63.342 are comparable with existing 10 C.F.R. § 63.342. The proposed rule conforms § 63.342 to EPA's revised standards, which specify the types of changes DOE shall account for in the post-10,000 year period. *See* 70 Fed. Reg. 53,319 (Sept. 8, 2005).

*Id.* at 6-112, 6-118). DOE's conclusion is rooted in the extensive analyses in its supporting document, "Drift Degradation Analysis" (BSC 2004, LSN# 2002203028), to which DOE provides specific references in its exclusion justification. *See* LSN# DEN001584824, at 6-552 to -555.

For another example, the CNWRA study assumes "some fraction" of seepage through drip shields, without providing reasoned basis or support for that assumption or quantifying the fraction of seepage expected. *See* Risk Insights Derived From Analyses of Model Updates in the Total System Performance Assessment Version 5.1 Code, Section 4.1, LSN# NRC000029711 (July 31, 2008). To the contrary, the exclusion justification for FEP 2.1.03.10.0B, "Advection of liquids and solids through cracks in the drip shield," finds that through-wall cracks are not expected to occur, but that if they do occur, the resulting seepage of 4 mL/yr would be bounded by the minimum liquid influx rate (100 mL/yr) or threshold seepage rate (100 mL/yr) per waste package that are defined for the TSPA. *See* Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN# DEN001584824, 6-466 – 6-480 (Mar. 6, 2008). Again, DOE's conclusion is rooted in extensive analyses in the FEP exclusion justification and the specific references therein. *See* LSN#: DEN001584824, 6-466 – 6-480 (Mar. 6, 2008).

It is not surprising, therefore, that the CNWRA model would predict an allegedly higher (albeit unspecified) dose, given the aforementioned assumptions. These assumptions are not grounded in fact or reasoned explanation, nor are they weighted by probability. *See* USEC, CLI-06-10, 63 NRC at 472. Accordingly, the CNWRA model offers no support for this contention, rendering it inadmissible.

Yet another example of the CNWRA's inadequacy as a supporting document for this contention is its failure to quantify projected dose. No part of the cited reference quantifies the

expected dose, not even the graph showing mean dose estimates for which the “Dose” axis has no unit or scale. *See Risk Insights Derived From Analyses of Model Updates in the Total System Performance Assessment Version 5.1 Code, Section 4.1 – 4.3, LSN# NRC000029711 (July 31, 2008).* Nevada uses this vague conclusion of resulting dose – calculated from a series of unspecified rates and values, and illustrated in a graph with no scale or frame of reference – as its sole support for its similarly unspecific claim that “[t]he assessed radiological impacts ... are substantially expressed within 10,000 years.” Petition at 654. Neither this contention nor its primary reference attempts to quantify dose or even allege that the result would be significant or exceed applicable regulatory limits. That bare speculation and vague conclusion cannot sustain the contention. *Dominion Nuclear Conn., CLI-08-17, 68 NRC \_\_ (slip op. at 4).*

Nevada, nonetheless, concludes that this model should be considered by DOE. However the CNWRA model, like the contention itself, establishes multiple events of causation, asserts that these events “may” occur, but does not demonstrate (let alone assert) that these events are certain or even likely. *See “Risk Insights Derived From Analyses of Model Updates in the Total System Performance Assessment Version 5.1 Code, Section 4.1 – 4.3,” (LSN# NRC000029711) (July 31, 2008) (“[d]rift degradation resulting from thermal loading is assumed to occur” ... “localized corrosion may occur” ... “if the resulting stress is amplified by seismic acceleration, mechanical damage of the waste package may occur”).* Such hypothetical assertions fail to provide any “reasoned basis for its results,” and therefore cannot form the basis for this contention. *Fansteel, CLI-03-13, 58 NRC at 203.*

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such

alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. For the reasons set forth below, this contention does not establish a genuine dispute of material fact and therefore must be dismissed.

This contention simply relies upon the CNWRA model of dose effects from drift degradation, and concludes that (1) DOE should evaluate this model, and (2) the model shows that DOE erroneously excluded FEPs related to rockfall and drift degradation. As shown above, however, this contention – and the model upon which it relies – fails to provide reasoned basis or explanation for its conclusions and therefore does not “provide sufficient information to show ...a genuine dispute ... with the applicant ... on a material issue of law or fact.” *See* 10 C.F.R. § 2.309(f)(1)(vi).

Furthermore, DOE considered and evaluated a variety of alternate models for drift degradation and rockfall loading, and, notwithstanding Nevada’s claim to the contrary, this *included* the CNWRA model during the process of addressing Key Technical Issues raised by the NRC through a series of meetings with CNWRA staff and technical work. *See* LSN# DN2001686826, Section 1 at 1-1 to 1-3. The use of the CNWRA model in TSPA is inconsistent with the NRC’s requirements in 10 C.F.R. § 63.101 and 63.304 to maintain “reasonable expectation” in performance assessment. DOE has therefore considered this alternate conceptual model, as required by 10 C.F.R. § 63.114(c), but has valid reasons for not including it in TSPA. Accordingly, Nevada fails to raise a genuine dispute and this contention is inadmissible because, in short, “the Petitioner’s assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[].” *Dominion Nuclear Conn.*, LBP-04-15, 60 NRC at 95.

DOE also investigated three additional alternate conceptual models for the rockfall loads in a collapsed drift analytical, continuum, and discontinuum. *See* BSC 2004, *Drift Degradation Analysis*, LSN# 2002203028, Section 6.4.2.5. DOE's assessed the capabilities and limitations of these representative models. That DOE ultimately included the predictions of the discontinuum approach only does not alter the fact that they were considered and evaluated as required by 10 C.F.R. § 63.114(c).

Nevada's contention also contains certain errors: (i) it alleges that DOE did not consider the CNWRA model, *see* Petition at 654-55, when in fact it did consider it as an alternative conceptual model, as it addressed NRC Key Technical Issues through a series of meetings with CNWRA staff and technical work. (LSN# DN2001686826, Section 1 at 1-1 to 1-3); (ii) it alleges that FEPs related to "seismic-induced rockfall damage, non-seismic rockfall and drift collapse" have been screened from the TSPA on the basis of low consequence and low probability, *see* Petition at 651 and 655, when in fact those FEPs were all screened on the basis of low consequence only, *see* (LSN# DEN001584824 at 6-99, 6-547, 6-552); (iii) it states that "[s]eismic-induced rockfall in the lithophysal units is not excluded from the TSPA," *see* Petition at 653, however, that FEP *is* excluded; and (iv) it represents that "in light of the CNWRA report, DOE's screening of [FEPs] relating to seismic-induced rockfall damage, non-seismic rockfall and drift collapse ... has not been adequately justified," *see* Petition at 655, however the CNWRA report concerns drift collapse *only*, and makes no reference to rockfall or the effects of rockfall whatsoever, *see* LSN# NRC000029711 at 4.1 - 4.3. Nevada's imprecise readings cannot form the basis for a litigable contention. *See Ga. Inst. of Tech. (Georgia Tech Research Reactor.)*, LBP-95-6, 41 NRC 281, 300 (1995).

Moreover, this contention does not present a genuine dispute on a material issue of fact regarding the screening justification for the subject FEPs. As described above, the contention and its referenced model establish multiple events of causation, assert that these events “may” occur, but do not demonstrate (let alone assert) that these events are certain or even likely, or that the results of the performance assessments for the first 10,000 year period would be significantly changed by the inclusion of these FEPs. *See* Petition at 654 - 55 (“localized corrosion *may* occur” ... “*if* the resulting stress is amplified by seismic acceleration, mechanical damage of the waste package *may* occur”). A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 239-40 (2006). Such hypothetical assertions do not directly controvert a position taken by the applicant in the application (*i.e.*, the exclusion justifications of the subject FEPs), and therefore cannot form the basis for this contention. *Texas Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

Finally, this contention fails to raise a genuine dispute on a material issue of fact because it acknowledges that it has not evaluated the extent to which DOE has undertaken the analyses for which it claims the LA is deficient. This contention first establishes that 10 C.F.R. § 63.114(c) requires that DOE “[c]onsider alternative conceptual models of features and processes that are consistent with available data and current scientific understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository.” Petition at 652. This contention concludes that “[t]here is a need to show either that

the CNWRA model is inconsistent with available data and scientific understanding, or to update the screening assessment to take account of the legitimacy of this model.” *Id.* at 655.

However, between these two statements, Nevada claims that “[t]he State of Nevada *has not* evaluated the extent to which analyses of [the effects of rockfall and drift degradation on drip shields and waste packages] have been undertaken by DOE and CNWRA, and *has not* investigated differences between these analyses.” *Id.* at 654 (emphasis added). This is the very *crux* of Nevada’s contention, yet it admits that it has not evaluated the merit of its position. This contention, in essence, attempts to shift the burden to DOE to show that the issue is *not* material, contrary to 10 C.F.R. § 2.309(f)(1)(vi). Similarly, Nevada’s language at Paragraph 6 essentially admits that Nevada does not know whether this contention is material, and shifts the burden to DOE to demonstrate that its contention is *not* material, contrary to the requirements of 10 C.F.R. § 2.309(f)(1)(vi). *See* Petition at 655-56; *see also Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). For this and the aforementioned reasons, this contention does not establish a genuine dispute on a material issue and therefore must be dismissed.

**123. NEV-SAFETY-123 - Durability Of Ground Support**

SAR Subsection 1.3.4.4 and similar subsections, which discuss the ground support system in the emplacement drifts, fail to consider that the assumed 100-year life for the Super Swellex™ friction-type rock bolts and the Bernold sheets is speculative because this particular ground support system has been in use for less than 40 years.

**RESPONSE**

This contention asserts that there is no proof that the stainless steel rock bolts and Bernold sheets planned for the ground support system will meet the 100 year design objective stated in SAR Subsection 1.3.4.4., since no rock bolts or Bernold sheets have been in service for a comparable period of time.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention concerns the ground support system, but does not cite any regulatory requirement associated with the ground support system. Paragraph 4 of this contention discusses

requirements of 10 C.F.R. §§ 63.21, 63.31, 63.102, 63.113, 63.114, and 63.115, but does not cite any basis for considering the ground support system to be an engineered barrier that must be considered in the TSPA. Moreover, Petitioner does not claim that the effects of failure of the ground support system, including the rock bolts and the Bernold sheets, would prevent the NRC from making any finding that the NRC must make to support issuance of construction authorization.

The LA also confirms that this contention does not raise a material issue. SAR subsection 1.3.4.4 “Ground Support System” states that:

The emplacement drift ground support is classified as non-ITS because it is not relied on to prevent or mitigate a Category 1 or Category 2 event sequence, and it is not ITWI because the total system performance assessment (TSPA) does not take credit for ground support during the postclosure performance period.

SAR at 1.3.4-8. This classification means that failure of the entire ground support system would not affect the results of the PCSA or TSPA. Nothing in this contention disputes DOE’s classification of the ground support system as non-ITS and non-ITWI.

An issue “is ‘material’ if its resolution would ‘make a difference in the outcome of the licensing proceeding.’” *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999) (*quoting* Final Rule, Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,172 (Aug. 11, 1989)). This contention does not provide any reasoned explanation of how resolution of this issue could make a difference in the outcome of this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual or expert opinion support in order for a contention to be admitted. This contention fails to meet those standards because: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits (by Don L. Shettel, Jr., and Doug F. Hambley), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Additionally, Paragraph 5 of this contention consists of one basic assertion, that friction type rock bolts and Bernold sheets were developed in the last half of the twentieth century, and there has been much less than 100 years of experience with them. Based on this assertion, Nevada concludes that there is no proof that the ground support system will last for 100 years. Petition at 658, 660. Although Nevada claims that there is no proof that the ground support system will last for 100 years, it stops short of asserting that the ground support system will not last for 100 years, or otherwise actually dispute the referenced statement in the LA. Moreover, the LA states that "[t]he ground support system is *designed to last* at least 100 years," and does not claim that any experience proves that such systems last that long. SAR Subsection 1.3.4.4 (SAR at 1.3.4-8) (emphasis added). Moreover, the LA does not rely on demonstrations of long service life to demonstrate that the ground support system will remain effective for at least 100

years. As discussed by Nevada in NEV-SAFETY-110, and by DOE in response to that contention, an engineering analysis evaluated the longevity of the ground support system components. *See* “Longevity of Emplacement Drift Ground Support Materials for LA” (LSN#: DN2001087393). In addition, the LA does not simply rely on the expected longevity of the rock bolts and Bernold sheets, but also describes other measures taken to enhance longevity. *See id.* at 1.3.4-9.

In sum, Nevada has not demonstrated that this contention raises a material issue of fact or law, and it has failed to provide any facts or expert opinion to provide meaningful support of this contention because nothing it has provided disputes any statement in the LA.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The discussion above shows that this contention is unfounded and not material and, therefore, puts no material issue in dispute. In particular, ground support is classified as non-ITS and non-ITWI, and the TSPA does not assume that the ground support or the rock bolts remain intact during the postclosure period. Nevada does not reference or challenge the portions of the LA that deal directly with the classification of the ground support system. This contention also does not provide any basis for concluding that there is any error in the analyses that support the expectation that the rock bolts and Bernold sheets will function for at least 100 years, or that their degradation could have any effect on compliance with any regulatory requirement.

Finally, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this flaw, since it does not specify any alleged ramifications other than the conclusory assertion that the SAR does not

comply with 10 C.F.R. § 63.114(f). Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(1)(vi).

**124. NEV-SAFETY-124 - Welding of Alpha Beta Titanium Alloy to Unalloyed Titanium**

SAR Subsection 1.3.4, Tables 1.3.4.3 and 1.3.4.4 and other similar and related subsections, which indicated that an all alpha titanium alloy (Grade 7) has been selected for the water diversion surface (WDS) of the drip shields and an alpha-beta titanium alloy (Grade 29) has been selected for structural components, fails to properly demonstrate, test, and account for the phenomena of delayed cracking due to hydrogen migration and precipitation of embrittling titanium hydrides to low solubility alpha material from higher solubility beta phase material, particularly at welds, and therefore DOE has failed to consider associated drip shield failures.

**RESPONSE**

This contention asserts that SAR Subsection 1.3.4, Tables 1.3.4.3 and 1.3.4.4 and other similar and related subsections, do not properly demonstrate, test, and account for the phenomena of delayed cracking due to hydrogen migration and precipitation of embrittling titanium hydrides to low solubility alpha material from higher solubility beta phase material, particularly at welds, and therefore DOE has failed to consider associated drip shield failures.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not demonstrate that the alleged cracking due to hydrogen migration and precipitation of embrittling titanium hydride would affect compliance with a regulatory requirement, safety or waste isolation. It also does not demonstrate that there is any regulatory requirement for DOE to include in the License Application, welding specifications for fabricating the drip shields, or that the omission of such information could affect compliance with any regulatory limit.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. Petition at 664. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada asserts that this contention alleges non-compliance with 10 CFR §§ 63.31(a)(2) and (3), 63.21(c)(3)(ii) and (14), 63.102(h), 63.113 and 63.115. Petition at 664. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. But because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as

mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach two affidavits (by Michael C. Thorne and Robert A. Cottis) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in Paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in

Paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention asserts that delayed cracking of titanium, associated with welds between alpha-beta and all alpha-alloys, has been observed in a number of instances, and that DOE has not demonstrated to what extent the specific combination of materials proposed for the drip shields may be susceptible to delayed cracking due to hydrogen migration and precipitation of embrittling titanium hydrides. Nevada asserts that hydrogen will be present in the drip shield materials, and that DOE has not produced welds with these materials to demonstrate that they will not be subject to delayed cracking. In support of this assertion, Nevada states that a recent publication of the American Welding Society, AWS D1.9/D1.9M “Structural Welding Code – Titanium”(07/2007), suggests that special precautions be applied to joints between alpha and alpha–beta titanium alloys due to risks of hydrogen concentration near weld boundaries. Petition at 665-66.

Nevada’s assertion does not adequately set forth a basis for this contention. Nevada states that the delayed cracking phenomenon it cites can be avoided through special precautions in the welding procedures. Nothing in this contention asserts that the welding procedures DOE develops in accordance with the applicable quality assurance requirements will not be adequate to avoid or impede the hydrogen-induced delayed cracking referenced in this contention. Moreover, the License Application specifically discusses the possibility that the drip shield water diversion surface may be subject to cracking. The License Application states that DOE specifically considered the phenomenon of hydride cracking, or delayed hydrogen induced cracking, of the drip shield and concluded that it should be excluded from the TSPA due to its

low probability. See SAR at 2.2-210 (Table 2.2-5), FEP 2.1.03.04.0B – “Hydride cracking of drip shields,” SAR at 2.2-233.

In addition, the Licensing Support Network contains a great deal of information describing DOE’s analyses related to the potential for corrosion of the drip shields, and specifically the potential for hydrogen-induced or hydride cracking of the drip shields. See “Hydrogen-Induced Cracking of the Drip Shield,” Bechtel SAIC Company, 2004 (LSN#: DN2001649010); and “General Corrosion and Localized Corrosion of the Drip Shield,” Sandia National Laboratories, 2007 (LSN#: DN2002467884).

The information in the License Application and the Licensing Support Network provided Nevada with ample information about DOE’s analyses. To demonstrate that this contention raises a material issue, Nevada had to show that, contrary to DOE’s findings, hydride cracking is likely to occur. Nevada also had to show that hydride cracking of the drip shields could cause a significant change in the TSPA results. In this contention, however, Nevada does not assert that hydrogen-induced delayed cracking is likely or that it would have a significant effect on the TSPA results. Moreover, Nevada did not provide facts or expert opinion to demonstrate support for such conclusions. Consequently, Nevada has not demonstrated that the issue raised by this contention is material to any finding the NRC must make for issuance of construction authorization.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency, since it does not specify any alleged

ramifications other than the conclusory assertions that the SAR does not comply with 10 C.F.R. § 63.113 and that such cracking could impact the dose to the RMEI. Petition at 666.

Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

**125. NEV-SAFETY-125 - Effectiveness Of Stress Relief To Eliminate SCC Or Hydrogen Effects**

SAR Subsection 2.3.6.8.3, which states that the drip shield will be fully stress-relief-annealed before emplacement reducing residual stresses by about 50% or to the point that SCC can be dismissed as an issue, fails to provide adequate information to make this demonstration and DOE did not report tests of actual material combinations proposed for the drip shield; therefore, it must be presumed that unquantified residual stresses could lead to hydride formation in areas of high stress and increased susceptibility to failure under external loads.

**RESPONSE**

This contention alleges that SAR subsection 2.3.6.8.3, which states that the drip shield will be fully stress-relief-annealed before emplacement reducing residual stresses by about 50% or the point that SCC can be dismissed as an issue, fails to provide adequate information to make this demonstration. Furthermore, the contention also alleges that DOE did not report tests of actual material combinations proposed for the drip shield and, that therefore, it must be presumed that unquantified residual stresses could lead to hydride formation in areas of high stress and increased susceptibility to failure under external loads. Petition at 668.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 668-669. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” Petition at 669. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC

from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing stress corrosion cracking of the drip shield is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values. Nevada fails to demonstrate that this issue is material to any finding the NRC must make; accordingly, this contention must be dismissed.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the

licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (by James A. McMaster, Robert A. Cottis, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Although Nevada makes copious technical assertions regarding the alleged need to consider various aspects of stress corrosion cracking of the drip shield, it does not provide *any* scholarly support. Therefore, this contention does not comply with 10 C.F.R. 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention urges that “[n]either the assumption that reducing residual stresses by 50% or that the proposed stress relief will eliminate the risk of stress corrosion cracking ... of the Grade 29 titanium has been demonstrated in the LA. Therefore, the level of these residual stresses and their effect on hydrogen accumulation that could lead to hydride formation and cracking have not been demonstrated in the LA.” Petition at 670. For several reasons, this contention does not establish a genuine dispute of material fact.

Although this contention provides pages of unsupported speculation, Nevada has failed to take issue with key points regarding stress corrosion cracking of the drip shield in SAR section 2.3.6.8.3, which provides:

The drip shield will be fully stress-relief annealed before emplacement (Section 1.3.4.7). Drip shield fabrication and handling processes will be based on the process described in Section 1.3.4.7 and will be controlled as described in Section 1.9.2. Therefore, the drip shield is not expected to be subjected to stress corrosion cracking in the absence of seismic events and rockfall. Even if stress corrosion cracking of the drip shield were to occur, the cracks would have no effect as advective flow through cracks of the drip shield is excluded from TSPA (Section 2.2, Table 2.2-5, FEP 2.1.03.10.08).

SAR Section 2.3.6.8.3.

Not only has Nevada failed to contravene the analysis in Sections 1.3.4.7 and 1.9.2 regarding the drip shield, but also it has failed to appreciate that exclusion of the drip shield SCC is based on the determination that any such cracking would not have significant consequences. Specifically, the LA states, and Nevada does not dispute, that:

Stress corrosion cracking is modeled to be independent of the environment although the environments to support stress corrosion may not occur within the repository. The presence of cracks will

not affect the performance of the drip shield in preventing or substantially reducing the amount of water that could directly contact the waste package, and is excluded from TSPA (section 2.2, Table 2.2-5, FEP 2.1.03.02.0B).

SAR Subsection 2.3.6.9.1, “Summary of Significant Processes for EBS Barrier Capability,” at 2.3.6-86. Thus, DOE excluded drip shield SCC from the TSPA on the basis of the low consequence, not on a determination that SCC is unlikely to occur. *See generally* FEP 2.1.03.02.0B, “Stress Corrosion Cracking (SCC) of Drip Shields,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, at 6-396 (Mar. 6, 2008) (justifying DOE’s screening due to “low consequence”). To the contrary, DOE acknowledges that [s]tress corrosion cracking in the drip shield plate material is assumed to occur ....” *Id.* In addition, DOE has found, and Nevada does not dispute that even if stress corrosion cracking of the drip shield were to occur, the cracks would have no effect as advective flow through cracks of the drip shield is excluded from TSPA based on “low consequence.” *See* FEP 2.1.03.10.0B, “Advection of Liquids and Solids Through Cracks in the Drip Shield,” *Id.* at 6-466 (justifying DOE’s screening due to “low consequence”).

Furthermore, the LA states that DOE specifically considered the phenomenon of hydride cracking of the drip shield including the phenomena of delayed cracking and concluded that it should be excluded from the TSPA due to its low probability. *See* SAR Table 2.2-5; FEP 2.1.03.04.0B – “Hydride Cracking of Drip Shields,” Features, Events, and Processes for the Total System Performance Assessment: Analyses, LSN#: DEN001584824, 6-418 (Mar. 6, 2008).

With regard to its contention, Nevada does not even allege, much less specify, why, how, and to what extent DOE’s screening justifications are somehow incorrect. Thus, Nevada fails to raise a genuine dispute.

The SAR also shows that DOE did testing of drip shield SCC under conditions that are expected to exist in the drifts. The SAR states that:

. . . available literature indicates Titanium Grade 7 is extremely resistant (or immune) to stress corrosion cracking initiation in repository-relevant brine environments .... Consistent with the literature, DOE-conducted testing confirmed that no stress corrosion cracking initiation is observed over the full range of primary (constant-load) (Figure 2.3.6-28) and secondary (U-bend) stresses that were evaluated.

SAR Subsection 2.3.6.8.3 “Stress Corrosion Cracking of Drip Shield,” at 2.3.6-79. As result, Petitioner’s unsupported criticisms of DOE’s testing also miss the mark.<sup>69</sup>

As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this infirmity. Specifically, nothing in this contention indicates that the Petitioner disputes the assessment described in the LA that any SCC of the drip shields would not have a significant effect. Because Petitioner does not dispute the assessment of low consequence or otherwise claim that the TSPA results would change “significantly” if drip shield SCC was included, the Petitioner has failed to demonstrate the existence of a genuine dispute on a material issue of fact.

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not

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<sup>69</sup> The LA also shows that DOE’s testing did consider the potential for corrosion in drip shield crevices. In summarizing the results of long-term corrosion tests on titanium alloys to provide the technical basis for models for drip shield degradation, the SAR notes that “[r]esults from testing in repository-relevant environments show that creviced specimens exhibit slightly lower corrosion rates than weight-loss specimens; only the weight-loss data were used in the model.” SAR at 2.1-104.

attempted to determine what effect, if any, acceptance of their contention would have on doses. Petition at 674. The petitioner has the burden of showing that its proposed contentions meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**126. NEV-SAFETY-126 - Properties Of Dissimilar Metal Weld Joints Between Grade 29 And Grade 7 Titanium**

SAR Subsection 1.3.4.7.7 and similar subsections describe the drip shield system and refer to SAR Table 1.3.4-5 where it is stated that, for Titanium Grade 7 to Titanium Grade 29 welds, Titanium Grade 28 filler material (ERTi-28) shall be used. There is no reference to an actual demonstration of welding and testing this combination of metals, there is insufficient information in the LA to demonstrate that these welds will behave mechanically as assumed in the TSPA, and in particular, there is a failure to consider that these unknown weld properties will lead to unanticipated locations of weld failures that could lead to early failure of drip shields due to external loads from rockfall. Petition at 675.

**RESPONSE**

This contention asserts that there is insufficient information in the LA to demonstrate that welds of Titanium Grade 7 to Titanium Grade 29, using Titanium Grade 28 filler material (ERTi-28) will behave mechanically as assumed in the TSPA, and fails to consider that these unknown weld properties will lead to unanticipated locations of weld failures that could lead to early failure of drip shields due to external loads from rockfall.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(2)(3), 63.21(c)(3)(ii) and (14), 63.102(h), 63.113 and 63.114(f). *See* Petition at 676-77. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 677. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC

from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a

contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Michael C. Thorne and Robert A. Cottis) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in Paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in Paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention asserts that: (1) the combination of Titanium Grade 7 to Titanium Grade 29 welds, using Titanium Grade 28 filler material needs to be welded and welding procedures need to be qualified (Petition at 677); (2) use of Titanium ERTi-28 as a weld filler will result in a weld metal composition with mechanical properties that are not adequately

evaluated (Petition at 677-78); and (3) there needs to be testing to support the assumption that stress relieving will reduce residual stresses by about 50%. (Petition at 678-79).

Nevada's first assertion, that the welding procedures must be properly demonstrated and qualified, is a truism in the nuclear industry, and does not provide a reasoned basis for this contention. Consistent with generally accepted industry standards and NRC regulations (*e.g.*, 10 C.F.R. § 63.142(j)), applicable DOE quality assurance requirements already mandate that “[s]pecial processes that control or verify quality, such as welding, heat treating, chemical cleaning, and nondestructive examination are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other requirements.” DOE/RW-0333P, Revision 20, “Quality Assurance Requirements and Description” (LSN# DEN001574022), which is incorporated by reference in the LA at SAR page 5.1-1. Nothing in this contention provides support for concluding that the welding procedures DOE develops in accordance with these applicable quality assurance requirements will not be adequate.

Nevada's second assertion, that due to differences in the strength of the weld filler material and the titanium Grade 7 WDS, a rockfall onto a drip shield may cause tears to occur in the WDS, does not identify any deficiency in the LA. Nevada first states that “[n]o evaluation of how such welds would fail under external loads like a rock fall has been made by model testing or finite element analysis (FEA) (indeed, there is inadequate information in the LA on the drip shield design to even consider such analysis).” Petition at 677. This assertion is wrong; the Application describes just such a finite element analysis:

. . . the structural performance of the drip shield is evaluated in terms of postclosure functions and postulated postclosure events. The stress magnitudes, deformations, and potential failure

mechanisms are evaluated using finite element analyses and the principles of mechanics of materials. These finite element analyses allow verification of the design performance in the changing emplacement drift environment during the postclosure period, including possible drift degradation and seismic ground motions (SNL 2007c, Sections 6.4 and 6.5).

SAR Subsection 1.3.4.7.6 “Design Methodologies,” SAR at 1.3.4-31. See also the document referenced as SNL 2007c (LSN#: DN2002479003). This contention does not reference or challenge that analysis.

Nevada then states that SAR Subsection 2.3.4.5.3.1 suggests that the drip shield will continue to function after structural collapse, but because the strength of the Grade 28 weld filler may be greater than the strength of the Grade 7 WDS, a rockfall could cause the WDS to tear and allow water seepage on to the waste package. Petition at 678. The Petition does not acknowledge, however, that the SAR also accounts for the possibility that rockfall may cause drip shield plates to tear and the drip shield to thereby lose its ability to divert seepage water away from the waste package. SAR 2.3.4.5.3 at 2.3.4-160. Rockfall-caused drip shield WDS tears are included in the TSPA. SAR 2.3.4.5.3.3 at 2.3.4-165. Thus, to the extent that the Petition avers that the SAR has failed to account for this potential phenomenon, it is in error. Thus this Nevada assertion does not demonstrate the existence of a material issue.

Nevada’s third, and final assertion is that it is not certain that DOE’s stress relief process will work, and that the effectiveness of this process must be demonstrated. Petition at 678-79. As indicated by the reference to the prototype specification in SAR Subsection 1.3.4.7.7 (SAR at 1.3.4-32), DOE has already planned such a demonstration. Thus, there does not appear to be an issue in controversy. In any event, Nevada has not claimed that an effective stress relief process can not be developed, nor has it claimed that, if the stress relief process is less effective than DOE anticipates, the TSPA results would change significantly and cause the mean dose to the

RMEI to exceed a regulatory limit. Petition at 678. Thus, this Nevada assertion also does not demonstrate the existence of a material issue.

In its discussion of the stress relief assertion, Nevada references and quotes from an American Welding Society (AWS) Guide, but does not explain the relevance of that Guide to the stress relief issue. As Nevada's comment on the AWS Guide implies, the drip shield design utilizes Grade 28 as a weld filler material (SAR at 1.9-129, parameter 07-12), and the use of this intermediate alloy between the Grade 7 WDS and the Grade 29 structural supports, is not addressed in the AWS Guide. In short, Nevada's reference to the AWS Guide does not address the DOE analysis, as reflected in the Application. *See* SAR Table 2.2-5 at 2.2-233 FEP 2.1.03.04.0B "Hydride Cracking of Drip Shields." As a result, neither Nevada's stress relief assertion nor its reference to the AWS Guide provides sufficient support for concluding that this contention raises a material issue.

Because, Nevada's statements in connection with this contention do not challenge the model of drip shield postclosure performance that is abstracted for use in the TSPA, and do not challenge the TSPA results, Nevada has not provided adequate support for concluding that this contention raises a material issue.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention does not specify any alleged ramifications other than the conclusory assertions that the SAR does not comply with 10 C.F.R. § 63.114 and that the drip shield welds could lead to early failure of drip shields that are subject to rockfall.

Petition at 675. Nevada does not claim that the effect of this contention on the model of the probability of early drip shield failure could cause the TSPA results to change significantly and cause the mean dose to the RMEI to exceed a regulatory limit. Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

**127. NEV-SAFETY-127 - Hydrogen And ERTi-28 Filler Metal For Welded Joints Between Grade 29 And Grade 7 Titanium**

SAR Subsection 1.3.4.7.7 and similar subsections, which describe the drip shield system, refer to SAR Table 1.3.4-5 where it is stated that, for Titanium Grade 7 to Titanium Grade 29 welds, Titanium Grade 28 filler material (ERTi-28) shall be used, with the objective of reducing the aluminum gradient across the weld as a means to mitigate hydrogen induced delayed cracking issues in these welds, but DOE's failure to include adequate controls on the use of such techniques or to qualify welding procedures and prepare samples to demonstrate that the aluminum gradient concept is truly valid may result in welds that fail to perform as hoped and that are not adequately evaluated for joining the Grade 29 structural members to the Grade 7 Water Diversion Surface (WDS), so such welds cannot be relied upon to behave as anticipated or required for postclosure performance purposes, and could lead to early failure of drip shields.

**RESPONSE**

This contention asserts that the LA does not include adequate controls on the welding of Titanium Grade 7 to Titanium Grade 29, using Titanium Grade 28 filler material (ERTi-28), to demonstrate that these welds will perform as DOE hopes and the welds could lead to early failure of drip shields. Petition at 681.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(3), 63.21(c)(3)(ii) and (c)(14), 63.102(h), 63.113, 63.115 and 63.114(f) in the contention. Petition at 682. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC

from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a

contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Michael C. Thorne, James A. McMaster and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention identifies perceived uncertainties regarding DOE's plans for Titanium Grade 7 to Titanium Grade 29 welds, using Titanium Grade 28 filler material, including: (1) it is not clear whether the Grade 28 filler or Grade 29 will have better corrosion resistance (Petition at 683); (2) use of Grade 28 as a weld filler for welding Grade 7 has not been

demonstrated industrially (*id.* at 684); (3) if the corrosion rate of the filler metal is significantly greater than that of the base metal galvanic corrosion may occur (*id.*); (4) it is not clear that the stress relief process will be as effective as DOE envisions (*id.* at 685); (5) Grade 28 may not be effective in preventing hydrogen migration (*id.*); (6) an AWS Guide warns of the potential for hydrogen migration and precipitation when welding alpha materials to alpha-beta materials (*Id.* at 686-87); and (7) alternative welding techniques may be more effective and should be tested (*id.* at 687).

Nevada's assertions need not be considered individually because they all share the characteristics of being attempts to raise speculation or questions about the selection of the optimum approach to welding titanium Grade 7 to titanium Grade 29, without providing substantiated answers or specific disagreement with any specific portion of the Application. Nothing in paragraph 5 controverts a statement in the Application; in fact, paragraph 5 does not contain a single specific reference to the Application. The SAR describes detailed analyses of the corrosion of the drip shield water diversion surface and the drip shield structural supports, and the repository features, events and processes that could affect the drip shields. *See* SAR Subsection 2.3.4.5.5, *passim*. Additional details concerning associated DOE studies are provided in "General Corrosion and Localized Corrosion of the Drip Shield," ANL-EBS-MD-000004 REV 02 ADD 01, which is identified as reference SNL 2007f in SAR Subsection 2.3.4., and as LSN#DN2002467884. Nothing in any of the assertions included in paragraph 5 appears to challenge a statement in the SAR, or the associated technical report.

As discussed in Section V.A.3 above, contentions expressing only generalized "uncertainties" in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63,

which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from this deficiency.

Nevada also fails to identify alternatives that Nevada believes would more accurately characterize the properties of the proposed drip shield weld materials or to specifically state the impact of those new properties. Accordingly, it is impossible to assess what effect, if any, Nevada's claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990)

Nevada's concerns about selection of the optimum weld technique, qualification of the welding procedures and welders, demonstration of the effectiveness of the stress relief process, and other similar details, are addressed by the DOE prototype program (referenced in the SAR at 1.3.4-32) and other ongoing project activities. In addition, before a welding procedure is allowed to be used to fabricate drip shields for use in the repository, applicable quality assurance requirements state that there must be a demonstration that the procedure will produce adequate welds. *See* 10 C.F.R. § 63.142(j). Consistent with the NRC regulation, DOE quality assurance requirements, which are incorporated by reference in SAR Subsection 5.1 at 5.1-1, provide that “[s]pecial processes that control or verify quality, such as welding, heat treating, chemical cleaning, and nondestructive examination are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other requirements.” “OCRWM Quality Assurance Requirements and Description, Revision 20” (LSN# DEN001574022, at 75).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada's statements in paragraph 5 of this contention do not challenge any specific statement in the Application or any other DOE document, or show that this contention would affect the models reflecting drip shield performance that are abstracted in the TSPA, and thereby cause the TSPA results to exceed a regulatory limit. As discussed in section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this flaw, since it does not specify any alleged ramifications other than the conclusory assertions that the SAR does not comply with 10 C.F.R. § 63.113. Petition at 688. Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

Finally, paragraph 6 of this contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.



**128. NEV-SAFETY-128 - Nuclear Code and Fabrication Quality Assurance Standards**

SAR Subsection 1.3.2.7 and similar subsections, and reference document “Drip Shield and Waste Package Emplacement Pallet Design Report, 000-00C-SSE0-00100-000-00B” (08/09/2007), LSN# DN2002459185, Para 6.2.4 at 20, and SAR Table 1.3.2-5 make reference to sections of the ASME Code, various Nuclear Codes and other standards to guide drip shield fabrication that DOE proposes to use but the cited codes and standards do not provide adequate information to evaluate the conceptual design or to specify subsequent detailed design, fabrication, or quality assurance requirements necessary to build drip shields.

**RESPONSE**

Nevada states that although SAR Subsection 1.3.2.7 and similar subsections, and a reference document address the ASME Code, various Nuclear Codes and other standards to guide drip shield fabrication, these codes and standards do not provide adequate information to evaluate the conceptual design or to specify subsequent detailed design, fabrication or quality assurance (QA) requirements necessary to build drip shields.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada in this contention cites to several regulatory provisions regarding requirements for the natural and engineered barriers in the repository and includes a lengthy discussion of

different welding techniques (Petition at 690) to support its allegation that there is insufficient information in the SAR to evaluate the drip shields. In essence, the contention is not a challenge to the drip shields per se, but rather a request for additional information to assist in the evaluation of the drip shields. As such, the issues raised by this contention are more properly the subject of requests for additional information by the NRC staff, than an adjudicatory challenge to the Application.

The notice of hearing, which is the only basis Nevada asserts for supporting its position that this contention raises an issue within the scope of this proceeding, states that “[t]he matters of fact and law to be considered are whether the application satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC’s standards in 10 CFR Part 63 for a construction authorization for a high-level waste geologic repository.” 73 Fed. Reg. 63,029, 63,029 (Oct. 22, 2008). Mere reference to the scope of the hearing is insufficient, without more, to satisfy the requirement of 10 C.F.R. §2.309(f)(1)(iii) and the Case Management Order for demonstrating that the contention is within the scope of the proceeding. *See* CMO, at p. 7.

Accordingly, if for no other reason, the contention should be dismissed for failure to demonstrate that it raises issues that are within the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

The contention fails to raise an issue that is material to the findings that the NRC must make because it fails to identify the information that is lacking from the Application with respect to the drip shields and fails to identify a particular provision of any of the regulations that seeks the information regarding the drip shields that was not provided.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 689-90. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceedings.” Petition at 690. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada asserts that the cited regulations relate to the design of the engineered barrier system, its relationship with the natural barriers and the postclosure performance objectives. Petition at 690. Nevada, however, fails to demonstrate what information, with regard to the drip shields, is missing from the Application required by these regulations and is material to any finding that the NRC must make to authorize construction of the repository.

Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. Nevada merely seeks additional information. Accordingly, this

contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (by James A. McMaster, Doug F. Hambley and Robert A. Cottis), which purportedly provide expert opinions to support this contention. Rather than providing information to support the assertions in paragraph 5 of this contention, however, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Further, the one document that Nevada cites in paragraph 5 in support of the contention does not relate to drip shields. Although the contention challenges the specifications associated with the drip shields, the specification it cites in paragraph 5 ("Waste Package Fabrication, 000-3SS-DSC0-00100-000-00B" (03/13/2007), LSN# DN2002380114) is restricted to the waste package and is not relevant to the fabrication of the drip shields. (Petition at 690).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to raise a genuine dispute on a material issue of law or fact because, as discussed in section d, above, Nevada fails to identify the information regarding the drip shields that is missing from the Application and required by regulation to be part of the Application.

The contention also states in its first paragraph, without further discussion or support, that the SAR and supporting documents do not specify the “quality assurance requirements necessary to build the drip shields.” Petition, at 689. The SAR at 5.1-1 incorporates the Quality Assurance Requirements Description (QARD), which describes the quality assurance program applicable to systems, structures and components important to safety, barriers important to waste isolation and to related activities. QARD, Rev. 20, at 19 (Oct. 1, 2008). The drip shields are a barrier important to waste isolation (SAR, §1.3.4.7.3 at 1.3.4-29), and thereby subject to the QARD. As such, Nevada’s statement that DOE has failed to specify the quality assurance requirements applicable to the drip shields does not raise a genuine dispute of a material issue.

Finally, the contention includes a lengthy discussion of potential welding techniques<sup>70</sup> that may be applied to the drip shields, without identifying whether and why any one of the techniques that may be selected by DOE is not appropriate. Yet, Nevada broadly claims that DOE has not adequately defined the welds or the quality controls applicable to each weld. *See* Petition at 691. This information is not required by any regulatory standard at this stage of the project and will be provided through the prototyping program for the drip shields, which is

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<sup>70</sup> One of the techniques referenced in the contention, Manual Metal Arc, is not discussed in *Yucca Mountain Project Engineering Specification Prototype Drip Shield*. 000-3SS-SSE0-00100-000 REV 000. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071206.0013. LSN#: DN2002502316, and the contention omits the option for the vendor to propose other welding techniques.

described in the SAR. *See* SAR, §1.3.4.7.7 at p. 1.3.4-32; Yucca Mountain Project Engineering Specification Prototype Drip Shield. 000-3SS-SSE0-00100-000 REV 000. Las Vegas, Nevada: Bechtel SAIC Company. ACC: ENG.20071206.0013. LSN#: DN2002502316 (2007).

Nevada fails to meet its burden of identifying information absent from the SAR or a regulatory requirement that has not been met. Further, the SAR and incorporated documents provide detailed descriptions of the drip shields, and the prototyping process will develop additional information. The contention, as such, must be dismissed for failure to raise a genuine dispute on a material issue of law or fact.

**129. NEV-SAFETY-129 - Early Failure Mechanisms Associated With Titanium Fabrication**

SAR Subsection 2.3.6.8.4 and similar subsections, which describe drip shield early failure due to manufacturing and handling defects, consider only a limited range of possible defects associated with titanium fabrication and welding (*e.g.*, improper heat treatment, base metal selection flaws, and improper weld filler material) and fail to include many additional defects that could result from fabrication and could lead to early failure of drip shields.

**RESPONSE**

In this contention, Nevada alleges that SAR subsection 2.3.6.8.4 and similar (but unidentified) subsections fail to consider the appropriate range of possible defects associated with the fabrication and welding of the titanium for the drip shields. Petition at 693. Nevada lists a variety of specific types of defects that it contends have not been adequately considered. *Id.*

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 694-95. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue . . . .” *Id.* at 694-95. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic

setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation:” (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada fails to explain *how* the potential titanium fabrication and welding deficiencies it identifies, even if they occur, will make a difference in the outcome of this proceeding. *See generally* Petition at 695-700. Accordingly, Nevada has not demonstrated that the issues raised in this contention are material to any finding the NRC must make to authorize construction of the repository.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, Nevada has failed to provide any tangible information, expert opinion or affidavits to support its claims. Nevada's Petition attaches affidavits (by James A. McMaster, Michael C. Thorne, and Robert A. Cottis), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopts" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada's basis statement is a litany of potential titanium fabrication and welding defects. Petition at 693. The same list begins Nevada's statement of alleged facts or expert opinion. *Id.* at 695. These purported problems fall into two categories. The first are eleven issues that are identified in the basis statement and initial paragraph of section 5, but are never specifically mentioned again. These are: (1) titanium cracking during forming and bending; (2) surface iron contamination; (3) missing welds; (4) undersized welds; (5) lack of weld penetration; (6) lack of

weld fusion; (7) hydrogen induced porosity; (8) high density and tungsten inclusions; (9) hydrogen contamination from stress relief; (10) inconsistent stress relief over the entire structure; (11) localized contamination due to flame impingement on the structure during stress relief.

Therefore, as a threshold matter, these eleven specific allegations amount to nothing more than bare unsupported assertions and cannot support the admission of this contention. *See Dominion Nuclear Conn., Inc.* (Millstone Power Station, Unit No. 3), LBP-08-09, 67 NRC \_\_ (June 4, 2008) (slip op. at 13) (finding that a contention that does not offer tangible information, expert opinion or substantive affidavits is based on just “bare assertions and speculation” and inadmissible).

As to the remaining issues, rather than providing a reasoned basis or explanation, Nevada merely presents a disorganized collection of vague and unsupported assertions. Nevada must set forth “the necessary technical analysis to show why the proffered bases support its contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech*, LBP-95-6, 41 NRC at 305); *see also USEC*, CLI-06-10, 63 NRC at 472 (an expert opinion that merely states a conclusion “without providing reasoned bases or explanation for that conclusion is inadequate . . .”). A cursory review of the “support” for this contention, however, reveals a consistent lack of reasoned basis or explanation for any of Nevada’s additional purported issues. It also reveals a series of unsupported assumptions regarding the titanium fabrication and welding methods DOE intends to use and an *unstated and unsupported assumption that DOE’s QA program is inadequate*. For example:

- (1) “undetected base metal flaws such as laps or seams” (Petition at 695):
  - “Depending on the ingot melting methods utilized, there can be composition variances and inclusions in the materials.” *Id.* (emphasis added).

- “Improper hot working . . . can leave *undetected* laps or seams in the material.” *Id.* (emphasis added).
  - “*Inadequate acid pickling of plate can* leave an excessive oxygen-rich surface zone that exhibits low ductility and *can* lead to cracking during fabrication or in service under loads that cause significant strains.” *Id.* (emphasis added).
- (2) “surface contamination” (Petition at 695):
- “[E]xcessive surface oxygen contamination causes a low ductility surface layer that *can* . . . lead to premature equipment failures in service. . . .” *Id.* at 695 (emphasis added).
- (3) weld contamination due to oxygen, nitrogen, iron, erosion or other unspecified causes (*see* Petition at 695):
- “[T]he quality of a titanium weld is vitally dependent on both the procedure used and the exact detail of how the procedure is applied.” *Id.* at 696.
  - “Much of the quality is dependent on the welder’s understanding of the contamination problem and instant recognition of the sources.” *Id.*
  - “Loss of control [over the welding process] *can* come from numerous sources, none of which are addressed in DOE’s [unspecified] FEP analysis.” *Id.* (emphasis added).
- (4) “improper filler metal selection” (Petition at 695):
- “[W]elding filler metal *may* have a minor amount of drawing compound left even after careful manufacture.” *Id.* at 697 (emphasis added).
- (5) “weld root contamination due to improper or inadequate inert gas shielding” (Petition at 695):
- “Drafts in the welding shop *can* disrupt inert gas shielding during welding.” *Id.* (emphasis added).
- (6) “nondestructive testing and inspection errors” (Petition at 695):
- “There is no standardized or universally accepted test for detecting contaminated titanium welds.” *Id.* at 697.
  - “At low levels, such contamination [of the weld shielding gas] *may* be difficult to detect . . . .” *Id.* (emphasis added).

Nevada provides no references to documentation corroborating its bare assertions regarding these alleged potential titanium fabrication or welding issues. Nevada cites no industry documentation, scholarly journal articles, codes or standards, nor does it provide any other technical analysis supporting the claim that its issues present serious problems in titanium fabrication or welding in general, or that DOE's QA procedures will be inadequate to address these purported problems. Accordingly, this contention must be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Because Nevada raises issues that, as explained in Sections d, and e above, are not material to the NRC's findings and are unsupported by facts or expert opinion, it also fails to raise a genuine dispute on a material issue of law or fact.

Moreover, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Petition at 700, Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. *Id.* at 699. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

Finally, Nevada fails to identify the pertinent portions of DOE's Application and explain its opposing view. *See* Rules of Practice for Domestic Licensing Proceedings—Procedural

Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 358. This is true with respect to each of the eleven issues that Nevada mentions in its basis statement but does not further explain. It is also true with respect to the remaining alleged titanium fabrication or welding defects.

- (1) Nevada presents the bare assertion that “DOE does not adequately address . . . undetected base metal flaws such as laps or seams.” Petition at 695. Allegedly, this problem is linked to certain unspecified “ingot melting methods,” “improper hot working,” and “[i]nadequate acid pickling of plate.” *Id.* Nevada, however, fails to address or identify any deficiency in DOE’s analysis of base metal flaws in SAR subsection 2.3.6.8.4.3.2.1, in which DOE acknowledges this potential problem and accounts for its frequency of occurrence in the TSPA. SAR at 2.3.6-82.
- (2) Nevada asserts that “DOE does not adequately address . . . surface contamination” in titanium manufacture. Petition at 695. For example, “excessive surface contamination [allegedly] causes a low ductility surface layer that can . . . lead to premature equipment failures . . . .” *Id.* (citing no authorities or examples of this phenomenon). This issue is addressed in SAR subsection 2.3.6.8.4.3.1. SAR at 2.3.6-81. Nevada fails to identify or explain any alleged deficiencies in the discussion of surface contamination in that subsection, or in the analyses cited therein.
- (3) Nevada asserts that “DOE does not adequately address . . . weld contamination due to oxygen” nitrogen, iron, erosion or other unspecified causes. *See* Petition at 695. Allegedly, because stress relief annealing “is not capable of eliminating

weld flaws,” DOE improperly relies upon it to avoid stress corrosion cracking (“SCC”) of titanium welds. *Id.* at 698. This ignores the fact that DOE does not rely on stress relief annealing to eliminate all such flaws. SAR § 2.3.6.8.3 at 2.3.6-79 (“Even if stress corrosion cracking of the drip shield were to occur, the crack would have no effect . . . .”) (citing FEP 2.1.03.02.0B). Nevada does not identify or dispute this information.<sup>71</sup>

- (4) Nevada asserts that “DOE does not adequately address . . . improper filler metal selection.” Petition at 695. Similarly, it alleges that “DOE does not consider the . . . risk of weld contamination from inadequately cleaned base or filler metal.” *Id.* at 699. As is the case with its allegations of base metal flaws, however, Nevada fails to address or identify any deficiency in DOE’s analysis of improper weld filler material in SAR subsection 2.3.6.8.4.3.2.2, in which DOE acknowledges this potential problem and accounts for its frequency of occurrence in the TSPA. SAR at 2.3.6-82.
- (5) Nevada’s allegations related to “weld root contamination due to improper or inadequate inert gas shielding” ignore the fact that the drip shield will be fabricated in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, which include requirements for inspection by an authorized and certified nuclear inspector. *See* SAR Table 1.3.2-5 at 1.3.2-42 to -43. The relevant ASME Code provisions also include strict cleanliness and quality specifications. Nevada fails to explain why such controls would be inadequate to address this problem. Indeed, Nevada essentially admits that this problem is

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<sup>71</sup> Nevada presents similar or related allegations in NEV-SAFETY-125 and -126, and -127. Those claims fail to raise a genuine dispute for the reasons set forth in DOE’s responses to those contentions, above.

within the capacity of an effective QA program to address. *See* Petition at 697 (“Detection of many of these problems depends on the skill and training of the welder, and as importantly on the attitude of the management of the welding shop . . . .”).

- (6) Nevada’s final allegation relates to “nondestructive testing and inspection errors.” Petition at 695. Nevada relies upon the following speculation: “the assumption that [weld contamination] defects will all be detected is wishful thinking.” Petition at 697-98. This assertion, however, is unsupported by evidence, example, analysis, or citation to any scholarly or industry documentation. Indeed, as explained in paragraph (5), above, it is contradicted by other speculation provided by Nevada in this contention. Therefore, this speculation fails to raise a genuine dispute.<sup>72</sup>

For all these reasons, this contention must be denied.

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<sup>72</sup> Nevada presents similar allegations in NEV-SAFETY-128. Those claims fail to raise a genuine dispute for the reasons set forth in DOE’s responses to that contention, above.

**130. NEV-SAFETY-130 - Drip Shield Emplacement Plan, Equipment, And Schedule**

SAR Subsection 1.3.4 at 1.3.4-1 identifies two engineered components within the repository drift that are important to waste isolation – the waste package and the drip shield – and the license application relies on installation of drip shields to prevent exceeding the allowable dose to the RMEI. The drip shields are a new technology that has never been designed in detail, prototyped, fabricated, or installed in any actual application in order to develop a basis for predicted performance or to demonstrate that drip shields can be installed and perform as assumed in the TSPA; therefore, the contribution of the drip shields in the predicted performance of the repository should be ignored in the TSPA or, at a minimum, the no drip shield scenario should be considered as an alternative conceptual model and propagated through the assessment.

**RESPONSE**

In this contention, Nevada alleges that because “drip shields are a new technology that has never been designed in detail, prototyped or installed,” the contribution of drip shields to the TSPA must be ignored, or “at a minimum, the no drip shield scenario should be considered.” Petition at 701. This contention presents a collection of vague assertions and unsupported speculation with no specific connection to any requirement in 10 C.F.R. Part 63. As such, it is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

To the extent Nevada seeks to litigate issues related to “Drip Shield Fabrication,” “Material Resources,” “Competing Uses of Materials,” or “Funding,” Petition at 705, 707-08, it cannot do so because such issues are outside the scope of this proceeding.

As to drip shield fabrication, Nevada announces its desire for more information about how DOE intends to “organize and manage the resources necessary to fabricate the drip shields.” Petition at 705. Nevada also expresses concerns about the supply of drip shield and waste package materials, the alleged associated strain on the “material supply industry” and raw material resources, and whether DOE “will convince Congress to allocate funds” for the drip shields. *Id.* at 707-08. In sum, Nevada asserts that, because of these and other issues it raises in this contention, drip shield installation “cannot be assumed to occur.” *Id.* at 701.

This proceeding, however, addresses whether the Application before this Board “satisfies the applicable safety, security, and technical standards” under the AEA, NWPA, and Part 63. Hearing Notice, 73 Fed. Reg. at 63,029. It is not a forum to adjudicate the generalized resource, funding, and material supply issues that Nevada seeks to raise. The Commission has rejected similar contentions that were based on speculation that applicants will not obtain sufficient funding or resources to implement the activities specified in a license application.

For example, in *Private Fuel Storage*, the State of Utah argued that after operation commenced, the applicant might fail to generate sufficient revenue and so might attempt to cut operating costs by reducing the number of trained firefighting personnel, contrary to the licensee’s commitments. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-01-9, 53 NRC 232, 234 (2001). The Commission rejected this argument on appeal, stating that “we will neither assume that PFS will operate without sufficient financing,

nor will we assume that an unexpected funding shortfall will induce PFS to ignore its responsibility to train and employ a sufficient number of firefighters.” *Id.* at 235; *see also Curators of the Univ. of Mo.*, CLI-95-8, 41 NRC 386, 400 (1995) (rejecting intervenor’s request “to base our findings on the assumption that the University will violate an explicit and unambiguous condition of the license”). Here, Nevada presents similar speculation that DOE will be unable to obtain sufficient financing or secure sufficient resources to implement the repository design as described in the Application.

Speculation regarding government funding decisions is also insufficient to support an admissible contention. In *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-90-10, 32 NRC 218 (1990), a petitioner sought to reopen the record of an operating license proceeding by arguing that future budget cuts might force the State of New Hampshire to fail to maintain sufficient emergency response staff. *Id.* at 221-23. The Commission found that petitioner’s “[s]peculation about future effects of budget curtailments” failed to provide sufficient factual basis for his concerns. *Id.* at 223. This contention is similarly based on speculation that DOE will not receive sufficient government funding to implement the design presented in the Application, and is therefore inadmissible.

Accordingly, in this proceeding Nevada cannot litigate questions about DOE’s plan to organize and manage the resources necessary to fabricate the drip shields, nor can it litigate similar concerns about material resources, competing uses of materials, and funding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 702.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere

assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue. . . .” *Id.* at 702. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations, Case Management Order, slip op. at 7, this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” *Id.* at 3.

Each allegation Nevada proffers in this contention is addressed in detail below. In every case, Nevada fails to link its complaints to a specific deficiency in the Application. Thus, Nevada fails to carry its burden of showing that the resolution of its complaints would make a difference to the outcome of this proceeding.

(1) General Issues: Nevada begins the supporting information in this contention with a “General” discussion which vaguely asserts that DOE’s drip shield emplacement plan is “not credible.” Petition at 703. Building on this assertion, Nevada posits that, if one assumes that drip shields are not present, then the repository would not meet the groundwater protection standards of 10 C.F.R. § 63.331 nor would it meet the dose requirements of 10 C.F.R. § 63.311. *Id.* at 703-704. Nevada’s conclusions with respect to groundwater standards are completely unsupported,

but its conclusions regarding dose are purportedly based on an (unspecified) “analysis of DOE’s own documentation.” *See id.* The “General” discussion ends with an expression of Nevada’s desire that, “At a minimum, the drip shield placement system . . . should be demonstrated numerous times in drifts prior to placement of the first waste packages to demonstrate that it may actually work as planned.” *Id.* (emphasis in original).

In essence, this portion of the contention restates—in a completely conclusory fashion—the allegations in NEV-SAFETY-133 (Drip Shield Gantry Description), in which Nevada speculates that drip shields may be difficult to install, and NEV-SAFETY-161 (Critical Role of the Drip Shield), in which Nevada provides a cursory calculation purportedly showing that dose limits are not met without the drip shield.<sup>73</sup> DOE’s responses to those contentions explain why they fail to raise issues that are material to the NRC’s required findings. Briefly, in NEV-SAFETY-133, Nevada fails to tie any specific alleged deficiencies in the level of detail in the Drip Shield Gantry design to any regulatory requirement, and in NEV-SAFETY-161, Nevada mistakenly claims that individual engineered barriers within the repository must be subjected to a quantitative performance evaluation. The additional allegation that appears in NEV-SAFETY-130 regarding groundwater protection is also immaterial for the same reasons set forth in DOE’s response to NEV-SAFETY-161.

Thus, Nevada has not shown that the specific drip shield emplacement demonstrations that it desires are required by the regulations.<sup>74</sup>

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<sup>73</sup> Nevada provides no references, however, indicating that, in NEV-SAFETY-130, it intends to rely upon any additional information provided in NEV-SAFETY-133 or -161. Nevada therefore cannot do so. 10 C.F.R. § 2.309(f)(1)(v) (requiring “references” to support petitioner’s position).

<sup>74</sup> Drip shields will, however, be fabricated and emplaced within the performance confirmation drift shortly after commencement of operations at the repository. *See* SAR at 4-14 (explaining that performance confirmation activities will include direct monitoring of “waste package and drip shield condition in a thermally accelerated drift”). Nevada fails to address this information or explain why it believes that this aspect of the Application is insufficient.

(2) Drip Shield Design: In this section, Nevada expresses its desire for additional drip shield design information and manufacturing specifications, but it fails to identify any specific regulatory requirement associated with its desires. Accordingly, this information is not material.

(3) Drip Shield Fabrication: Because Nevada's allegations regarding drip shield fabrication are outside the scope of this proceeding, they are also immaterial to the NRC's findings. This section of the contention, however, further asserts that "[k]ey manufacturing processes, like welding the Grade 28 to the Grade 7, or the proposed thermal stress relieving, have not been demonstrated or qualified." Petition at 705. This vague statement appears to reflect allegations similar to those presented in NEV-SAFETY-126 through -129, although Nevada does not reference any of those contentions here, nor does it elaborate beyond the conclusory statement quoted above. In its response to those contentions above, DOE explains why Nevada's concerns about titanium welding fail to raise material issues.

(4) Gantry Design: This section reiterates Nevada's desire for additional information regarding the drip shield gantry design. Here, Nevada attempts, but fails, to articulate a connection between its desires and a regulatory requirement: "Failure of the gantry system to perform as assumed in the TSPA *can* result in exceeding the individual and groundwater protection standards." Petition at 705 (emphasis added). This conclusory statement, however, falls far short of carrying Nevada's burden of demonstrating that its contention, if true, would make a difference in the outcome of this proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

(5) Emplacement Procedures: Here, Nevada expresses its desire for training of drip shield emplacement operators, and its desire to change the schedule presented in the Application to begin drip shield emplacement "shortly after the beginning of placement of waste packages."

Petition at 706. Once again, Nevada fails to identify any specific regulatory requirement associated with its desires. Thus, as in the “General” issues section addressed above, Nevada fails to show any connection between its desire for a demonstration or “[p]ractice[]” in drip shield emplacement and any regulatory requirement. Petition at 706.

(6) Material Resources, Competing Uses of Materials, and Funding: As explained in Section c, above, the speculation in these sections is outside the scope of this proceeding. It is also therefore immaterial. In addition, as in previous sections, Nevada fails to identify any specific regulatory requirement associated with its desires, so it has failed to carry its burden of demonstrating the materiality of its allegations.

(7) Drift Deterioration/Collapse: In this section, Nevada accuses DOE of assuming, “that no anticipated or unanticipated event can or will occur during this [undefined] time interval that will hinder or prevent placement of the drip shields or during the act of installing the drip shields except for a low probability scenario of one misplaced drip shield due to operator error.” Petition at 708. No citation is provided in support of this accusation. Nevada goes on to reference certain other contentions (NEV-SAFETY-123, NEV-SAFETY-136, and NEV-SAFETY-173) that purportedly “specify rock fall and drip shield collapse scenarios that can occur prior to repository closure, including prior to drip shield installation.” *Id.* Nevada provides no further explanation of any alleged *material* impact of these claims, thus failing to carry its burden.<sup>75</sup> Accordingly, this information is not material.

For all these reasons, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and must be dismissed.

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<sup>75</sup> In addition, DOE’s responses to the allegations in NEV-SAFETY-123, NEV-SAFETY-136, and NEV-SAFETY-173 are provided in this Answer brief.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to those requirements: (1) the contention does not reference any documents, other than the Application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits (by James A. McMaster, Allen Messenger, and Michael C. Thorne), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In addition, this contention is rife with unsupported assertions of fact and vague statements that render it inadmissible. *See USEC, CLI-06-10, 63 NRC at 472* (requiring a contention to be supported with a "reasoned basis or explanation"). For example:

- "Without proper installation of the drip shields, the proposed Yucca Mountain repository will not perform as modeled in the TSPA and it will not meet the ground water protection standards set forth in 10 C.F.R. § 63.331." Petition at 703.
- "Today, there are insufficient specialist titanium subcontractor resources in the United States to fabricate drip shields on the schedule required." *Id.* at 705.
- "Failure of the gantry system to perform as assumed in the TSPA can result in exceeding the individual and groundwater protection standards." *Id.*
- "There are other similar FEPs that may occur and have not been assessed by DOE." *Id.* at 707.

- “Palladium and ruthenium in particular are mined, and mined resources are limited and the exploitation lifetime is finite.” *Id.*
- “The cost of drip shields is likely to rise relative to inflation and will most likely be impacted by speculation in at least palladium and ruthenium as the project grows closer to realization.” *Id.* at 708.

Accordingly, this contention must be rejected for failure to provide adequate support in fact or expert opinion.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Because Nevada raises issues that, as explained in Sections c, d and e above, are outside scope, immaterial to the NRC’s findings and unsupported by facts or expert opinion, it also fails to raise a genuine dispute on a material issue of law or fact.

In particular, Nevada fails to identify the pertinent portions of DOE’s Application and explain its opposing view. *See* Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. at 33,170; *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at 358.

(1) General Issues: To the extent Nevada seeks to rely upon information NEV-SAFETY-133 or -161 to support this contention, it cannot—DOE explains why those contentions fail to raise a genuine dispute in its responses to NEV-SAFETY-133 and -161. Briefly, among other things, in NEV-SAFETY-133, Nevada fails to address, refute, or otherwise provide any explanation of why the information on Drip Shield Gantry design described below is inadequate under 10 C.F.R. §§ 63.21(c), 63.114(a), or any other provision of Part 63. NEV-SAFETY-161 rested primarily upon a “back of the envelope” calculation—based on unsupportable assumptions—purportedly showing that without drip shields, postclosure dose requirements would not be met.

It also rested on impermissible speculation that DOE would not implement the design in the Application.

(2) Drip Shield Design: Nevada fails to identify and explain its dispute with any information presented in the Application. *See* SAR § 1.3.4.7; *see also* “Yucca Mountain Project Engineering Specification Prototype Drip Shield,” LSN No. DN2002502316, cited at SAR 1.3.4-32.

(3) Drip Shield Fabrication: Nevada fails to identify and explain its dispute with any information presented in the Application. *See* SAR § 1.3.4.7; LSN No. DN2002502316, cited at SAR 1.3.4-32.

(4) Gantry Design: Nevada fails to identify and explain its dispute with any information presented in the Application. *See generally* SAR § 1.3.4.7; DOE’s response to NEV-SAFETY-133, below.

(5) Emplacement Procedures: Although Nevada complains that “DOE concludes that errors in waste emplacement (that could prevent drip shield installation) will not exist at the time of closure because such errors are excluded by regulation (FEP: 1.1.03.01.0A),” Petition at 706, Nevada fails to address the information presented in this FEP and explain why it disagrees with DOE’s analysis. Indeed, instead of providing an explanation for its disagreement, Nevada engages in hyperbole: “DOE has not even identified the types of Category 1 accidents that could impact the waste package.” *Id.* (emphasis added). With respect to its specific “concern” about waste package obstruction of the drip shield gantry, Nevada fails to address or refute the relevant information in FEP: 1.1.03.01.0A: “The regulatory requirements for performance confirmation and quality assurance require that any deviation from design be evaluated for potential impact, and that significant deviations which are detected during the operational period be corrected.” “Features, Events; and Processes for the Total Systems Performance Assessment: Analyses,”

(Mar. 6, 2008) (LSN# DEN001584804 at 6-39). In particular, Nevada does not explain why it believes such a waste package obstruction would not be identified, nor why it could not be corrected.

Moreover, contrary to Nevada's accusations, DOE's decision to perform an additional analysis of a TEV collision with a waste package is not an admission of any deficiency in the current Application. In particular, and again contrary to Nevada's innuendo, DOE's decision to perform additional analysis is certainly not an admission that such a collision would cause *irreparable* problems with respect to the emplacement of drip shields. *Cf. Duke Energy*, CLI-99-11, 49 NRC at 337 ("Petitioners seeking to litigate contentions must do more than attach a list of RAIs and declare an application 'incomplete.' It is their job to review the application and to identify what deficiencies exist and to explain why the deficiencies raise material safety concerns.").

(6) Material Resources, Competing Uses of Materials, and Funding: Nevada fails to identify and explain its dispute with any information presented in the Application.

(7) Drift Deterioration/Collapse: As noted above, Nevada provides no citations for its accusations against DOE in this section. In addition, DOE's responses to NEV-SAFETY-123, NEV-SAFETY-136, and NEV-SAFETY-173 show that the information presented in those contentions fails to raise a genuine dispute.

For all these reasons, this contention must be denied.

**131. NEV-SAFETY-131 - Rock Debris Removal**

SAR Subsection 1.3.4.4 and similar subsections, which discuss the design and performance of the waste emplacement areas of the repository, fail to include sufficient detail to demonstrate that consideration has been given to the potential need to remove rock debris from around the waste packages prior to removal of the waste packages, if necessary, and/or installation of the drip shields, and as a result, the TSPA-LA assumptions relating to drip shield emplacement and effectiveness of the EBS are unfounded.

**RESPONSE**

This contention asserts that SAR Subsection 1.3.4.4 does not demonstrate that consideration has been given to the potential need to remove rock debris from around the waste packages prior to any removal of the waste packages or installation of the drip shields, and as a result, the TSPA assumptions relating to drip shield emplacement and effectiveness of the EBS are unfounded.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

As discussed in Section V.A.3, a contention is outside the scope of the proceeding if it challenges the regulations set forth in 10 C.F.R. Part 63 and advocates a stricter requirement than NRC rules impose. This contention challenges Part 63 by asserting that the SAR must

discuss methods to remove a waste package after emplacement, if the waste package is covered in debris or damaged, Petition at 713; by a large rockfall. Contrary to Nevada's contention, 10 C.F.R. Part 63 requires only that the SAR include analyses of Category 1 and Category 2 events. *See* 10 C.F.R. § 63.112(e). Nevada does not claim that a significant rockfall in an emplacement drift would be a Category 1 or Category 2 event. Moreover, as described below and in more detail in SAR section 1.7, DOE determined that a significant rockfall in an emplacement drift is not a Category 1 or Category 2 event. Consequently, Nevada's contention that the SAR must address such circumstances is outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 712-13. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* at 713. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. Petition at 713. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach an affidavit (by Doug F. Hambley), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply “adopts” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention makes two assertions: (1) “[p]resumably, the need to repair or replace a component of the ground support system would be triggered by a significant roof fall,” and therefore the SAR should have addressed the possibility of a waste package being covered with debris or damaged (Petition at 713-14); and (2) the SAR statement that “[b]enefits

of repairs and replacements would be weighed against potential radiological exposures and other operational concerns specific to the situation” implies that minor rock falls will be left in place, and that DOE appears not to recognize that rockfalls could interfere with drip shield installation (*Id.* at 714).

Nevada’s first assertion is premised on the occurrence of a significant rockfall, but it does not claim that such a rockfall would meet the definition of an event sequence that must be considered in the SAR; and it does not provide any basis for making such a claim. Nevada also completely ignores SAR Subsection 1.7.5.6, which states that DOE’s analysis determined that there are no Category 1 subsurface event sequences that lead to exposure of individuals to radiation, and the Category 2 subsurface event sequences do not involve rockfall in the emplacement drift. SAR at 1.7-49. Consequently, there is no requirement for the SAR to address such an event.

Moreover, this contention does not discuss the portions of the License Application that address action that would be taken in the event of an occurrence or condition outside the bounds of routine operations. For example, SAR Subsection 1.3.1.2.1.7 “Off-Normal Response Activities” (SAR at 1.3.1-12) states that handling such events requires procedures and controls specific to that operation, which are developed for the specific situations when they occur, and discusses examples of such events, as well as procedures in the event of need for emergency egress or refuge. In addition, SAR Subsection 1.3.4.8.2.2 (SAR at 1.3.4-36) discusses waste package recovery; SAR Subsection 1.3.6.1.1 (SAR at 1.3.6-3) discusses the final inspection of waste packages before closure, including actions in the event of a damaged waste package. Other relevant information is provided in reference documents available in the Licensing Support Network. For example, “Ground Support Maintenance Plan,” Bechtel SAIC 2008, LSN#:

DEN001584677, includes a discussion of off-normal scenarios (“If rockfalls are detected after some or all of the waste packages have been emplaced in an emplacement drift and a decision is made to proceed with repair, the following required sequence of maintenance activities will be implemented . . .” LSN#: DEN001584677 at 37), and “Strategies For Recovery After An Off-Normal Event To The Waste Package Transport And Emplacement Vehicle,” Bechtel SAIC 2007, LSN#: DN2002411321, discusses concepts for recovery from various unanticipated events, including realigning a misaligned waste package, and removing debris due to a significant rockfall. Thus, the SAR and related documents do address potential actions to respond to off-normal events such as a significant rockfall.

Nevada’s second assertion is pure speculation. Nevada presumes that because the SAR indicates that a decision on repair or replacement of the ground support in an emplacement drift would take into consideration the potential radiological exposures and any other operational concerns specific to the situation, that: (1) DOE would not repair deteriorating ground support, and instead allow minor rockfalls; (2) such rockfalls would interfere with drip shield installation; (3) DOE would decide not to take action to assure proper installation of the drip shield; (4) NRC approves of that decision; and (5) there would nevertheless be a significant effect on the TSPA results. Nevada does not claim or provide any basis for claiming that such a chain of events would meet the definition of a Category 1 or Category 2 event sequence. In addition, each step in this hypothesized chain of events involves speculation. To be admissible, a contention must be founded on facts, not on such speculation. *See Dominion Nuclear Connecticut, Inc.*, (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 213 (2003). Consequently, this second assertion also does not provide meaningful support for this contention.

Thus, Nevada has failed to provide adequate support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons discussed in d. and e. above, the information Nevada has provided to support this contention is not sufficient to show that a genuine dispute exists with DOE on a material issue of law or fact. Nothing that Nevada states in connection with this contention constitutes a reasoned statement of why the Application is unacceptable in some material respect. Consequently, Nevada has not demonstrated that there is a genuine dispute on a material issue and this contention should be dismissed.

### **132. NEV-SAFETY-132 - TEV Description**

SAR Subsection 1.3.3.5.1.1 and similar subsections, which identify the Transport and Emplacement Vehicle (TEV) as the crane-rail-based transport assembly that moves waste packages on emplacement pallets from surface facilities to the emplacement drifts, fail to include sufficient detail to determine whether the TEV will fulfill the requirements that the TSPA-LA places on it, and as a result, the TSPA-LA assumptions relating to waste package emplacement and effectiveness of the engineered barrier system are unfounded.

### **RESPONSE**

In this contention, Nevada alleges that “SAR Subsection 1.3.3.5.1.1 and similar subsections . . . fail to include sufficient detail to determine whether the TEV will fulfill the requirements that the TSPA-LA places on it, and as a result, the TSPA-LA assumptions relating to waste package emplacement and effectiveness of the engineered barrier system are unfounded.” Petition at 716. As explained below, this contention is inadmissible because it fails to raise an issue material to the NRC’s required findings, is unsupported by fact or expert opinion, and fails to raise a genuine dispute on a material issue of law or fact.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

#### **b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 716-17. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue. . . .” *Id.* at 717. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations, Case Management Order, slip op. at 7, this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” *Id.* at 3.

Nevada asserts that “precise geometry” of waste package emplacement is required to demonstrate compliance with postclosure requirements. *Compare* Petition at 718 *with id.* at 716-17. However, Nevada cites no evidence for or further explanation of this “precision”

requirement, nor does it provide any quantitative or qualitative evaluation of why it believes that resolution of this issue will make a difference to the outcome of this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to those requirements: (1) the contention does not reference any documents, other than the Application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Doug F. Hambley and Steven A. Frishman), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Moreover, as explained in Section V.A.3 above, Boards must carefully scrutinize factual allegations and the documents cited in support of contentions. This includes a review of the information relied upon to confirm that it supports the proposed contention. Section f, below, discusses Nevada's allegations in detail and explains why they fail to provide the requisite factual or expert opinion support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons set forth in Section d, above, this contention fails to raise a genuine dispute on a material issue of law or fact. In addition, the Application provides sufficient details on the design of the TEV for the NRC to make its required determinations under 10 C.F.R. Part 63. Nevada identifies no available information that DOE has not considered, nor has Nevada addressed any of the information that is in the Application or explained why it believes that information does not meet the requirements of Part 63. Nevada's curiosity and desire for additional information do not raise a litigable issue.

Instead of identifying or explaining any specific deficiencies in the TEV design information provided in the Application, Nevada identifies two statements from the same paragraph in the Application: (1) "most components of the TEV are based on commercially available equipment"; and (2) "Codes and standards have been evaluated and design requirements and testing specifications are being developed". Petition at 717 (quoting SAR at 1.3.3-30). From these statements, Nevada jumps to the conclusion that DOE has admitted "there is no engineering design for the TEV." *Id.* Nevada does not address or refute any of the detailed information that *is* in the Application (indeed, in the very subsection that includes DOE's purported admission), nor does Nevada articulate how the design information provided in the LA does not meet the regulatory requirements of Part 63.

Building on DOE's purported admissions of deficiencies, Nevada next speculates about the alleged consequences of the "lack of design information." Petition at 718. *Assuming* the "absence of a TEV design," Nevada speculates that in a "restricted, high radiation, underground environment, it is not possible to have any confidence that the precise emplacement geometry

required on thermohydrological grounds can be achieved.” *Id.* Nevada provides no citations to any evidence to support this allegation.<sup>76</sup>

Nevada fails to address, refute, or otherwise provide any explanation of why the information on TEV design described below is inadequate under 10 C.F.R. §§ 63.21(c), 63.114(a), or any other provision of Part 63. The regulations specify that the SAR must include a “description of the design of the various components of the geological repository operations area and the engineered barrier system,” including the “design bases and their relationship to the design criteria.” 10 C.F.R. § 63.21(c)(3). In turn, Part 63 defines “design bases” to include:

information that identifies the specific functions to be performed by a structure, system, or component of a facility and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be constraints derived from generally accepted “state-of-the-art” practices for achieving functional goals or requirements derived from analysis (based on calculation or experiments) of the effects of a postulated event under which a structure, system, or component must meet its functional goals.

10 C.F.R. § 63.2. In addition, 10 C.F.R. § 63.21(c)(9) requires an “assessment to determine the degree to which those of the features, events and processes of the site that are expected to materially affect compliance with 10 C.F.R. § 63.113 . . . have been characterized.”

To meet these regulatory requirements, the SAR provides an extensive, specific, and detailed description of the TEV design, which Nevada ignores. SAR § 1.3.3.5.1.1 provides approximately six pages describing the TEV design, with references to Project documents and other sections of the Application, including:

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<sup>76</sup> As explained in Section d, above, Nevada does not draw any connection between the purported need for “precise geometry” and any regulatory requirement. Thus, even if one assumes that this speculation reflects the opinion of Messrs. Hambley and Frishman—which, as explained above, one cannot—it still falls far short of the reasoned basis or explanation required to support an admissible contention. *See* Section V.A.3, above.

- Power supply;
- Pallet lifting operational processes;
- Frame structure;
- Specific electronic control features designed to permit operation in high-radiation environments;
- Braking process and specific procedural controls to ensure proper braking system operation;
- Collision and speed control design features;
- Analysis of the potential for TEV tipover and derailment and a description of specific safety features designed to minimize the consequences of derailment;
- Seismic restraint features included in the TEV design;
- Analysis of the efficacy of the shielded enclosure with respect to personnel radiation protection and potential rockfall; and
- Analysis of required thermal performance characteristics.

In addition, Table 1.3.3-5 of the SAR provides a direct comparison of the preclosure nuclear safety design bases with the TEV design criteria, as specified in 10 C.F.R. § 63.21(c)(3). SAR at 1.3.3-56 to -57. Table 1.3.3-6 provides a comparison of TEV design requirements with the implementation of those requirements. SAR at 1.3.3-58 to-61. Table 1.3.3-7 describes component development activities for specific nuclear design basis requirements for the TEV. SAR at 1.3.3-62. Tables 1.3.3-8 (at pages 1.3.3-66 to -67) and 1.3.4-5 (at pages 1.3.4-55 and 57) address postclosure parameters applicable to the TEV, including operational limits that the TEV must meet to satisfy the initial conditions for the TSPA-LA, to demonstrate compliance with 10 C.F.R. §§ 63.21(c)(9) and 63.114(a). This information includes specifications for monitoring equipment, instrumentation, and sensors designed to ensure proper waste package emplacement.

A petitioner must “read the pertinent portions of the license application . . . state the applicant’s position and the petitioner’s opposing view,” and explain why it disagrees with the

applicant. *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001), *recons. denied*, CLI-02-1, 55 NRC 1 (2002). This contention, however, does not address or refute the information that appears in the Application, nor does it take the next required step of explaining why it believes that information fails to satisfy the applicable regulations with respect to either the required level of detail or the NRC's required safety findings.

Moreover, Nevada also fails to explain why it believes that any defect or omission in this information will lead to the problems that it speculates about: the alleged difficulties of conducting "precise" TEV operations in a "hot, spatially restricted, high radiation environment." Petition at 718. With respect to temperature, the SAR shows that the TEV is designed for a maximum bounding ambient temperature of 50° C, SAR § 1.3.3.5.1.1 at 1.3.3-34, which is greater than the maximum ambient temperature for repository operations, which is 47° C. *Id.* Table 1.2.2-1 at 1.2.2-45. The TEV is also designed to operate in the "spatially restricted" subsurface environment. *See id.* Table 1.3.4-5 at 1.3.4-50; Figure 1.34-20 at 1.34-99 (describing the operating envelope of the TEV with a waste package in the re-emplacment drift); Figure 1.3.5-10 at 1.35-51 (showing typical turnout bulkhead and emplacement access door dimensions). Finally, the SAR explains that the TEV design and materials selected address the high radiation environment inside the emplacement drifts. *See id.* § 1.3.3.5.7 at 1.3.3-45. Nevada does not recognize or refute any of this information.

Thus, this proposed contention fails to raise a demonstrate a genuine dispute on a material issue of law or fact and is inadmissible.

### **133. NEV-SAFETY-133 - Drip Shield Gantry Description**

SAR Subsection 1.3.4.7 and similar subsections, which identify the Drip Shield Gantry as the crane-rail-based transport assembly that moves the drip shields from surface facilities to the emplacement drifts and into position covering the waste packages, fail to include sufficient detail to determine whether the Drip Shield Gantry will fulfill the requirements that the TSPA-LA places on it, and as a result, the TSPA-LA assumptions relating to drip shield emplacement and effectiveness of the engineered barrier system are unfounded.

#### **RESPONSE**

Nevada alleges that in SAR Subsection 1.3.4.7 and similar subsections, the Application “fail[s] to include sufficient detail to determine whether the Drip Shield Gantry will fulfill the requirements that the TSPA-LA places on it, and as a result, the TSPA-LA assumptions relating to drip shield emplacement and effectiveness of the engineered barrier system are unfounded.” Petition at 720. As explained below, this contention is inadmissible because it fails to raise an issue that is material to the NRC’s required findings, is unsupported by fact or expert opinion, and fails to raise a genuine dispute on a material issue of law or fact.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

#### **b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 720-21. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue. . . .” *Id.* at 721. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations, Case Management Order, slip op. at 7, this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” *Id.* at 3.

Nevada asserts that “precise geometry” in drip shield emplacement is required to demonstrate compliance with postclosure requirements. *Compare* Petition at 721-22 *with id.* at 720-21. However, Nevada cites no evidence for or further explanation of this “precision”

requirement, nor does it provide any quantitative or qualitative evaluation of why it believes that resolution of this issue will make a difference to the outcome of this proceeding.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to those requirements: (1) the contention does not reference any documents, other than the Application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Doug F. Hambley and Steven A. Frishman), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Indeed, in asserting this contention, Nevada relies *solely* upon the following statement:

SAR Subsection 1.3.4.7.2 at 1.3.4-27 through 1.3.4-29 describes many of the systems and components on the Drip Shield Gantry are [sic] being similar to those on the TEV. Consequently, *one can assume* that, as for the TEV, not only is there, as yet, no engineering design for the Drip Shield Gantry, but that some of the requirements to be achieved through that design have yet to be defined.

Petition at 721. (emphasis added). Thus, Nevada’s only substantive allegation is the completely unexplained and unsupported *assumption* that the TEV design is incomplete and fails to meet regulatory requirements. Building on this baseless assumption, Nevada speculates that the Drip Shield Gantry design suffers from the same deficiencies.<sup>77</sup> As explained in Section V.A.3, these types of statements are insufficient.<sup>78</sup>

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons set forth in Section d, above, this contention fails to raise a genuine dispute on a material issue of law or fact. In addition, Nevada claims that because the Drip Shield Gantry design is similar to the TEV, and because the TEV design is incomplete, that, likewise, the Drip Shield Gantry design is incomplete. Petition at 721. Nevada’s statement is conjecture and absent requisite clarity. Compounding this problem, Nevada concludes that “the TSPA-LA assumptions relating to drip shield emplacement and effectiveness of the engineered barrier system are unfounded.” *Id.* at 720. The Application, however, provides sufficient details on the design of the Drip Shield Gantry for the NRC to make its required determinations under 10 C.F.R. Part 63; and Nevada fails to address or refute any of the Drip Shield Gantry design information in the Application. Nevada’s curiosity and desire to see additional information do not raise a litigable issue. As such, even if this Board were to permit Nevada to incorporate into

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<sup>77</sup> Even if one assumes that such speculation reflects the opinion of Messrs. Hambley and Frishman—which, as explained above, one cannot—it still falls far short of the reasoned basis or explanation required to support an admissible contention. *See* Section V.A.3, above.

<sup>78</sup> Insofar as Nevada seeks to incorporate the allegations made in NEV-SAFETY-132 (TEV Description)—a contention that is *not* referenced in this contention, it is foreclosed from doing so under 10 C.F.R. §2.309(f)(1)(v), which requires *references* to the “specific sources and documents on which the requestor/petitioner intends to rely.” *See also* Case Management Order, LBP-08-10, slip op. at 7 (“Such references shall be as specific as reasonably possible”) (internal quotations omitted); *cf. Hydro Res., Inc.* (P.O. Box 15910 Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 46 (2001) (“The Commission should not be expected to sift unaided through large swaths of earlier briefs . . . in order to piece together and discern the intervenors’ particular concerns or the grounds for their claims.”).

this contention the claims in NEV-SAFETY-132—which, as explained above, it cannot—it still fails to raise a genuine dispute on a material issue of law or fact.

Nevada fails to address, refute, or otherwise provide any explanation of why the information on Drip Shield Gantry design described below is inadequate under 10 C.F.R. §§ 63.21(c), 63.114(a), or any other provision of Part 63. The regulations specify that the SAR must include a “description of the design of the various components of the geological repository operations area and the engineered barrier system,” including the “design bases and their relationship to the design criteria.” 10 C.F.R. § 63.21(c)(3). In turn, Part 63 defines “design bases” to include:

information that identifies the specific functions to be performed by a structure, system, or component of a facility and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be constraints derived from generally accepted “state-of-the-art” practices for achieving functional goals or requirements derived from analysis (based on calculation or experiments) of the effects of a postulated event under which a structure, system, or component must meet its functional goals.

10 C.F.R. § 63.2. In addition, 10 C.F.R. § 63.21(c)(9) requires an “assessment to determine the degree to which those of the features, events and processes of the site that are expected to materially affect compliance with 10 C.F.R. § 63.113 . . . have been characterized.”

To meet these regulatory requirements, the SAR provides an extensive, specific, and detailed description of the Drip Shield Gantry design, which Nevada ignores. SAR § 1.3.4.7.2 provides a description of the Drip Shield Gantry design, with over a dozen references to Project documents and other sections of the Application. This description includes specific information on the similarities and differences between the Drip Shield Gantry design, and the TEV design that is described in more detail in SAR § 1.3.4.8. In addition, Table 1.3.4-5 of the SAR provides

a direct comparison of the subsurface facility design, including the Drip Shield Gantry, to postclosure control parameters. SAR at 1.3.4-58 to -61. Nevada fails to address, refute, or otherwise provide any explanation of why the information on Drip Shield Gantry design described above is inadequate under 10 C.F.R. §§ 63.21(c), 63.114(a), or any other provision of Part 63.

A petitioner must “read the pertinent portions of the license application . . . state the applicant’s position and the petitioner’s opposing view,” and explain why it disagrees with the applicant. *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001), *recons. denied*, CLI-02-1, 55 NRC 1 (2002). In this contention, however, Nevada fails to address or refute the information that appears in the Application, and fails to explain why it believes that information fails to satisfy the applicable regulations with respect to either the required level of detail or the NRC’s required safety findings.

Moreover, Nevada also fails to explain why it believes that any defect or omission in this information will lead to the problems that it speculates about: the alleged difficulties of conducting “precise” Drip Shield Gantry operations in a “hot, spatially restricted, high radiation environment.” Petition at 722.<sup>79</sup> With respect to temperature, the SAR shows that the Drip Shield Gantry is designed to operate at temperatures up to 50° C. *See* SAR at 1.3.4-28. Emplacement drift temperatures will be cooled below this value prior to drip shield emplacement operations. *See id.* The Drip Shield Gantry is also designed to operate in the “spatially restricted” subsurface environment. *See id.* at 1.3.4-58 to -61; 1.3.4-95 (showing a diagram of emplacement drift configuration for drip shield installation). Finally, the SAR explains that the Drip Shield Gantry design and the materials selected address the high radiation environment

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<sup>79</sup> Moreover, as explained in Section d, above, Nevada does not draw any connection between the purported need for “precise geometry” and any specific regulatory requirement.

inside the emplacement drifts. *See id.* at 1.3.4-28. Nevada does not recognize or refute any of this information.

Thus, this proposed contention fails to raise a genuine dispute on a material issue of law or fact and is inadmissible.

**134. NEV-SAFETY-134 - Retrieval Or Alternate Storage Description**

SAR Subsection 1.11.1 and similar subsections, which discuss the approach to retrieval of waste packages from the repository, fail to consider that rockfall debris, breached waste packages and other “off-normal” conditions can be reasonably expected to be encountered in the emplacement drifts, such that retrieval is not simply a reversal of the emplacement process and may require development of specialized equipment.

**RESPONSE**

This contention asserts that SAR Subsection 1.11.1 and similar subsections, which discuss the approach to retrieval of waste packages from the repository, fail to consider that rockfall debris, breached waste packages and other “off-normal” conditions can be reasonably expected to be encountered in the emplacement drifts, such that retrieval is not simply a reversal of the emplacement process and may require development of specialized equipment.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not demonstrate that the alleged concerns regarding DOE's description of its retrieval plans would affect compliance with a regulatory requirement, safety or waste isolation.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies regulations concerning waste retrieval. Petition at 723. Nevada concludes this general description of these sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

Nevada asserts that this contention alleges non-compliance with 10 C.F.R. §§ 63.21(c)(7) and 63.111(e)(1). Petition at 723. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R.

§ 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Doug F. Hambley and Steven A. Frishman) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention asserts that SAR Subsection 1.11.1: (1) states that derailment of the TEV, waste package drop, damage to the TEV by impacts, and impact between the TEV and facility structures, equipment, or objects all could occur during retrieval, but dismisses such events with a statement that lessons learned from addressing similar events during emplacement will be applied during retrieval (Petition at 724); and (2) defines "recovery" as "removing or relocating selective waste packages from the subsurface as a result of concerns

related to an off-normal condition,” and thereby avoids the issue of accounting for such events in DOE’s retrieval plans (*Id.*).

Neither of these assertions provides meaningful support for this contention. Although Nevada’s contention asserts that SAR Subsection 1.11.1 “fail(s) to consider that rockfall debris, breached waste packages and other “off-normal” conditions can be expected, Nevada’s first assertion in paragraph 5 states explicitly that SAR Subsection 1.11.1 does consider such events. Petition at 724. Thus, this first assertion contradicts Nevada’s contention, and does not provide any support for it.

As for Nevada’s statement that the SAR acknowledges that such off-normal events could occur, but that the SAR dismisses them with its statement that lessons learned during waste emplacement will be applied to any similar events that occur during retrieval, Petition at 724, Nevada does not provide *any* reasoned basis for concluding that the SAR is deficient. Moreover, the SAR explains that “[o]ff-normal conditions, if any, will require an assessment to identify specific conditions and determine an appropriate operational strategy.” SAR at 1.11-7.

Nevertheless, SAR Subsection 1.11 also includes references to: “Strategies for Recovery After an Off-Normal Event to the Waste Package Transport and Emplacement Vehicle,” 800-30R-HE00-01800-000-000, ACC: ENG.20070531.0043, LSN#: DN2002399654, and “Concepts for Waste Retrieval and Alternate Storage of Radioactive Waste. 800-30R-HER0-00100-000-007, LSN#: DEN001570516, both of which provide such information. LSN#: DN2002399654 discusses conceptual approaches to recovery from various off-normal events similar to the ones listed at page 1.11-7 of the SAR, including: a conceptual multipurpose recovery vehicle for use in various recovery operations; recovery of a derailed TEV in an emplacement drift; repair of damaged rail in an emplacement drift; removing rockfall debris around the TEV; dismantling

and removing a disabled TEV from an emplacement drift; and recovery from a misaligned waste package. LSN#: : DN2002399654 at 6-17. LSN#: DEN001570516 identifies additional contingencies and general approaches to them, including: Emplacement Access Doors are Damaged, TEV Cannot Retrieve Waste Package, Rockfall or Ground Support Failure. LSN#: DEN001570516 at 17. These reports show that there is no substance to Nevada's claim that such information has not received any consideration.

Nevada's second assertion is that the SAR was in some way avoiding the issue of removing or relocating selective waste packages from the subsurface by defining recovery as a separate term from retrieval. Petition at 724. In support of this assertion, Nevada states that "It should be noted that the "retrieval" as defined in 10 C.F.R. § 63.2 includes removal of any or all waste packages, and therefore encompasses DOE's "recovery" concept." Petition at 725.

Nevada does not explain how removal of a portion of the stored waste would present more difficult or different types of problems than complete waste removal. Furthermore, contrary to Nevada's assertion, the complete definition in § 63.2 is

*Retrieval* means the act of permanently removing radioactive waste from the underground location at which the waste had been previously emplaced for disposal.

While Nevada supplements this definition with "any and all," it also omits "permanently." By stating that retrieval is permanent removal, NRC's definition excludes *temporary* removal. Consequently, a separate term is required for temporary removal (*i.e.*, "recovery"). DOE's acknowledgment that there could be a need for temporary removal to deal with an unanticipated situation cannot reasonably be described as avoiding an issue. In any event, Nevada's statements in paragraph 5 do not identify any facts or expert opinions that support this contention. This is another reason that this contention must be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

As discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention does not specify any alleged ramifications other than the conclusory assertion that the SAR does not comply with 10 C.F.R. § 63.21(c)(7), without any showing of a requirement of that regulation that this Application allegedly fails to meet. Petition at 725. Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

**135. NEV-SAFETY-135 - The Ventilation Doors At The Entry To The Emplacement Drifts**

SAR Subsection 1.3.5.1.3.3 and similar subsections, which describe the ventilation doors and associated airflow regulators intended to isolated the emplacement drifts from the access drifts and minimize leakage of radiation into the latter drifts during the waste emplacement process, fail to provide sufficient detail to determine whether the doors will fulfill the requirements that the LA places on them and as a result, the LA assumptions relating to the isolation of the emplacement drifts are unfounded.

**RESPONSE**

In this contention, Nevada claims that SAR Subsection 1.3.5.1 and similar subsections fail to provide sufficiently detailed information to determine whether the emplacement drift access doors and airflow regulators will, as the Application allegedly assumes, “provide an airtight seal” between the access mains and the emplacement drifts. Petition at 726.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 726-27. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue . . . .” *Id.* at 727. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, (Oconee Nuclear Station, Units 1, 2 and 3) CLI-99-11, 49 NRC 328, 333 (1999).

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations, (*U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board) LBP-08-10, 67 NRC \_\_\_ (slip op. at 7) (June 20, 2008) (Case Management Order)), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the Case Management Order focused exclusively on “format” and “procedural matters.” *Id.* at 3.

To the extent Nevada seeks to establish the importance of establishing an airtight seal at the emplacement drift entrance to prevent “leakage of radiation from the emplacement drifts into the access drifts,” Petition at 726, Nevada cites inapposite regulations. Nevada’s concerns relate only to preclosure issues. *See id.* (“during the emplacement process”). Nevada’s boilerplate

materiality statement, however, alleges deficiencies related to postclosure requirements only, and does not address preclosure regulations. *Id.* at 727 (citing 10 C.F.R. §§ 63.21(c)(9), 63.113, and 63.114). Thus, Nevada fails to identify any regulations that even relate to this contention, much less carry its burden to demonstrate that this would make a difference in the outcome of the proceeding.

Nor does such a link exist. Nevada claims that the “LA assumes that the ventilation doors will provide an airtight seal to minimize the leakage of radiation from the emplacement drifts into the access drifts.” Petition at 726. Nevada offers no citation for this statement and in any event, Nevada is wrong. The emplacement access doors are designed to limit the leakage of air, but are not required to be airtight. *See* “Subsurface Construction and Emplacement Ventilation,” LSN No. DEN001573151 at 59, cited at 1.3.5-5 (“System Location and Functional Arrangement”). The doors do not need to be airtight because, as explained in the Application, air flow is designed to always move away from the access mains into the emplacement drifts. As a result, any air leakage would be into the emplacement drifts, and away from any inhabited areas. *See* SAR at 1.3.5-1; SAR Figure 1.3.5-5 at 1.3.5-41 (showing air flow direction to be from the access mains into the emplacement drifts. Thus the Application does not rely upon the emplacement access doors to provide an airtight seal. For this reason, among others, the subsurface ventilation system is neither important to safety, SAR at 1.9-35, nor is it important to waste isolation, *id.* at 1.9-111. Nevada does not dispute these classifications. As a result, there is no direct connection between any alleged deficiency in the subsurface ventilation system and preclosure or postclosure regulatory requirements.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual or expert opinion support in order for a contention to be admitted. This contention fails to meet those standards because: (1) the contention does not reference any documents, other than the License Application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits (by Allen Messenger, Doug F. Hambley, and Steven A. Frishman), which purportedly provide expert opinions to support this contention. Petition Attachment 5 (Messenger Affidavit at 1, Attach. B); Attachment 9 (Hambley Affidavit at 1, Attach. B); Attachment 20 (Frishman Affidavit at 1, Attach. B). However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopts" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to raise a genuine dispute on a material issue of law or fact. The Application provides an extensive and detailed description of the emplacement drift doors and associated airflow regulators. As explained in Section d, above, Nevada fails to articulate any connection between the various purported deficiencies it identifies and any specific regulatory requirement related to the NRC's findings in this proceeding. Indeed, contrary to Nevada's assumption, there is no need for the emplacement drift doors to maintain an airtight seal. As a result, none of the purported "problems" Nevada identifies relate to any regulatory or design

requirement, and so they fail to raise a genuine dispute. Accordingly, this contention is inadmissible.<sup>80</sup>

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<sup>80</sup> Nevada's specific technical concerns, moreover, are all addressed in the SAR and its associated references, as follows. Nevada does not recognize or refute any of this information.

- To the extent Nevada expresses concerns about emplacement access door tolerances, the door actuator linkage will contain an adjustment mechanism to provide fine tuning of the door sealing, to the extent it may be necessary. *See* "Subsurface Construction and Emplacement Ventilation" January 2008, (LSN# DEN001573151 at 57) (reference BSC 2008a to SAR § 1.3.5).
- Nevada's questions about the gasket material are also addressed in the same document, LSN No. DEN001573151 at 55, and in the SAR at 1.3.5-15.
- Nevada's "concern" about "shock losses from the expansion and contraction into [sic]" the bulkhead airflow regulator is alleviated in "Subsurface Ventilation Network Model for License Application," LSN No. DEN001572123 at 37, referenced in LSN# DEN001573151 at 11.
- Finally, Nevada's desire to confirm whether the TEV will fit through the ventilation doors is also satisfied in LSN No. DEN001573151 at 54 (showing the emplacement and retrieval equipment envelope to be 16' wide and 12' high, while the emplacement access door is 16'6" wide and 12'5" high).

**136. NEV-SAFETY-136 - Phased Ground Support Installation**

SAR Subsection 1.3.4.4 and similar subsections, which discuss the ground support system in the emplacement drifts, fail to include sufficient detail to determine whether the rock support system will fulfill the requirements that the LA places on it, and as a result, the LA assumptions relating to effectiveness of the geologic and engineered barrier system are unfounded.

**RESPONSE**

This contention asserts that SAR Subsection 1.3.4.4 does not provide sufficient detail to show that the ground support system will fulfill the requirements that the Application places on it, and as a result, assumptions in the Application relating to effectiveness of the geologic and engineered barrier system are unfounded.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada broadly identifies various regulations. Petition at 730-31.

Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that, “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 731. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, Nevada asserts that the LA “does not comply with 10 C.F.R. § 63.114(a), which requires the inclusion of information on the design of the engineered barrier system for use in a performance assessment.” Petition at 732. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of this contention would make a difference in the proceeding.

Instead, Nevada simply makes broad assertions that “[t]his will impact the assumptions concerning the heat transfer into the rock mass surrounding the drifts, the effectiveness of the ventilation system..., and the effectiveness of the capillary barrier to seepage postulated for the

postclosure period.” Petition at 732. Such statements do not come close to satisfying requisite specificity in the contention to establish materiality.

Moreover, Nevada’s burden was even greater in this instance, because the subject of this contention, the ground support system, does not have an obvious relationship to nuclear safety or waste isolation. In fact, SAR Subsection 1.3.4.4, “Ground Support System” states that:

The emplacement drift ground support is classified as non-ITS because it is not relied on to prevent or mitigate a Category 1 or Category 2 event sequence, and it is not ITWI because the total system performance assessment (TSPA) does not take credit for ground support during the postclosure performance period.

SAR at page 3.4.4-8. In this contention, however, Nevada does not dispute DOE’s classification of the ground support system as non-ITS and non-ITWI, or claim that failure of the ground support system would affect the results of the PCSA or the TSPA. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention mainly contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition does attach an affidavit (by Doug F. Hambley), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5

of this contention, the affidavit simply “adopts” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada’s comments are based entirely on information that is included in the Application regarding the emplacement drift host rock and ground support system, and therefore, do not provide any basis for concluding that more detailed information is required. Nor do they show that such additional information, even if provided, would be material. Instead of referencing expert opinion or some documentation other than the Application, this contention appears to consist entirely of arguments of counsel and, as shown in Section f. below, illustrates a fundamental misunderstanding of the ground support system installation process.

In particular, nowhere in this contention does Nevada allege that the omissions and errors that it claims exist in DOE’s description of the ground support system will result in an increase in the mean dose above regulatory limits. Nevada merely asserts that because it believes DOE has not provided enough detail for it to understand the Application, the assumptions in the Application regarding the effectiveness of the geologic and engineered barrier system are unfounded. Petition at 730. The contention does not, however, identify any specific assumptions that are alleged to be unfounded, or explain the effect of the alleged concerns on such assumptions, the safety of the repository, or the NRC’s ability to make a required finding.

Moreover, Nevada’s assertions are not borne out by any of the statements made in the contention, such as the statements in paragraph 5. Indeed, the contention makes no attempt to show that, if true, this contention would prevent the NRC from making any finding required for issuance of construction authorization, or that the proposed repository would not meet any regulatory requirement. *Id.* at 730. For example, Nevada has asserted that drift wall unevenness

will impact assumptions made in the Application, but it concludes only that such impacts “could be of significance with respect to the characteristics of water seeping into the emplacement drifts, degradation of waste packages and release of radionuclides.” Petition at 732. This claim stops far short of providing a reason to believe that the condition could cause a radiation dose to the RMEI that would exceed regulatory limits or that the issue raised by this contention would prevent the NRC from making the findings necessary for issuance of construction authorization. *Id.* Accordingly, the assertions made in support of this contention are not sufficient to show that it raises an issue that is material to the findings that the NRC must make in this proceeding, and for this reason as well, this contention must be dismissed.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention does not include references to specific portions of the LA that Nevada disputes or the supporting reasons for each dispute, and although Nevada asserts that the Application does not provide sufficient information on a relevant matter as required by law, it does not identify such a failure and provide the supporting reasons for Nevada’s belief that such information is required.

In Paragraph 2 of the contention, Nevada argues that:

[t]he LA assumes that the emplacement drifts will have a regular circular cross-section that is not significantly modified as a result of the use of a two-stage rock reinforcement and support system. Given the very close fracturing in the lithophysal units that will form the host rock for 85% of the emplacement drifts, there is no assurance that this will be achieved.

Petition at 730. Nevada does not, however, provide any specific references to such assumptions in the Application.

Similarly, in Paragraph 5 of the contention, Nevada cites, without dispute, information in the Application as a basis for asserting that “one can expect . . .significant roof falls [and that] scaling . . . will exacerbate the unevenness.” *Id.* at 731-32. At the same time, Nevada ignores the fact that DOE’s analyses of emplacement drift stability conditions are based, in part, on DOE’s experience with the excavation of the Exploratory Study Facility (ESF) and the Enhanced Characterization of the Repository Block (ECRB) Cross-Drift. *See* SAR at 1.3.4-15 and “Ground Control for Emplacement Drifts for LA,” which is reference BSC 2007e in SAR Subsection 1.3.4, (LSN# DN2002491254), Section 6.1.1, page 38. The SAR states that “[t]hese excavations have been demonstrated to be self-supporting with safety factors of 2 or greater against collapse modes for the rock mass quality conditions. Therefore, the primary role of ground support at Yucca Mountain is to prevent deterioration and loosening of the rock mass tunnel periphery.” SAR at 1.3.4-15. Nevada does not reference or dispute these statements in the SAR. Consequently, there is no foundation for Nevada’s expectations of significant roof fall and scaling.

Nevada also does not provide a reference in the Application for its assertion that the Application assumes that the perimeter of the emplacement drifts will be smooth. Petition at 732. Thus, although this statement appears to dispute the Application, Nevada does not identify any specific portion of the Application that it disputes. In fact, Nevada’s claim that the Application assumes that the emplacement drifts will be smooth is wrong. The Application states that the tunnel boring machine produces a clean bore that facilitates the installation of the ground supports and the smoother excavation also improves ventilation efficiency, but the Application also indicates that before installing the final ground support, DOE will examine the drift walls and correct significant problems. The SAR states that:

Geologic mapping is performed in the emplacement drift during development and after initial ground support has been installed for personnel safety to support engineering analyses and in conformance with the Performance Confirmation Program (Section 4.2.2.1). This includes mapping of fracture and fault zone characteristics, stratigraphic contacts, and lithophysal content in the emplacement drifts. The mapping is performed before installation of the final ground support.

\* \* \*

Anomalies could be associated with geologic faults or fault splay zones, zones of unusually large lithophysae, or changes in rock types. The emplacement panels are located to minimize the potential of encountering areas of potentially poor quality rock, but there is a possibility of encountering anomalies because characterization data do not provide complete coverage of the host rock . . . analyses and operational procedures implemented during construction of the repository will provide steps to analyze any such problem, maintain or restore excavation alignment, implement mitigation measures to ensure drift stability, and restore an excavated drift cross section.

SAR at 1.3.4-7-8. Thus, the SAR describes a process for determining if there is a need for corrective measures before installation of the final ground support system, and does not assume that the emplacement drifts will necessarily be smooth after removal of the initial ground support. Nevada ignores this process, and its implicit assumption that effective corrective measures will not be implemented has no foundation. As a result, nothing Nevada states in connection with this contention is sufficient to demonstrate the existence of a genuine dispute.

An allegation that some aspect of an application is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Units 3 and 4), LBP-90-16, 31 NRC 509, 521 n.12 (1990). Nevada has not even provided a reasoned statement of why it disputes the Application, much less demonstrated that there is a

genuine dispute on a material issue of fact or law. For this reason, too, this contention should be dismissed.

**137. NEV-SAFETY-137 - Construction Of The Emplacement Drifts**

SAR Subsection 1.3.4.3 and similar subsections, which discuss excavation of the emplacement drifts, fail to include sufficient detail to determine whether the tunnel boring machine (TBM) will fulfill the requirements that the LA places on it, and as a result the LA assumptions concerning the excavation of the emplacement drifts are unfounded.

**RESPONSE**

This contention asserts that SAR Subsection 1.3.4.4 does not provide sufficient detail to show that the TBM will fulfill the requirements that the LA places on it, and as a result, assumptions in the LA concerning the excavation of emplacement drifts are unfounded.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention does not identify any NRC requirement that allegedly is not met by the LA. Nevada simply asserts that the TBM may not work as anticipated, notwithstanding the previous successful use of TBMs at Yucca Mountain, as noted at SAR Subsection 1.3.4.3 at 1.3.4-7; and claims that without additional, unspecified information about the TBM there is no assurance that the emplacement drifts will meet specified tolerances and be in accordance with other specifications. However, the NRC regulations do not require use of a TBM to construct the emplacement drifts; the LA does not rely on the TBM to assure that the emplacement drifts meet

the design specifications; and the TBM deficiencies this contention asserts would not significantly affect the final configuration of the emplacement drifts.

SAR Subsection 1.3.4.3 describes the process to be followed during and after excavation, and before installation of the final ground support. SAR at 1.3.4-7-8. Geologic mapping is performed and operational procedures are put in place during construction that will provide steps to analyze identified problems, maintain or restore excavation alignment, implement mitigation measures to ensure drift stability, and restore, as necessary, the cross section of the excavated drift; indeed, the SAR describes procedures already implemented for a TBM during the previous drilling of the Exploratory Studies Facility tunnel and the Enhanced Characterization of the Repository Block Cross-Drift. *Id.* at 1.3.4-7-8; GI-5 at 5-6, 5-19. Nothing in this contention raises any question about whether the process described in SAR Subsection 1.3.4.3 provides reasonable assurance that the emplacement drifts will meet applicable requirements. Thus, even if this contention was correct, the issue it raises would not affect DOE's compliance with Part 63, the NWPA or the AEA. Consequently, this contention does not raise an issue that is within the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

The reasons discussed in c. above, for why this contention does not raise an issue that is within the scope of this proceeding, also demonstrate that the issue it raises is not material to the findings the NRC must make for issuance of construction authorization. This contention does not identify any safety concerns or any NRC regulatory requirement that allegedly is not met.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(2) and (3), 63.21(c)(9) and (15), 63.114 and 63.114(a). Petition at 733-34. Nevada concludes this general description

of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* at 734. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

This contention also should be dismissed because it is not supported by any facts or expert opinion. To the contrary, the "facts" cited by Nevada fail to provide any basis for concluding that the questions about TBM performance cited in this contention are material to any determination that the NRC must make. Nevada's comments on the level of detail in the Application regarding the TBM, therefore, do not provide any basis for concluding that more detailed information is required, and do not show that such information is material. Indeed, this contention does not reference any expert opinion or documentation other than the Application. Instead, it appears to consist entirely of arguments of counsel and, as discussed further below,

illustrates a fundamental failure to consider the positive experience with operation of a TBM at Yucca Mountain.

Section V.A.3. above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the Application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach three affidavits (by Allen L. Messenger, Doug F. Hambley and Steven A. Frishman), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

In addition, paragraph 5 of this contention does not demonstrate that the effectiveness or efficiency of the TBM is a material issue. The entire crux of the contention is an assertion of a difference between TBM performance in drilling through hard rock versus Tonopah Springs tuff; yet the total basis for this proposition consists of the unsupported assertions that DOE's expectation about TBM performance in Tonopah Springs tuff is "somewhat optimistic and idealized." Petition at 734. Nevada states only that "*it is quite possible* that abandonment of a number of areas becomes necessary and *in the extreme case*, the ability of the repository to isolate waste becomes compromised." Petition at 735 (emphasis added). Implicit in this totally speculative scenario is an assumption that DOE would not take corrective action to address any

deficient TBM performance. This contention does not provide any justification for such an assumption. Consequently, Nevada has not provided adequate support for its assertion that the alleged deficiencies in TBM performance will occur or, if they did occur, that they would affect compliance with any regulatory requirement or prevent the NRC from making the findings necessary for issuance of construction authorization.

Moreover, Nevada's speculation about whether a TBM will perform as anticipated by DOE ignores the considerable positive experience with excavation at Yucca Mountain using a TBM. As mentioned above and described in the Application, a TBM was used to excavate both the Exploratory Study Facility (ESF), a 5-mile tunnel mined through Yucca Mountain during 1995 to 1997, and the Enhanced Characterization of the Repository Block (ECRB), a 2-mile cross-drift tunnel that was completed in 1998. *See* GI-5 at 5-6, 5-19; SAR at 1.3.4-7-8. Nevada does not acknowledge this experience, or provide a basis for concluding that it is not representative of the likely performance of a TBM in repository construction. Nor does it attempt to account for the obvious effect of this favorable experience on its assertion that the amount of TBM design information furnished in the LA is insufficient to assess its likely effectiveness. Consequently, Nevada's unsupported assertions do not provide sufficient support for this contention, or show that the issue raised is material to any finding the NRC must make.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency. Paragraph 4 of the contention discusses various regulations and then asserts that "[t]his contention alleges non-compliance with

these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” Petition at 733-4. But this assertion is not borne out by the actual contention or any of the statements made in connection with it. Indeed, the contention makes no attempt to show that, if true, the allegedly missing information would prevent the NRC from making any finding required for issuance of construction authorization, or that the proposed repository would not meet a regulatory requirement. Instead, Nevada merely alleges that “the LA assumptions concerning the excavation of the emplacement drifts are unfounded.” *Id.* at 735. The contention does not, however, identify any specific assumptions that are alleged to be unfounded, or any effect on the safety of the repository or NRC’s ability to make a required finding.

In Paragraph 2 of the contention, Nevada argues that:

[t]he LA assumes that the emplacement drifts will be constructed to meet specified tolerances and in conformance with other engineering specifications; however, the lack of design information on the TBM means that there is no assurance that these requirements can be achieved.

Petition at 733. Nevada does not, however, provide any references to such tolerances or specifications, or any explanation of the regulatory significance of such alleged deficiencies. In paragraph 5 of the contention, Nevada characterizes as “optimistic” the statements in SAR Subsection 1.3.4.4, that use of the TBM assures correct alignment of the drifts and produces a clean bore. Petition at 734. Nevada does not, however, challenge the statements at SAR at 1.3.4-8, in the same SAR subsection, that “analyses and operational procedures implemented during construction of the repository will provide steps to analyze any such problem, maintain or restore excavation alignment, implement mitigation measures to ensure drift stability, and restore an excavated drift cross section.” Petition at 734-35. Thus, despite Nevada’s questions about the TBM performance, it does not provide any support for questioning the Application’s discussion

showing that the emplacement drifts will be correctly aligned and stable and have the intended cross section. *Id.*

An allegation that some aspect of the Application is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the Application is unacceptable in some material respect. *See Fla. Power & Light Co. (Turkey Point Plan, Units 3 and 4), LBP-90-16, 31 NRC 509, 521 n.12 (1990).* Nevada has not provided a reasoned statement of why it disputes the Application, and has not demonstrated that there is a genuine dispute on a material issue of fact or law. For this reason, too, this contention should be dismissed.

**138. NEV-SAFETY-138 - Description Of The Ventilation System For The Repository Options Made In The TSPA-LA Regarding Waste Isolation**

SAR Subsection 1.3.5.1.3.1 and similar subsections, which describe the intake and exhaust fans for the facility, fail to provide sufficient detail to determine whether the ventilation fans will fulfill the requirements that the LA places on them and as a result, the LA assumptions relating to the isolation of the emplacement drifts during the preclosure period are unfounded.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsection 1.3.5.1.3.1 and similar subsections”: (1) rely upon ventilation fans that are not commercially available; and (2) have not adequately considered the possibility of fan blade failures. *See* Petition at 736-38. As explained below, even if one assumes that all of the unsupported speculation in this contention is true, Nevada still ignores information in the Application that directly addresses its concerns. Accordingly, this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 736-37. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges noncompliance with these regulatory provisions and therefore raises a material issue . . . .” *Id.* at 737. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333 (1999).*

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations, (*U.S. Dep’t of Energy (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_\_\_ (slip op. at 7) (June 20, 2008) (Case Management Order)*), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the Case Management Order focused exclusively on “format” and “procedural matters.” *Id.* at 3.

Nevada also proffers two allegations in this contention, but neither one carries its burden of demonstrating that the contention would make a difference in the outcome of the proceeding. With respect to Nevada’s complaint that ventilation fans of the required size are not currently commercially available, Petition at 737, Nevada does not identify any Part 63 provision requiring

such a demonstration from DOE. As to Nevada's second allegation, that DOE has not given "adequate consideration" to the "possibility of ventilation fan failures," *id.* at 738, Nevada likewise fails to carry its burden of directly linking this point to any regulatory requirement.

Accordingly, Nevada has failed to explain how this contention, if true, would make a difference in the outcome of this proceeding. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to those requirements: (1) the contention does not reference any documents, other than the License Application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits (by Allen Messenger, Doug F. Hambley, and Steven A. Frishman), which purportedly provide expert opinions to support this contention. Petition, Attachments 5, 9 and 20. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Specifically, the two allegations in this contention utterly lack support, either in fact or expert opinion. First, Nevada vaguely asserts that, "[i]n the past 15 years, few, *if any*, fans of this size [required to meet ventilation system specifications] have been built and installed and

*many* of the former manufacturers of these fans are no longer in business.” Petition at 737 (emphasis added). As is clear from the text, this statement is rife with speculation, and completely vague. Nevada does not even assert that *no* fans of the required size have been built, or that *all* manufacturers of such fans are out of business. Additionally, it is a conclusory statement, completely unsupported with reference to any verifiable supporting documentation, or any other reasoned basis or explanation. *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

Nevada’s second claim is equally infirm:

Blade failures associated with this type and size of fan are not unusual, and lead times for delivery and installation of replacement blades are on the order of months. Historical data would indicate that the frequency of a fan blade failure for such large fans is approximately one failure of a set of blades per fan per 10 years of operation.

Petition at 738 (emphasis added). Nevada provides no reference for its speculation regarding fan blade replacement schedules, nor to any purported “[h]istorical data” on failure rates. Strikingly, by admitting that current manufacturers are capable of manufacturing replacement blades for the types of fans specified in the Application, the assertions in this paragraph undercut Nevada’s previous claim that there is no commercial manufacturing capability for such fans.<sup>81</sup>

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Because Nevada raises issues that, as explained in Sections d and e above, are not material to the NRC’s findings and are unsupported by facts or expert opinion, it also fails to raise a genuine dispute on a material issue of law or fact.

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<sup>81</sup> Nevada’s counsel – or the individuals who have “adopted” this text – also display a measure of confusion and misunderstanding of the repository design and basic physics when they state that the ventilation fans “are to provide the air flow for radiation and heat removal during the postclosure period.” Petition at 737. First, “radiation,” unlike air or even radioactive material, cannot be mobilized by airflow. Second, the ventilation system will not be operated during the postclosure period. SAR at 1.3.5-6.

Specifically, Nevada fails to articulate how its first assertion—that the required ventilation fans are not currently commercially available—is directly related to any deficiency in the Application. Thus, Nevada fails to “explain why the application is deficient.” Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,170 (Aug. 11, 1989).

Even if we assume that Nevada’s speculation regarding fan blade failure rates and expected repair times is true, it fails to contradict the information in the Application. Nevada’s concerns about the long lead-time for manufacturing replacement fan blades are directly addressed in SAR § 1.3.5: the Project will ensure the “[a]bility for rapid fan replacement with spare fans and parts stocked on site.” SAR at 1.3.5-3. Nevada ignores this information, and as a result, its contention fails to raise a genuine dispute and is inadmissible. *See Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2) LBP-92-37, 36 NRC 370, 384 (1992) (a contention that does not directly controvert a position taken by the applicant in the application is subject to dismissal).

### **139. NEV-SAFETY-139 - Description Of Reasonable Emergencies**

SAR Subsection 5.7 and similar subsections, which discuss plans for dealing with radiological emergencies prior to permanent closure, fail to include sufficient detail to determine whether these plans will fulfill all of the requirements that the LA places on them, and as a result, the LA assumptions related to the effectiveness of the engineered barrier system are unfounded.

#### **RESPONSE**

This contention alleges that the description of the emergency plan in SAR § 5.7 contains insufficient details about responding to and recovering from radiological emergencies that may occur during operations at the repository and that, as a result, DOE's assumptions related to the effectiveness of the engineered barrier system (EBS) are also unfounded. The contention can be read to allege that the description of the emergency plan in the Application is inherently incomplete relative to the requirements of NRC regulations, though it does not state so directly. Alternatively, it can be read to allege that the level of detail in the emergency plan description is insufficient to support certain assumptions made about the effectiveness of the EBS.

#### **a. Statement of Issue of Law or Fact to be Controverted**

This contention appears to state two equally defective arguments: (1) that DOE's emergency plan description itself is deficient because it does not include certain details which will be included in the final emergency plan at the receive-and-possess license stage, but which are not included at this stage; and (2) that necessary assumptions regarding the "effectiveness" of the EBS cannot be made because various details are "missing" from the emergency plan description.

If Nevada intends to make both arguments, then it has failed to comply with the requirement of the Case Management Order for this proceeding for "narrow, single-issue

contentions” and should therefore be dismissed. *U.S. Dep’t of Energy*, (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 6) (June 20, 2008) (Case Management Order). If, on the other hand, Nevada is attempting only to make one of these arguments, then, because it is unclear which one Nevada intends to make, this contention does not “provide a specific statement of the issue of law or fact to be raised or controverted,” as required by 10 C.F.R. § 2.309(f)(1)(i), and should be dismissed.

It should also be noted that this contention, if it is ultimately read to implicate the EBS, is deficient for several other reasons related to its lack of clarity. Nevada refers to allegedly missing details from the emergency plan description, but fails to specify which assumptions, or how the emergency plan even relates to the EBS. Petition at 740. Notably, various sections of the SAR discuss the EBS. *See, e.g.*, SAR § 2.1.1.2 (“Engineered Barrier System”); SAR § 2.1.2 (“Barrier Capability Description”); SAR § 2.3.4 (“Mechanical Degradation of the Engineered Barrier System”); SAR § 2.3.7 (“Waste Form Degradation and Mobilization and Engineered Barrier System Flow and Transport”); SAR § 2.1.1 (“Identification of Barriers”). Nevada makes no reference to any of these sections, or how they relate to emergency planning.

Nevada also never explains what is meant by “the effectiveness of the [EBS]” or which specific EBS features are at issue. Petition at 740. Table 1.9-8 (“ITWI Classification of Features that Support the Three Barriers”), SAR § 1.9 at 1.9-110-16, identifies nearly 20 EBS features; and EBS features are classified as Important to Safety (ITS), not Important to Safety (non-ITS), Important to Waste Isolation (ITWI), or non-ITWI, depending on their barrier function. Nevertheless, Nevada makes no reference to a specific EBS feature or even a class of EBS features. Accordingly, this contention does not alert DOE to the specific assumptions or EBS

features that Nevada seeks to challenge. For these and additional reasons discussed below, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

As noted at the outset, this contention is susceptible to two interpretations. To the extent that Nevada argues that the emergency plan description is deficient because it lacks certain details about emergency planning, the contention must be dismissed for raising issues that are outside the scope of this proceeding. Such an argument would amount to an impermissible attack on the regulations governing Application content by requesting that a stricter standard be applied. *See* 10 C.F.R. § 2.335(a) (stating that absent a waiver, “no rule or regulation of the Commission . . . is subject to attack . . . in an adjudicatory proceeding”); *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159 (2001), *aff’d*, CLI-01-17, 54 NRC 3 (2001) (dismissing contention on the basis that petitioner sought “to impose requirements in addition to those set forth in the regulations”).

The regulations governing what the Application must contain regarding emergency planning could not be clearer. All that is required at this stage is a description of the plan; and that description need only contain all the information that was reasonably available *at the time of docketing*. *See* 10 C.F.R. § 63.21(c)(21) (requiring “[a] description of the plan for responding to, and recovering from, radiological emergencies”); 10 C.F.R. § 63.21(a) (requiring that the Application “be as complete as possible in the light of information that is reasonably available at

the time of docketing”). In sum, NRC regulations do not require that a full plan be submitted with the Application.

Nonetheless, Nevada appears to claim that DOE’s emergency plan description is deficient because “the types of radioactive material accidents are not identified, a classification system for classifying accidents as ‘alerts’ or ‘site-wide conditions’ is not provided, the means of detecting accidents are not given, and the methods for mitigating the consequences of each type of accident are not provided.” Petition at 740. But nowhere does Nevada contend, let alone provide any supporting evidence to show, why this particular information must be provided. Indeed, Nevada does not argue in this contention that NRC regulations require a complete emergency plan at this time, and even acknowledges that “[t]he general requirements in 10 C.F.R. § 63.21(c)(21) *do* appear to be met by discussion presented in SAR [section] 5.7.” *Id.* (emphasis added).

Despite this admission, Nevada makes reference to 10 C.F.R. § 63.161 and 10 C.F.R. § 72.32(b), and suggests that these provisions somehow demonstrate that the details identified above should have been included in SAR § 5.7. These provisions, however, describe what a complete emergency plan must contain, not what the *description* of the plan must contain. DOE has committed to include those items, consistent with 10 C.F.R. § 72.32(b). *See* SAR Subsection 5.7.3.1 at 5.7-6 to -7 (addressing types of accidents and classification system); SAR Subsection 5.7.4.2 at 5.7-8 (addressing means of detecting event sequences that lead to an alert or site area emergency); SAR Subsection 5.7.5.1 at 5.7-9 (addressing the means to mitigate consequences of each type of accident). To the extent Nevada relies on these provisions to argue that DOE’s emergency plan description (or commitment to include information in the emergency plan in the

future) is insufficient, Nevada ultimately advocates for a stricter standard than what NRC regulations currently require. As noted, such challenges are not permitted.

Given the ambiguous nature of this contention, it also is possible that Nevada is arguing that the details “missing” from the emergency plan description are required, not because of the requirements that specifically relate to emergency planning, but rather because of the relationship of these details to the performance of the EBS. As shown in section d below, however, Nevada would, again, be incorrect, because it does not demonstrate that there is any connection between the emergency plan and the performance of the EBS. Nor can it.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As noted above, this contention discusses the emergency plan as if it were a component or feature that relates to and even supports the EBS, but Nevada does not cite any requirements associated with the performance of the EBS. Nevada simply recites selected requirements of 10 C.F.R. §§ 63.21, 63.161 and 72.32(b), all of which relate to the contents of an emergency plan. Nevada never cites to any of the requirements in 10 C.F.R. Part 63—or even to the sections of the SAR—that relate to the EBS or the performance of the repository during the preclosure or postclosure period. In other words, Nevada does not make any effort to show how details allegedly “missing” from the emergency plan description relate to, let alone could prevent the NRC from making, the requisite safety findings regarding the EBS.

Nor does Nevada mention, much less challenge, the information in the Application that demonstrates that the contents of the emergency plan are immaterial to the EBS during the preclosure and postclosure periods. For example, SAR § 1.9 states unequivocally that “[t]he *Emergency Plan is not relied upon to prevent or mitigate event sequences.*” SAR § 1.9.1.10 at 1.9-12 (emphasis added). In other words, the emergency plan is immaterial to the preclosure

performance of the repository and is treated as a non-ITS component. Likewise, for postclosure, neither the emergency plan, nor any of the information to be derived from the emergency plan, is identified as a feature that is ITWI or that supports the EBS in any way. *See generally* SAR at 1.9-110 (Table 1.9-8) (“ITWI Classification of Features that Support the Three Barriers”). Nevada never reckons with this information.

A contention, to pass the materiality test of 10 C.F.R. § 2.309(f)(1), must state a claim that, if proven, would make a difference in the outcome of the proceeding. *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3) CLI-99-11, 49 NRC 328, 333-34 (1999). Thus, each contention must be one that, if proven, would entitle the petitioner to relief. *Yankee Atomic Elec. Co.* (Yankee Power Station), CLI-96-7, 43 NRC 235, 244 (1996). The Case Management Order states that this criterion “requires citation to a statute or regulation that, explicitly or implicitly, has not been satisfied by reason of the issue raised in the contention.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 7); *see also* Section II.A.3.d of this consolidated Response.

Under these tests, the contention should be dismissed. The content of the emergency plan, as indicated on the face of the Application, is not material to findings about the performance of the EBS, and vice versa. The emergency plan is simply not relied upon to prevent or mitigate preclosure event sequences, and with respect to postclosure, neither the emergency plan nor any information derived from it is classified as ITWI. The contention makes no attempt to demonstrate otherwise; and the Application affirmatively demonstrates that the emergency plan is not material to any EBS-related findings.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

The contention, if read as arguing that the emergency plan description is deficient on its face, raises issues solely outside the scope of this proceeding and should be dismissed, as argued

in section c. above. If read to argue that the emergency plan description is inadequate because its level of detail is insufficient to permit evaluation of hypothesized “failure of one or more components of the engineered barrier system,” Petition at 739, it fails to allege facts or expert opinion sufficient to support its admission.

The contention, Petition at 740, refers to details allegedly missing from the plan description, but, as noted in section a. above, fails to specify which assumptions regarding the EBS, if any, depend on or even relate to these details. Nor does it attempt to explain what is meant by “the effectiveness of the [EBS]” or which specific EBS features are at issue, though the material is readily available. Nor does it support these general assertions with any reference to authority beyond excerpts from NRC regulations and nonspecific references to the Application, particularly SAR § 5.7. Nor does it refer to any expert opinion. And the two affidavits attached by Nevada in support of this contention (by Doug F. Hambley and Steven A. Frishman), purportedly to provide expert opinions to support it, do not in fact provide supporting information, but instead simply “adopt” the assertions made in paragraph 5 of the contention. *See* Petition, Attachment 9 (Hambley Affidavit at 1, Attach. B); Attachment 20 (Frishman Affidavit at 1, Attach. B). The allegations in the contention thus amount to little more than unsupported speculation. A petitioner must explain the significance of any factual information upon which it relies. *See Fansteel, Inc.* (Muskogee, Oklahoma Site), CLI-03-13, 58 NRC 195, 204-5 (2003). Further, conclusory expert “opinions” are not sufficient to support a contention. *See USEC, Inc.* (American Centrifuge Plant), CLI-06-10, 63 NRC 451, 472 (2006). Under these tests, the contention lacks an adequate basis in fact or expert opinion, and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention fails to raise a genuine dispute on a material issue of law or fact.

Specifically, Nevada never actually disputes that DOE is not required to submit a full emergency plan at this time. Rather, without providing any basis, it suggests that the plan description must contain additional information, but offers no support for this proposition. In the absence of any support for this argument, the contention must be dismissed. Likewise, to the extent Nevada argues that the emergency plan description casts doubt on the performance of the EBS, the contention must, again, be dismissed, because Nevada offers nothing that shows how the emergency plan could impact the EBS. Nor does Nevada dispute the treatment of the emergency plan as a non-ITS component and non-ITWI feature in the Application.

It should also be noted that Nevada does not address, let alone dispute, the detailed information that the Application *does* contain and that relates to the subject matter that Nevada references in this contention. Indeed, some of this information will be relied upon to support the development of the emergency plan and is even referenced in SAR § 5.7. For example, with respect to details concerning the identification and classification of accidents, Petition at 740, SAR § 5.7 explains that potential accidents and the classification of emergencies will be described in the emergency plan based on “the list of possible internal and external events presented in [SAR] Section 1.7.” SAR § 5.7.3.1 at 5.7-6 -7. Nevada does not address SAR § 1.7.

As for details concerning the means of detecting accidents, Petition at 740, SAR § 5.7 also provides that the “[r]adiation and radiological monitoring systems [are] described in Section 1.4.2.2.” *See* SAR Subsection 5.7.4.2 at 5.7-8. Nevada also makes no reference to SAR Subsection 1.4.2.2. Regarding methods for mitigating the consequences of accidents, Petition at

740, SAR § 5.7 indicates that information in this area will be derived from SAR §§ 1.7 and 5.11. See SAR at 5.7-9 (indicating that the emergency plan “will describe the means to mitigate consequences of each type of accident, as presented in [SAR] Section 1.7”); SAR at 5.7-13 (indicating that the emergency plan will describe radiological sampling and monitoring methods and referencing SAR § 5.11). Nevada apparently did not address or account for any of this material.

A petitioner must “read the pertinent portions of the license application [and] . . . state the applicant’s position and the petitioner’s opposing view,” and explain why it disagrees with the applicant. *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 358 (2001) (internal quotation and citation omitted), *recons. denied*, CLI-02-1, 55 NRC 1 (2002) (quoting Final Rule, Rules of Practice for Domestic Licensing Proceedings – Procedural Change in the Hearing Process, 54 Fed. Reg. 33,168, 33,170 (Aug. 11, 1989)). In this contention, however, Nevada fails to address or refute the information that appears in the Application, and fails to explain why it believes that information fails to satisfy the applicable regulations with respect to either the required level of detail or the NRC’s required safety findings. As a result, Nevada fails to raise a genuine dispute on a material issue, and the contention should be dismissed.

**140. NEV-SAFETY-140 - Engineered Barrier System Design Basis**

SAR Subsection 1.3.4 and similar subsections, which describe the design of ground control system, ventilation system and components of the engineered barrier system, fail either to include sufficient detail to determine whether the component discussed will fulfill the requirements placed on it by the LA or to provide sufficient reference to supporting documents that provide the required detail.

**RESPONSE**

In this contention, Nevada alleges that “SAR Subsection 1.3.4 and similar subsections” contain insufficient detail or insufficient references to supporting documents with respect to the “ground control system, ventilation system, and components of the engineered barrier system.” *See* Petition at 741-44. Nevada fails to demonstrate that the contention would make a difference in the outcome of the proceeding, so this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

Nevada’s statement of this contention and summary of its basis identify three aspects of the repository as allegedly deficient: the “ground control system, ventilation system, and components of the engineered barrier system.” Petition at 741. The information presented in support of this contention, however, bears no discernable relationship to the “ground support system.” *See generally id.* at 742-45 (presenting complaints related to the ventilation system, waste package emplacement equipment, and drip shield emplacement equipment). Thus, the statement of this contention is impermissibly vague, to the extent Nevada seeks to litigate issues related to the “ground support system.”

**b. Brief Explanation of Basis**

To the extent the basis for this contention suffers from the same infirmities described in Section a, above, it is also deficient.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 741-42. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue . . . .” *Id.* at 742. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations, Case Management Order, slip op. at 7, this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” *Id.* at 3.

Nevada proffers three allegations in this contention, but fails to carry its burden of demonstrating that they would make a difference in the outcome of the proceeding. Nevada's first claim is that the "total airflow" and "pressure capacity" parameters for each ventilation exhaust fan do not appear in the Application, or in a supporting document directly referenced in the Application. *See* Petition at 742 (*citing* SAR § 1.3.5.1.3.1; "Subsurface Construction and Emplacement Ventilation" (01/24/2008), LSN# DEN001573151 at 11 ("Ventilation Analysis")).<sup>82</sup> Nevada identifies the information it seeks in another Project document cited in the Ventilation Analysis, but complains that it is not clear whether this information is "applicable in the context of the LA." *Id.* at 742 (*citing* "Subsurface Ventilation Network Model for LA" (01/14/2008), LSN# DEN001572123 ("Ventilation Model Calculation")). Allegedly, this "illustrates a general problem in determining what design information has been used as a basis for safety related statements in the LA." *Id.* at 742-743. Nevada, however, completely fails to connect its "general problem" to any specific regulatory requirement. In particular, Nevada articulates no connection between the specific data that it seeks and any specific requirement that the data appear in the Application, rather than in a supporting calculation.

Moreover, Nevada fails to identify any regulation that prevents DOE from generally relying upon referenced documents to support its Application, or, for that matter, on more detailed calculations that support the analyses referenced in the Application. On the contrary, and as is standard procedure, the NRC's review will include a review of cited reference documents to ensure that they are sufficient to support the conclusions presented in the Application. *See* NRC Presentation at September 23, 2008 Public Outreach Meeting at 22,

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82 This first allegation is similar in some respects to the claims presented in NEV-SAFETY-138. To the extent that NEV-SAFETY-138 alleges additional deficiencies related to ventilation fan parameters that are not reiterated in this contention, DOE addresses those issues in its response to NEV-SAFETY-138, above.

*available at* ADAMS Accession No. ML083030512. Indeed, the Ventilation Model Calculation Nevada identified is available on the LSN. It was required to be placed there, among other reasons, to assist “potential parties . . . [in] formulating meaningful contentions.” *U.S. Dep’t of Energy*, CLI-08-12, 67 NRC \_\_ (slip op. at 9). Nevada’s identification of the specific information it seeks in an underlying Project calculation, therefore, merely further confirms that there is no deficiency.

Finally, as to Nevada’s lack of clarity regarding whether the information cited in DOE’s Project reference documents is “applicable,” Nevada answers its own question: the underlying calculation is a “supporting document” to the Application reference. Petition at 742. A cursory review of the Ventilation Analysis confirms this fact. The Ventilation Analysis identifies the Ventilation Model Calculation as a “Reference” that “support[s] this analysis.” Ventilation Analysis at 8. In other words, the information that Nevada identified is “applicable in the context of the LA.” *Id.* at 742.

Nevada’s second and third claims, relating to the TEV and Drip Shield Gantry, are verbatim repetitions of information presented in NEV-SAFETY-132 and -133, respectively. DOE addresses Nevada’s failure to demonstrate the materiality of these allegations in its responses to those contentions. Specifically, Nevada cites no evidence for, nor provides further explanation of, the alleged need for “[p]recise . . . [w]aste package emplacement geometry,” Petition at 743, nor for the proposition that “precise emplacement geometry [is] required for the drip shields,” *id.* at 744, to meet any specific preclosure or postclosure regulatory requirements.

Thus, Nevada has failed to carry its burden of explaining how this contention, if true, would make a difference in the outcome of this proceeding. Accordingly, this contention fails to

raise an issue that is material to the findings that the NRC must make in this proceeding, and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to those requirements: (1) the contention does not reference any documents, other than the Application and DOE's supporting references; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach affidavits (by Doug F. Hambley and Steven A. Frishman), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Moreover, as explained in Section V.A.3 above, Boards must carefully scrutinize factual allegations and the documents cited in support of contentions. This includes a review of the information relied upon to confirm that it supports the proposed contention. Section f, below, discusses Nevada's allegations in detail and explains why they fail to provide the requisite factual or expert opinion support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Because Nevada raises issues that, as explained in Sections d and e above, are not material to the NRC's findings and are unsupported by facts or expert opinion, it also fails to raise a genuine dispute on a material issue of law or fact.

Also, as noted above, the three claims in this contention overlap substantially with (or, in the case of Nevada's TEV and Drip Shield Gantry claims, are identical to) the claims presented in NEV-SAFETY-138, -132, and -133, respectively. In addition to the reasons presented in Sections d and e, above, each of these three claims fails, individually, to raise a genuine dispute for the reasons set forth in DOE's responses to those contentions.

Finally, to the extent Nevada may seek to litigate this contention as a "cumulative impact" contention, its efforts fall far short of the mark. Case Management Order, slip op. at 7. First, as explained in DOE's responses to each of those contentions, none of the three are adequately supported by facts or expert opinion. Thus, as explained in Section V.A.3, above, none of these three contentions should be considered in any analysis of cumulative impacts. Second, even if one considers the substance of these three contentions, Nevada provides absolutely no analysis even purportedly showing that the impact of these three alleged deficiencies, when taken together, would materially impact the adequacy of the ground control system, the ventilation system, or the engineered barrier system, or any combination of these systems. *Id.* at 7. Thus, this contention fails to raise a genuine dispute and must be dismissed.

**141. NEV-SAFETY-141 - Ground Support Descriptions**

Subsection 1.3.4.4, and similar and related sections of the SAR, lacks detailed descriptions of ground support items, such as "super Swellex-type rock bolts" and "Bernold-type perforated liners" and treats them as generic, which is inappropriate for a final repository design.

**RESPONSE**

This contention asserts that Subsection 1.3.4.4, and similar and related sections of the SAR, lack detailed descriptions of ground support items, such as "super Swellex-type rock bolts" and "Bernold-type perforated liners" and treats them as generic, and that this is inappropriate for a final repository design.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention seeks to raise an issue that is outside the scope of this proceeding, because it argues for the application of a stricter standard than NRC regulations require. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-17, 54 NRC 3 (2001). Nevada asserts that DOE failed to provide design details sufficient for a final design of the ground support system, and that without such information it is not possible to evaluate the impacts of ground support items on the hydrological, thermal and mechanical characteristics of the near field of the repository. Petition

at 748. Nevada does not, however, cite any regulatory requirement for such information to be included in the LA, nor does it show how such design details could affect compliance with any regulatory requirement. As discussed below, DOE determined that the ground support system is not ITS or ITWI, and DOE did not include the ground support system in its TSPA because failure of the ground support system would not have a significant effect on the TSPA results. Nevada does not challenge DOE's determination that the ground support system should not be classified as ITS or ITWI, and does not claim that design details concerning the ground support system would have a *significant* effect on the projected dose to the RMEI. Consequently, Nevada has not demonstrated that the issue raised in this contention is within the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies 10 C.F.R. §§ 63.31(a)(2) and (3), 63.21(c)(1)(ii), (3)(ii) and (14), 63.102(h), 63.113, 63.114(a) and 63.115. Petition at 746-47. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ..., " not merely a citation of the relevant regulations.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be

read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

This contention does not claim that there is any regulatory requirement specifically associated with the ground support system that the LA does not fulfill. Paragraph 4 of this contention discusses requirements of 10 C.F.R. §§ 63.31, 63.21, 63.102, 63.113, 63.114 and 63.115, but does not explain how the ground support system design details affect compliance with any of them, or could significantly affect the TSPA results. Moreover, Nevada also does not claim that the effects of failure of the ground support system, including the rock bolts and the Bernold sheets, would prevent the NRC from making any finding that the NRC must make to support issuance of construction authorization.

In addition, as mentioned above, the Application confirms that this contention does not raise a material issue. SAR subsection 1.3.4.4 "Ground Support System" states that:

The emplacement drift ground support is classified as non-ITS because it is not relied on to prevent or mitigate a Category 1 or Category 2 event sequence, and it is not ITWI because the total system performance assessment (TSPA) does not take credit for ground support during the postclosure performance period.

SAR at 3.4.4-8. This classification means that failure of the entire ground support system would not affect the results of the PCSA or TSPA. As mentioned above, nothing in this contention disputes DOE's classification of the ground support system as non-ITS and non-ITWI.

An issue "is 'material' if its resolution would 'make a difference in the outcome of the licensing proceeding.'" *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999) (*quoting* Final Rule, Rules of Practice for Domestic Licensing Proceedings—Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,172 (Aug.

11, 1989)). This contention does not provide any reasoned explanation of how resolution of this issue could make a difference in the outcome of this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in the specific response below: (1) the contention does not reference any documents, other than the license application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Doug F. Hambley and Don L. Shettel, Jr.) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention asserts that: (1) the SAR purports to be a final design document but does not reference design documents, uses generic terms for the rock bolts and Bernold-type sheets, and does not give the diameter of the rock bolt holes or the size, shape and spacing of the Bernold-type sheet perforations (Petition at 747); (2) DOE may plan to use temporary rock bolts but does not mention them in the SAR (*id.* at 748); and (3) with this limited information, it is not possible to evaluate the ground support system impacts on the near field hydrological, thermal and mechanical characteristics (*id.*). None of these assertions demonstrates the existence of a material issue.

Nevada's first assertion does not identify any regulatory requirement for such design details, nor does it provide any basis for concluding that such information is necessary to evaluate the repository design. Nevada's second assertion overlooks the specific discussion in the SAR of the initial ground support system, which specifically states that "[t]he wire mesh is removed prior to installation of the final ground support, while the initial rock bolts remain in place." SAR at 1.3.4-10. The initial ground support system also is mentioned in the SAR at 1.3.1-29, 1.3.2-16 and 1.3.3-15. Nevada's third assertion does not claim, let alone provide a basis for doing so, that the design details not yet provided could have a significant effect on the PCSA or TSPA.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The discussion above shows that this contention is unfounded and not material. In particular, ground support is classified as non-ITS and non-ITWI, and the TSPA does not assume that the ground support or the rock bolts remain intact during the postclosure period. The contention does not reference or challenge the portions of the LA that deal directly with the classification of the ground support system. The contention also does not provide any basis for concluding that there is any error in the analyses that support the expectation that the rock bolts and Bernold sheets will function for at least 100 years, or that their degradation could have any affect on compliance with any regulatory requirement.

Finally, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency, since it does not specify any alleged ramifications other than the conclusory assertion that the SAR does not comply with 10 C.F.R. §

63.114(a). Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

## **142. NEV-SAFETY-142 - Standard Titanium Grades Considered**

In SAR Subsection 2.1.1.2 and similar subsections, DOE considered only standard ASTM specification titanium for the drip shields, which is an inadequate basis for design and results in significant differences in corrosion performance of the drip shield surface, structural members and welds, for which the LA provides inadequate information to demonstrate the performance DOE assumes for the titanium alloys selected for fabrication of the drip shields.

### **RESPONSE**

This contention appears to allege that, in “SAR Subsection 2.1.1.2 and similar subsections,” DOE erroneously considered “only standard ASTM specification titanium for the drip shields,” which may lead to early failure of the drip shields. Petition at 750. The contention claims that DOE did not provide adequate information to demonstrate performance of the titanium alloys selected, and that other materials might be preferable.

#### **a. Statement of Issue of Law or Fact to be Controverted**

The contention fails to define the relevant issue to be controverted, with the requisite specificity, because it is impossible to discern what precisely the focus of this contention is, and what exactly in the LA Nevada is challenging. At different points in the contention, Nevada identifies varying subjects of its purported dispute. For example, Paragraph 1 points to “SAR Subsection 2.1.1.2 and similar subsections,” but Nevada does not reference that section at any other point in the contention. Rather, in Paragraphs 5 and 6, Nevada points broadly to SAR Subsection 2.3.6. As another example, in the first three pages of Paragraph 5, Nevada muses on alternative materials that DOE could have considered for its drip shield design, and concludes this section on the fourth page with a one paragraph discussion of corrosion tests conducted or not conducted by DOE. *See* Petition at 752-755.

Thus, as written, the contention fails to give DOE sufficient notice of the issues of law or fact that Nevada seeks to dispute. Moreover, the contention does not comply with the Board's Case Management Order that contentions be "narrow, single-issue contentions" that are "sufficiently specific as to define the relevant issues" and do not require the Parties or Board to exhaust extensive resources to clarify the issue. *U.S. Dep't of Energy*, LBP-08-10, 67 NRC \_\_\_ (slip op. at 6). Based on the information Nevada has provided, this contention lacks the specificity required by 10 C.F.R. § 63.309(f)(1)(v) and the Board's Case Management Order and, therefore, must be rejected.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada's contention concludes that "DOE has assumed that the drip shields will function for hundreds of thousands of years based on corrosion testing of wrought and welded titanium (Grade 16 and Grade 7), as described in SAR Subsection 2.3.6 and similar subsections, but has not considered custom compositions to make corrosion performance of welds and structural components more uniform." Petition at 755-56. Nevada alleges that, as a result, DOE violated a number of NRC regulations applicable to Yucca Mountain, including 10 C.F.R. § 63.113. *Id.* at 756. To the extent that Nevada is claiming that DOE is required to consider any particular alloy or material to construct drip shields (or any other component of the engineered barrier system), this represents an impermissible collateral attack on the Commission's regulations. No NRC regulation, nor combination of regulations, including those cited by Nevada in Paragraph 4 and 6 of this contention, requires DOE to conduct such an evaluation. As the Commission has held,

absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001). Accordingly, Nevada’s contention should be dismissed as outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada does not demonstrate that the issue presented in its contention is material to any finding the NRC must make to authorize construction of the repository. Nevada’s contention is devoid of any qualitative, let alone *quantitative*, discussion of the impact of this alleged deficiency. Nevada neglects to establish how, if DOE had “consider[ed] composition options other than the existing ASTM ‘standard’ grades,” Petition at 752, its performance assessment would have estimated a dose to the RMEI above regulatory requirements. Even more striking, Nevada fails to allege that DOE’s drip shield design is not conservative, or is not sufficient to protect the health and safety of the public or the environment.

Accordingly, Nevada’s only objection to DOE’s assessment is that it was limited, and “has not left an option to take advantage of development of new and better materials.” Petition at 752. In other words, the data DOE used for its drip shield design could have been more robust or accurate. As another Licensing Board has held, however a petitioner must allege more than simply that “more accurate input data could be used in applicant’s model,” but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006). As noted above, Nevada has not done so.

In addition, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 750-751. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 751. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The methods the DOE used in assessing drip shield performance are consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, (1) the contention cites to only one supporting document, other than the license application and DOE's supporting documents, and then only to support a limited proposition; (2) the contention contains mostly unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition attaches several affidavits (by James A. McMaster and Robert A. Cottis) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

As noted above, Nevada cites to only one supporting document, and then only for the limited proposition that a certain test has shown corrosion in Alloy 22. *See* Petition at 755. For the remaining six-plus pages of assertions and conclusory statements provided in this contention, Nevada fails to provide *any* references or support, despite the requirement to present "claims rooted in fact, documents, or expert opinions." *Yankee Atomic Elec. Co.*, CLI-96-7, 43 NRC at 262 (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). Such unsupported passages include those that are rife with asserted facts and speculative arguments of counsel, such as the following:

Ti-Ru alloy microstructures are significantly different from Ti-Pd microstructures, in that the Ti-Ru alloys have a definite second metallurgical phase. This second phase could have a significant effect on the relative sensitivity of the two materials to hydrogen effects.

Petition at 753-54.

A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel*, CLI-03-13, 58 NRC at 203 (quoting *Gen. Pub. Utils. Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). The amalgamation of unsupported assertions presented in this contention amounts to little more than pure speculation by counsel.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s contention regarding DOE’s analysis of drip shield materials presents an issue that is not sufficiently specific, within the scope of this proceeding, or material. For these reasons, and for the reasons discussed below, this contention does not establish a genuine dispute on a material issue of fact.

As discussed in section (a) above, Nevada asserts a number of broad challenges to the LA in this contention. Nevada alleges, generally, that DOE failed to provide adequate information to demonstrate corrosion performance of the drip shield components. *See* Petition at 750. This assertion challenges DOE’s corrosion analysis of drip shield components generally, and does not point to specific portions of the SAR or supporting documents, such as “Drip Shield and Waste Package Emplacement Pallet Design Report,” (August 2007) (LSN# DN2002459185). Moreover, this assertion finds no basis in fact, given the extensive discussion of drip shield corrosion provided in SAR Section 2.3.6.8. That section analyzes general corrosion, localized

corrosion, stress corrosion cracking, early failure, thermal aging and phase stability, and titanium creep as these processes pertain to drip shields. *See* SAR Section 2.3.6.8 at 2.3.6-71. As discussed in the applicable Legal Standards Section V.A.3, above, a contention that fails to controvert the Application directly, or mistakenly asserts that the Application fails to address an issue that the Application does address, is defective.

Nevada then proceeds to propose a number of alternative “composition options” that DOE could have considered. *See* Petition at 752-754 (“DOE failed to consider if the use of a ruthenium grade for the water diversion surface ... *might* have reduced hydrogen concerns”) (emphasis added). Such hypothetical assertions do not directly controvert a position taken by the applicant in the application, and therefore cannot form the basis for this contention. *See Texas Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

Nevada’s proposals are riddled with speculation and devoid of any actual results or comparisons to DOE’s findings. *See* Petition at 755 (“DOE failed to test a realistic under-deposit ... corrosion mechanism .... Such a test has been shown by the State of Nevada to cause corrosion in Alloy 22. Tests of Grade 7 or ERTi-7 welds, let alone of Grade 29 and ERTi-29 welds or ERTi-28 welds between Grade 7 and Grade 29) [sic] under these same conditions or at the even higher temperature possible in the repository in the near term after closure *have the potential* to fail by a similar corrosion mechanism”) (emphasis added) (citations omitted). These proposals fail to establish a genuine dispute, however, because Nevada must allege more than just that “more accurate input data could be used in applicant’s model,” but that the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy*

*Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-40 (2006).

Nevada also provides a number of misleading musings regarding the analyses and decisions undertaken by DOE. *See* Petition at 752-54 (“[DOE’s change to Grade 29 Titanium] *may* have been driven by the realization that standard Ti 6Al-4V material ... was found to be more susceptible to stress corrosion cracking” ... “DOE failed to consider Ti 6Al-4VELI-0.06Pd or 0.015 Pd alloy, *possibly* because it was not listed in the ASTM Specifications” . . . “DOE did not consider that the use of the single alloy would also reduce concerns for weld filler metal selection errors”) (emphasis added). These assertions have no basis, and altogether fail to establish a genuine dispute.

Nevada also enumerates alleged shortcomings of DOE’s analyses, yet not only fails to provide any support for these assertions, but also fails to even attempt to provide any insight into the *ramifications* of the alleged omissions. *See* Petition at 754 (“DOE failed to consider if the design *might have been safer* and more reliable using either all Ru or all Pd enhanced titanium grades or alloys”) (emphasis added). Nevada does not claim DOE’s analyses are, as a result, not conservative or not protective of the health and safety of the public and the environment. Such bare assertions, “without any specific source of evidence concerning the importance of the alleged omission,” do not raise a valid basis for attacking the DOE’s analyses. *Fla. Power and Light Co.* (Turkey Point Plant Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 515, 521 (1990).

In sum, this contention does not raise a genuine dispute of a material fact because it fails to establish – or even assert – that the drip shield compositions as designed by DOE are insufficient for protection of the health and safety of the public and the environment or would result in an increase in mean dose above regulatory limits. Its suggestions for possible

improvements to the drip shield compositions are baseless, unsupported, and not even alleged to materially affect the outcome of this proceeding. For the aforementioned reasons, and in light of the applicable legal standards provided in Section V.A.3 above, this contention fails to raise a genuine dispute on a material issue and must be dismissed.

**143. NEV-SAFETY-143 - Available Drip Shield Design Information**

In the "Yucca Mountain Project Engineering Specification for Prototype Drip Shield & Drip Shield Fabrication Specification; 000-3SS-SSE0-00100-000-00Bb" (12/06/2006), LSN# DN2002362768, in SAR Figures 1.2.3-14 and 15, and 2.3.4-56, and throughout SAR Subsection 1.3.4.7 and similar subsections, DOE fails to provide necessary information to adequately understand and evaluate the drip shield design, fabrication, or installation.

**RESPONSE**

This contention asserts that a Yucca Mountain Project Engineering and Fabrication Specification for the drip shield, SAR Figures 1.2.3-14 (SAR at 1.2.3-77), 1.2.3-15 (SAR at 1.2.3-79) and 2.3.4-56 (SAR at 2.3.4-313) and SAR Subsection 1.3.4.7 (SAR at 1.3.4-26 to 1.3.4-33) and similar subsections, do not provide necessary information to adequately understand and evaluate the drip shield design, fabrication, or installation.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 757-58. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* 758. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

Because Nevada has not explained how specific alleged deficiencies in the License Application would violate specific requirements of 10 C.F.R. Part 63, it has not demonstrated that this contention is material to findings that the NRC must make and the contention therefore must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by James A. McMaster and Doug F Hambley), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention makes essentially three assertions:

(1) Nevada asserts that SAR Subsection 1.3.4.7 and similar subsections do not provide enough design detail for Nevada to be able to assess the capability of the drip shield to perform its design functions, specifically how the structural supports would be attached to the water diversion surface (WDS). Petition at 758.

(2) Nevada asserts that DOE failed to consider certain design alternatives for fabrication of the WDS, and the Grade 29 titanium structural framework. Petition at 758-9.

(3) Nevada asserts that the SAR descriptions of the drip shield interlocking connector are not clear, and should not be relied upon without a demonstration that they will work. Petition at 759-61.

None of these assertions demonstrates the existence of a material issue, but merely reflect Nevada's apparent lack of understanding of the License Application. Although Nevada's first assertion questions the level of design detail in the SAR, the only example it cites concerns whether the structural supports would provide a "continuous high-strength framework." Petition at 758. This question does not identify any requirement that the drip shield design would allegedly not meet, and therefore, does not provide meaningful support for this contention. Moreover, the SAR provides considerable design detail in SAR Subsection 1.3.4.7, including a verbal description (SAR at 1.3.4-26), Table 1.3.4-3 (SAR at 1.3.4-46, providing drip shield dimensions and materials), Table 1.3.4-4 (SAR at 1.3.4-47, defining drip shield nomenclature) and Figures 1.3.4-14 (SAR at 1.3.4-89, depicting drip shield interlocking features) and 1.3.4-15 (SAR at 1.3.4-91, depicting drip shield structural details). Other drawings and specifications that are available in the Licensing Support Network are identified by Nevada at page 768 of its Petition. Nevada does not show that there is any inadequacy in the level of information provided.

Nevada's example appears to focus on the strength of the drip shield structural supports, but Nevada does not mention SAR Subsection 2.3.4.5.3 "Drip Shield Fragility" (SAR at 2.3.4-160 to 2.3.4-171) which deals directly with analyses of drip shield performance during postclosure that are reflected in the TSPA, including the ability of the structural supports to fulfill their design functions. Since Nevada does not reference SAR Subsection 2.3.4.5.3, or raise any question about the model of drip shield performance reflected in the TSPA, Nevada's first assertion does not provide meaningful support for this contention.

Nevada's second assertion is simply that DOE should have considered alternatives to the drip shield fabrication plan and material selection. Nevada does not allege that any aspect of

either the fabrication plan or material selection would not comply with any regulatory requirement, or is not properly reflected in the TSPA. There is no regulatory requirement for the SAR to include a discussion of design alternatives or demonstrate that the proposed design is superior to alternatives. Consequently, this Nevada assertion does not provide meaningful support for this contention.

Nevada's third and final assertion is that the description of the drip shield interlocking connector is not clear, and should be demonstrated. Petition at 759-61. Nevada's explanation of this assertion discusses several DOE documents that describe different characteristics of the drip shield interconnection. The differences do not reflect any inconsistency, but only that a drip shield characteristic that is important for one analysis is not necessarily the characteristic that is important for other analyses. The drip shield interlocking connector design diverts water, but is not air-tight.

Nevada does not show that there is any lack of clarity in the License Application regarding the drip shield design. The feature is described in SAR Subsection 1.3.4.7 (SAR at 1.3.4-26 -27) and clearly depicted in SAR Figures 1.3.4-14 (SAR at 1.3.4-89) and 1.3.4-15 (SAR at 1.3.4-91). SAR Figure 1.3.4-14 clearly identifies Drip Shield Connector Plate 1 (top, left), Drip Shield Connector Plate 2 (bottom, left), the Drip Shield Connector Guide on the underside of the Drip Shield Connector Plates, and a mating Drip Shield Connector Guide on the outside of the opposite end of the drip shield. It does not require much imagination to envision this Drip Shield being lowered on the right-hand side of an adjacent Drip Shield, so that its Drip Shield Connector Plates overlap the left-hand side of the adjacent Drip Shield, and its left-hand side Drip Shield Connector Guide is to the left of the right-hand side Drip Shield Connector Guide of the adjacent Drip Shield.

In any event, Nevada does not identify any aspect of the drip shield that would not function as described in the SAR and as reflected in the TSPA. Consequently, Nevada's third assertion also does not provide meaningful support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Finally, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency, since it does not specify any alleged ramifications other than the conclusory assertion that the SAR does not comply with 10 C.F.R. § 63.113. Nothing in this contention shows that there is a genuine dispute about whether the drip shield will fulfill its design functions, and is reflected reasonably in the TSPA. Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, does not satisfy 10 C.F.R. § 2.309(f)(vi), and must be dismissed.

**144. NEV-SAFETY-144 - Drip Shield Failure Mechanisms**

SAR Subsection 2.3.4.5.3.1 and similar subsections do not consider all of the applicable failure mechanisms for the drip shields or provide sufficient design information in order to evaluate all possible failure mechanisms.

**RESPONSE**

This contention alleges that, in “SAR Subsection 2.3.4.5.3.1 and similar subsections,” DOE fails to consider "all of the applicable failure mechanisms for the drip shields," and therefore has not sufficiently evaluated the performance of the EBS. Petition at 762.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada alleges that DOE “failed to consider *all* of the drip shield failure mechanisms that *could* affect performance of the engineered barrier system and the timing and dose to the RMEI.” Petition at 764. On this basis, Nevada concludes that DOE violated a number of NRC regulations applicable to Yucca Mountain, including 10 C.F.R. § 63.113. *Id; see also* Petition at 762-63. To the extent that Nevada is claiming that DOE is required to consider *each and every mechanism* that could *possibly* affect performance of the engineered barrier system, this represents an impermissible collateral attack on the Commission’s regulations. No NRC regulation, nor combination of regulations, including those cited by Nevada in Paragraph 4 of

this contention, requires DOE to conduct such an evaluation. As the Commission has held, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001). Accordingly, Nevada’s contention should be dismissed as outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada does not demonstrate that the issue presented in its contention is material to any finding the NRC must make to authorize construction of the repository. Nevada’s contention is devoid of any qualitative, let alone *quantitative*, discussion of the impact of this alleged deficiency. Nevada neglects to establish how, if DOE had “considered all of the drip shield failure mechanisms,” Petition at 764, it would have resulted in DOE’s performance assessment to estimate an increased dose to the RMEI above regulatory requirements. Instead, Nevada merely asserts, without any support, that the alleged failure mechanisms it presents in its contention “*could* have a considerable impact on the assumed performance of the [EBS],” and “*could* affect performance of the engineered barrier system and the timing and dose to the RMEI.” Petition at 763-64.

Notably, Nevada does not claim that DOE did not consider *any* drip shield failure mechanisms, or challenge that the ones DOE *did* examine were not reasonable. Petition at 763. Accordingly, Nevada’s only objection with DOE’s assessment is that it was limited. In other words, the data DOE used in its failure analysis could have been more robust or accurate. However, as another Licensing Board has held, a petitioner must allege more than simply that

“more accurate input data” could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006). As noted above, Nevada has not done so.

In addition, in its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 762-763. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* at 763. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, (Oconee Nuclear Station), CLI-99-11, 49 NRC at 328, 333 (1999).

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (*U.S. Dep't of Energy* (High-Level Waste Repository: Pre-Application Matters Advisory PAPO Board), LBP-08-10, 67 NRC \_\_\_\_ (slip op. at 7) (June 20, 2008) (Case Management Order), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the Case Management Order focused exclusively on "format" and "procedural matters." *Id.* at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

Also, as stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The method the DOE used in addressing drip shield performance is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a

“reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below, (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada’s Petition attaches several affidavits (by James A. McMaster, Doug F. Hambley, and Michael C. Thorne) that purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada fails to provide *any* references or support for the assertions and conclusory statements provided in this contention, despite the requirement to present “claims rooted in fact,

documents, or expert opinions.” *Yankee Atomic Elec. Co.*, (Yankee Nuclear Power Station), CLI-96-7, 43 NRC 235, 262 (1996) (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel Inc.*, (Mukogee, Oklahoma Site) CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)). Because Nevada cites to not one paper or supporting document, its amalgamation of unsupported assertions amounts to little more than pure speculation by counsel.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s contention regarding DOE’s analysis of mechanisms for possible drip shield failure presents an issue that is neither within the scope of this proceeding nor material. For this reason, and because Nevada fails to consider DOE’s relevant analyses and neglects to establish that its alleged deficiencies would result in increased radiological release or exposure, this contention does not establish a genuine dispute of material fact.

Contrary to Nevada’s assertion, the SAR and underlying reports demonstrate that DOE appropriately considered the relevant failure mechanisms for drip shields, and provided design information sufficient for the purpose of evaluating possible failure mechanisms. These analyses include consideration of potential failure at welded or boundary points on the drip shield, as identified in Nevada’s contention. *See* Petition at 763. SAR Subsection 2.3.4.5, related FEPs, and supporting documentation provide a comprehensive discussion of potential drip shield failure mechanisms.

Specifically, SAR Subsection 2.3.4.5 describes potential drip shield failure mechanisms, the associated failure criteria, the computational approaches for determining failure, and the abstraction of these failure processes into the TSPA. Specific SAR subsections that are relevant to drip shield failure mechanisms, failure criteria, and abstractions for TSPA are as follows:

- SAR Subsection 2.3.4.5.1.1 provides general design information for the drip shield based on engineering drawings.
- SAR Subsection 2.3.4.5.1.2 summarizes the potential failure mechanisms for EBS features. Mechanisms 3, 6, and 7 listed in that section regard buckling of the drip shield side walls, tearing/rupture of the drip shield plates, separation of adjacent drip shields at welded points as a result of vibratory ground motion, and damage from waste package-to-drip shield impacts. Failures from creep of Titanium components of the drip shield and from nonuniform settlement of the drip shield into the invert have also been considered and evaluated. *See id.* at 2.3.4-118.
- SAR Subsections 2.3.4.5.1.2.2 and 2.3.4.5.1.2.3 provide conceptual descriptions of failure of EBS features through tensile rupture and through buckling/excessive deformation, respectively.
- SAR Subsection 2.3.4.5.1.4.2 describes the model and model uncertainty for tensile rupture, including at boundary points.
- SAR Subsection 2.3.4.5.1.3.6 explains how general corrosion of Titanium is incorporated into the structural analyses.
- SAR Subsection 2.3.4.5.3 describes failure mechanisms and design information specific to drip shields, including the uncertainties in rockfall loads and in structural integrity of the drip shield's welded joints and component thicknesses, which define the fragility of

the drip shield. This section also describes the development of the fragility curves for the drip shield framework and drip shield plates as a function of ground motion level and component thickness. The failure mode for the framework is buckling of the sidewalls and the failure mode for the plates is tensile rupture. These fragility curves directly incorporate the uncertainties in rockfall loads and structural condition into TSPA.

- SAR Subsection 2.3.4.5.2.2 summarizes structural analyses of potential damage to the drip shield resulting from the static rubble load, from the dynamic amplification of the rubble load during vibratory ground motion, and from rockfall impacts to the drip shield.
- SAR Subsection 2.3.4.5.3.1 describes the technical approach to evaluating impacts of waste packages on drip shields.

In addition, DOE describes and evaluates drip shield failure mechanisms in the following

FEPs:

- FEP 2.1.03.01.0B – General Corrosion of Drip Shields
- FEP 2.1.03.02.0B – Stress Corrosion Cracking of Drip Shields
- FEP 2.1.03.03.0B – Localized Corrosion of Drip Shields
- FEP 2.1.03.04.0B – Hydride Cracking of Drip Shields
- FEP 2.1.03.05.0B – Microbially Induced Corrosion of Drip Shields
- FEP 2.1.03.07.0B – Mechanical Impact on Drip Shield
- FEP 2.1.03.08.0B – Early Failure of Drip Shields
- FEP 2.1.03.11.0A – Physical Form of Waste Package and Drip Shield
- FEP 2.1.06.06.0B – Oxygen Embrittlement of Drip Shields
- FEP 2.1.06.07.0A – Chemical Effects at EBS Component Interfaces
- FEP 2.1.06.07.0B – Mechanical Effects at EBS Component Interfaces

- FEP 2.1.07.01.0A – Rockfall
- FEP 2.1.07.04.0B – Hydrostatic Pressure on Drip Shield
- FEP 2.1.07.05.0B – Creep of Metallic Materials In the Drip Shield
- FEP 2.1.09.28.0B – Localized Corrosion on Drip Shield Surface Due to Deliquescence
- FEP 2.1.11.06.0B – Thermal Sensitization of Drip Shields
- FEP 2.1.11.07.0A – Thermal Expansion/Stress of In-Drift EBS Components
- FEP 2.1.13.02.0A – Radiation Damage in EBS

*See* “Features, Events, and Processes for the Total System Performance Assessment: Analyses,” ((Mar. 6, 2008) LSN# DEN001584824 at 2.2-155 to -156 (Table 2.2-2)).

General design information for the drip shield is contained in SAR Subsection 2.3.4.5.1.1 and, contrary to the contention’s assertion, is sufficient for purposes of evaluating possible failure mechanisms. As described in that section, the main structural (load bearing) element of the drip shield is a simple framework whose bulkheads and support beams will be manufactured of Titanium Grade 29 (UNS R56404). *See* SAR at 2.3.4-115. Drip shield plates are placed continuously over the bulkheads and the support beams, and are manufactured of Titanium Grade 7. *See id.* The plates provide the ultimate functionality of the structure to prevent (1) dripping of water from the drift roof and walls onto the waste packages; and (2) impacts of loose rock blocks from the drift roof and the walls directly onto the waste packages. *Id.* This design information provides adequate information for evaluating the failure modes of the drip shield in TSPA.

The probability of failure of the drip shield in TSPA is defined by fragility curves for buckling of the sidewalls of the drip shield or tensile rupture of the drip shield plates. SAR at 2.3.4-162. A key input to the fragility calculations is the plastic load capacity of the structure,

discussed in SAR Subsections 2.3.4.5.3.1 and 2.3.4.5.3.2.3. Plastic load capacity is a random variable that represents the uncertainty in rockfall loads on the drip shield and the uncertainty in the integrity of the drip shield and its welds. *Id.* at 2.3.4-160 to 161.

The SAR anticipates that the boundary conditions on the drip shield plate are a source of uncertainty in defining plastic load capacity. SAR at 2.3.4-154. The rockfall loads on the plates may be nonuniform, producing an asymmetric response between the sides of the plate. The welds between the plates and the underlying framework may also constrain displacement and rotation of the plates to varying degrees. The resulting response of a plate may not match typical boundary conditions, such as fixed or simply supported, because of these effects. Accordingly, the range of potential boundary conditions is represented by considering two options that envelope the extremes of the response: (1) a plate that is fixed to maximize the load-bearing capacity, and (2) a plate that is free to move laterally, which tends to minimize the load-bearing capacity. *See id.*

A similar approach is used to define the plastic load capacity of the drip shield framework, based on two nonuniform rockfall load patterns, as described in SAR Subsection 2.3.4.5.3.2.1 and supporting documentation.

The above approach is consistent with 10 C.F.R. § 63.114, as required by 10 C.F.R. § 63.113, because: (1) the design of the engineered barrier system has been used to define parameters and conceptual models for TSPA (per 63.114(a)); (2) uncertainties and variabilities are accounted for in the parameter values (per 63.114(b)); (3) alternative failure mechanisms have been considered (per 63.114(c)); (4) the detailed technical basis for either inclusion or exclusion of specific failure mechanisms from TSPA has been documented (per 63.114(e)); and (5) degradation of EBS features is represented in the abstractions (per 63.114(f)). Accordingly,

Nevada completely ignores the relevant portions of the Application and fails to explain how DOE has failed to comply with applicable regulations. In short, this contention is inadmissible because “the Petitioner’s assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[].” *Dominion Nuclear Conn., Inc.*, (Millstone Nuclear Power Station, Units 2 and 3), LBP-04-15, 60 NRC 81, 95 (2004) *aff’d*, CLI-04-6, 60 NRC 631 (2004).

As discussed above and in the applicable Legal Standards section, this contention alleges potential errors, omissions, and alternative approaches -- without specifying the ramifications or results of such alleged deficiencies. Nevada’s language at Paragraph 6 essentially admits that it does not know whether this contention is material, and attempts to shift the burden to DOE to demonstrate that its contention is *not* material, contrary to the requirements of 10 C.F.R. § 2.309(f)(1)(vi). *See* Petition at 764; *see also Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). For this and the aforementioned reasons, this contention does not establish a genuine dispute of a material issue and therefore must be dismissed.

**145. NEV-SAFETY-145 - Drip Shield Specifications**

SAR Subsections 1.3.4.7.8 and 1.3.2, and Table 1.3.2-5, and similar subsections, list design codes and standards presumed applicable to the design and fabrication of the drip shield, but include specifications that are not appropriate or relevant and omit specifications necessary to the unique requirements to fabrication of drip shields from titanium such that they will meet the assumptions used in the TSPA for this "important to waste isolation" component of the engineered barrier system.

**RESPONSE**

This contention asserts that design codes and standards referenced in SAR Subsections 1.3.4.7.8 (SAR at 1.3.4-32) and 1.3.2 (SAR at 1.3.2-1 through 1.3.2-56), and Table 1.3.2-5 (SAR at 1.3.2-42-43) and similar subsections, include specifications that are not appropriate or relevant and omit specifications necessary to fabrication of drip shields to meet the assumptions used in the TSPA.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not demonstrate that the alleged citation to design codes and standards that are not appropriate or relevant would affect compliance with a regulatory requirement, safety or waste isolation. It also does not demonstrate that there is any regulatory requirement to include drip shield fabrication specifications in the LA, or that the omission of such information could affect compliance with any regulatory limit.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 765-66. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” *Id.* at 766. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

Nevada asserts that this contention alleges non-compliance with 10 CFR §§ 63.31(a), 63.21, 63.102(h), 63.113 and 63.115. Petition at 765-66. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, Nevada has failed to demonstrate that this contention fails to raises an issue that is material to the findings that the NRC must make in this proceeding, and, thus, this contention must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE’s

supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by James A. McMaster and Doug F Hambley), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Paragraph 5 of this contention asserts that: (1) SAR Table 1.3.2-5 and other, unspecified places in the SAR reference non-applicable nuclear codes and provide inadequate process or quality guidelines (Petition at 766-8); (2) DOE's Engineering Specification for Prototype Drip Shield, and the conceptual drawing do not provide adequate fabrication guidelines and acceptance criteria (Id. at 768-69); and (3) with no design details it is difficult to assess whether the WDS will continue to function after a rockfall (Id. at 769).

Nevada's first assertion appears to be based on an incomplete review of SAR Table 1.3.2-5 (SAR 1.3.2-42 and 1.3.2-43). Nevada declares that "The LA should be specific as to just what sections of the ASME Code it is relying on." Petition at 768. SAR Table 1.3.2-5 contains just such information, and additional details. For example, a representative row of SAR Table 1.3.2-5 includes the following code description: "2001 ASME Boiler and Pressure Vessel Code (including 2002 addenda) (ASME 2001, Section II, Part D, Table TE-5)." This entry specifies the section, and also detail about the place within that section. In addition the column for "Applicability" indicates how the code was applied to a particular subsurface component, such as "Drip shield Titanium Grade 7-Mean Coefficient of Thermal Expansion." Thus, the

applicability is clear. Nevada has not explained what codes it believes to be non-applicable, and thus does not support that assertion.

In discussing this assertion, Nevada mentions various quality control considerations that it contends are required to be included in the LA, but Nevada does not cite any regulation that requires such information to be included in the LA. Moreover, as shown below, the DOE specification Nevada cites in this contention is part of DOE's process to develop appropriate drip shield fabrication and welding requirements. Consequently, Nevada's list of potential welding procedure quality control provisions does not provide any support for this assertion.

Nevada's second assertion is that there are insufficient details in DOE's "Specification Cover Sheet & Yucca Mountain Project Engineering Specification for Prototype Drip Shield & Drip Shield Fabrication Specification; 000-3SS-SSE0-00100-000-00Bb," and related drawings. Petition at 768. That specification is not referenced in the SAR subsections cited in this contention, and Nevada does not claim that it, or the drawings Nevada also references, are in any way inconsistent with the SAR subsections cited in this contention. Thus, Nevada's comments regarding the specification and drawings do not provide support for this contention.

In addition, Nevada's comments about the DOE specification and other design documents are also wrong; the specification includes numerous detailed quality requirements, including materials and material controls, dimensions, non-destructive examination, etc. *See* LSN#: DN2002362768 at 10-13, 20-22. Moreover, although Nevada correctly quotes the title of the specification, it appears not to have recognized that a specification for a prototype is not the same as one for production of drip shields for use in the repository. The specification states:

Some of the early Drip Shields to be fabricated will be prototypes. The prototype Drip Shield is intended to be used for testing such as verifying the interlock feature. In the future, actual Drip Shields will be fabricated and placed within drifts at the Yucca Mountain

facility. All such activities will be in accord with the technical and quality requirements of this document and any improvements discovered during the prototyping efforts. Improvement is part of the reason for a prototyping program.

LSN#: DN2002362768 at 4, Section 1.2 “Project Summary.” Nevada does not explain how a drip shield that will be used only for testing can affect safety, or why it would be unreasonable for DOE to seek to benefit from the experience of the contractor retained to fabricate the prototype in developing the detailed procedures. Since this specification is only for a prototype that will not be used in the repository, Nevada’s second assertion does not provide adequate support for this contention.

Nevada’s third, and final assertion is that it is difficult to assess how the drip shield will function if subjected to a rockfall. Petition at 769. The LA discusses this subject in detail in SAR Subsection 2.3.4, including analysis of the rockfall characteristics in SAR Subsection 2.3.4.4 “Rockfall Analysis” (SAR at 2.3.4-51 to -108) and the effects on the EBS features in SAR Subsection 2.3.4.5 “Structural Response of EBS Features to Mechanical Degradation” (SAR at 2.3.4-108 to -191). The latter subsection includes SAR Subsection 2.3.4.5.3 “Drip Shield Fragility,” (SAR at 2.3.4-160 to -171). These portions of the SAR specifically discuss the very subject Nevada raises. In discussing this assertion, however, Nevada does not refer to these relevant portions of the LA, and does not challenge any statement in them. Thus, this third Nevada assertion also does not provide adequate support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Finally, as discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore,

inadmissible. This contention suffers from this deficiency, since it does not specify any alleged ramifications other than the conclusory assertion that the SAR does not comply with 10 C.F.R. § 63.113. Consequently, this contention does not establish that there is a genuine dispute on a material issue of fact or law, and does not satisfy 10 C.F.R. § 2.309(f)(vi).

**146. NEV-SAFETY-146 - Reliance On Preliminary Or Conceptual Design Information**

Legal Issue: The LA cannot be granted because it relies on preliminary or conceptual design information for both preclosure and postclosure aspects.

**RESPONSE**

This contention—recycled from a prior pleading, as explained below—argues that the Application is incomplete because it “relies on preliminary or conceptual design information for both preclosure and postclosure aspects.” Petition at 770. In Nevada’s view, 10 C.F.R. Part 63 requires “an essentially one-step licensing process in which the final design must be submitted and approved before construction authorization may be issued.” *Id.* This contention is inadmissible because it fails to specify the information allegedly missing from the Application; impermissibly challenges 10 C.F.R. Part 63; lacks adequate factual support; and creates no genuine dispute on a material issue of law or fact regarding the completeness of the Application’s design information.

**a. Statement of Issue of Law or Fact to be Controverted**

The Licensing Board must dismiss this contention because the one-line statement of the contention fails to provide a specific statement of the issue of law or fact to be raised or controverted. Although Nevada asserts that this contention raises a single issue of law, it in fact raises numerous challenges to the sufficiency of the Application’s compliance with 10 C.F.R. Part 63, as well as the NRC’s Staff’s underlying sufficiency determination that resulted in docketing of the application. Indeed, as the contention acknowledges, it “challenges the legal sufficiency of DOE’s description of its pre- and postclosure designs in *all pages* of SAR Subsections 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.7, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.5, 1.3.6, 1.4.1, 1.4.2, 1.4.3, 1.4.4, 1.5.2 1.9, 2.1.2.2, and related sections.” *Id.* at 771 (emphasis added).

This is yet another attempt by Nevada to challenge the sufficiency of the application, as it refers the reader to the “specific examples of deficiencies” in its July 21, 2008, pleading seeking to reject docking of the Application. *Id.* The cited examples, however, do not even remotely touch upon the numerous SAR sections cited here. As such, this contention violates 10 C.F.R. § 2.309(f)(1)(i).

Furthermore, this contention runs afoul of the Case Management Order governing this proceeding, which requires that petitioners raise a “narrow, single-issue [contention].” *U.S. Dep’t of Energy* (High Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 6) (June 20, 2008). In issuing the Case Management Order, the Advisory PAPO Board stated that “contentions should be sufficiently specific as to define the relevant issues for eventual rulings on the merits, and not require the parties or licensing boards to devote substantial resources to narrow or to clarify them.” *Id.* To adjudicate this contention, however, the parties and Licensing Board would need to ferret out and define each and every unspecified design detail that Nevada believes is unavailable, and evaluate whether its unavailability is material to the NRC’s findings under Part 63, resulting in inefficiency and expenditure of resources. Such an outcome is antithetical to and undermines the purpose of the Case Management Order.

The Commission has explained that a contention must be “reasonably specific.” *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328 (1999). In *Duke Energy*, a Licensing Board rejected a contention that the application was incomplete, based on the NRC Staff’s having issued a large number of requests for additional information. In affirming, the Commission stated that:

Petitioners seeking to litigate contentions must do more than attach a list of RAIs and declare an application “incomplete.” It is their job to review the application and to identify *what* deficiencies exist and to explain *why* the deficiencies raise material safety concerns.

*Id.* at 337 (emphasis added); *see also Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3), LBP-08-13, 68 NRC \_\_ (slip op. July 31, 2008) (denying contention, which challenged Staff’s docketing decision, “as too broad and that [Petitioner] must deal with each ‘deficiency’ in the [Application] in a separate, specific, and well-supported contention”). Similarly, this contention constitutes a generalized claim that the Application lacks required information, which does not cite the specific regulatory requirements at issue or the information allegedly omitted. Accordingly, the Licensing Board must dismiss it.

**b. Brief Explanation of Basis**

As explained above, the cited basis supporting this contention is impermissibly vague and lacking specificity. To merely state that “[p]reliminary and conceptual design information of the type found in the LA is not final design information,” Petition at 770, without some reasonable level of explanation or supporting detail is not adequate to support admitting a contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is also outside the scope of the proceeding because it impermissibly challenges the regulations set forth in Part 63 and advocates a stricter requirement than NRC rules impose. Contrary to Nevada’s allegations, Part 63 does *not* require that “the final design must be submitted . . . before a construction authorization may be issued.” Petition at 770. Rather, Part 63 requires only that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a). This provision, by itself, demonstrates that final design information is not required if it is not reasonably available at the time of docketing.

The NRC Staff has also stated that the regulations setting forth the NRC’s fundamental safety findings—10 C.F.R. § 63.31(a)(1) and (a)(2)—do not require DOE to submit final design information. According to the NRC Staff, these “regulations do not require DOE to fully describe all design aspects before the Commission may give a construction authorization, so long as DOE provides *sufficient* information about the design aspects that are most important to radiological safety.” NRC Staff Response Opposing Nevada’s June 4, 2008 Petition at 8 (June 16, 2008) (emphasis added) (NRC Staff Response); *see also id.* (noting that the Commission “has not established a level of detail or prescribed a percentage of compliance for safe operation”). The Application meets this standard and Nevada has not proven otherwise.

NRC Chairman Dale E. Klein also addressed this issue in Congressional correspondence. In a letter dated March 11, 2008, Chairman Klein explained to Senator Barbara Boxer that “[p]ercent completion of the total design is not a valid indicator of the sufficiency of the safety information contained in an application.” Letter from NRC Chairman Dale E. Klein to Senator Barbara Boxer, Chairman of the Senate Committee on Environment and Public Works, Mar. 11, 2008, *available at* ADAMS Accession No. ML080380182. He further stated that the NRC Staff’s first step would be to determine if the Application contained all of the information required by the Commission’s regulations and he assured the senator that the NRC would not begin its review unless the Application contained sufficient information to evaluate the proposed repository’s safety. *Id.*

Together, the regulations and Commission statements confirm that DOE’s application need not contain final design information. To the extent that Nevada asserts that all final design information must be provided at the time of docketing, Nevada impermissibly challenges the regulations, contrary to 10 C.F.R. § 2.335.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

The Licensing Board should also dismiss this contention because Petitioner has failed to demonstrate that the issue raised in the contention is material to the findings that the NRC must make in this proceeding. Before it grants a construction authorization, the NRC must make a safety finding that (1) there is reasonable assurance that the types and amounts of radioactive materials described in the application can be received and possessed without unreasonable risk to public health and safety; and (2) there is reasonable expectation that the materials can be disposed of without unreasonable risk to public health and safety. 10 C.F.R. § 63.31(a)(1-2).

The issue raised in this contention is not material because, as explained above, Part 63 does not require that the NRC make any findings about whether the Application provides final design information. In this regard, Petitioner has misinterpreted the underlying regulatory requirement. Thus, this proposed contention fails to demonstrate that resolving this contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The Licensing Board must reject this contention because it is not supported by adequate factual information or expert opinion. In an obvious attempt to sidestep this precondition for admissibility, Nevada claims that “[t]his contention raises a purely legal question, and supporting facts and opinions are not necessary beyond those discussed below.” Petition at 771. However, “as discussed below” in Section 6 of the contention, Nevada argues that the description of the pre- and postclosure designs in more than twenty subsections of the LA is insufficient. The purported inadequacy of such design-related information does not raise a “purely legal” question,

however, and Nevada has not supported its design-related claims with any facts or expert opinion. On this basis as well, the Licensing Board must reject the contention.

Petitioner also does not cite any legal authorities or expert opinion to support its allegation that Part 63 requires DOE to provide all final design information in its initial Application. Nevada solely relies upon vague references to the “history [of 10 C.F.R. Part 63] and contemporaneous NRC and DOE interpretations[.]” Petition at 770. Nevada, however, does not actually discuss the “history” of 10 C.F.R. Part 63 or “contemporaneous NRC and DOE interpretations,” nor does it provide any citation to these authorities. The Licensing Board should not make assumptions of fact that favor the petitioner or supply information that is lacking. *See Ariz. Pub. Serv. Co.* (Palo Verde Nuclear Generating Station, Unit Nos. 1, 2 and 3), CLI-91-12, 34 NRC 149, 155 (1991). Again, such generalities, unsupported by fact, do not suffice for purposes of admissibility in this proceeding.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For yet another reason, the Licensing Board must reject this contention. It fails to raise a genuine dispute on a material issue of law or fact. Significantly, except for a brief mention of the TAD—“there is no final TAD design”—this contention does not identify *any* alleged inadequate design information. Petition at 771. Although the contention states that it challenges all of the pages in a long list of SAR subsections, it does not identify *any* required information that is missing from the LA.

The contention further suggests that “[s]pecific examples of deficiencies are offered in Nevada’s July 21, 2008 Supplement to its June 4, 2008 Petition Asking the NRC to Reject DOE’s Yucca Mountain License Application as Unauthorized and Substantially Incomplete” *id.* but does not elaborate on these alleged deficiencies. The Commission has previously cautioned

against generalized claims followed by citations of earlier briefs: “The Commission should not be expected to sift unaided through large swaths of earlier briefs . . . in order to piece together and discern the intervenors’ particular concerns or the grounds for their claims.” *Hydro Res., Inc.* (P.O. Box 15910 Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 46 (2001).

In any case, to the extent such claims are asserted in that prior pleading, they were fully addressed in DOE’s Response to the State of Nevada’s Supplemental Pre-Docketing Petition To Reject The Yucca Mountain License Application at 6–10 (July 31, 2008). There, DOE addressed Nevada’s assertion that the NRC should reject the Application before the Staff made its docketing decision because the Application allegedly lacked information regarding (1) the transportation and emplacement vehicle (TEV) and (2) the multi-canister overpack (MCO).

DOE's Response stated as follows:

1. *The LA Contains Sufficient Information Concerning the Transportation and Emplacement Vehicle*

Contrary to Nevada’s assertion, that the “codes and standards and design requirements for the critically important TEV . . . necessary to ensure safety do not exist,” the LA details the applicable codes and standards and design requirements in [SAR] Section 1.3.3.5, which total approximately 20 pages of text, plus figures. In [SAR] Sections 1.6, 1.7, and 1.9 of the LA, DOE has analyzed and identified potential hazards, and developed relevant master logic diagrams and fault trees to assess what aspects of the TEV are important to safety. Based upon the foregoing analyses, DOE has been able to assess the design bases and design criteria important to safety related to the equipment. Final design of the equipment will occur in the future and it will need to be verified that it is in conformance with the design bases and design criteria specified in the LA. Accordingly, Nevada’s claim regarding the TEV provides no basis for rejecting the LA or terminating the NRC Staff’s docketing review.<sup>83</sup>

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83 Nevada also raises concerns about the TEV in NEV-SAFETY-132, alleging that the Application fails to include sufficient detail. That contention should be dismissed for the reasons provided in DOE’s response to

## *2. The LA Contains Sufficient Information Concerning the Multi-Canister Overpack*

For the MCO, Nevada mischaracterizes DOE's position with respect to these containers in the LA. Nevada asserts that "the design detail, event sequence, and reliability analysis needed to determine the nuclear safety design basis" for the MCO have not been completed and therefore, NRC cannot make the required safety determination in accordance with 10 C.F.R. § 63.31(a)(3)(i) and (ii). DOE's LA, however, makes it clear that DOE does not seek any safety determination from the NRC on the use of the MCO based on the analyses described in the LA. As discussed in [SAR] Section 1.5.1, page 1.5.1-1, "[t]he MCO is included in this section to provide a description of the analyses that have been completed and to demonstrate the intent of DOE to complete the above analyses and include DOE SNF in MCOs in future licensed operations of the repository." DOE further acknowledges the need to "obtain authorization to receive DOE SNF in MCOs once the safety analyses are completed." Therefore, DOE does not currently request that the NRC make a preclosure operations safety determination on the use of the MCO based on the LA. Accordingly, Nevada's claim regarding the MCO provides no basis for rejecting the LA or terminating the NRC Staff's docketing review.

DOE's Response to the State of Nevada's Supplemental Pre-Docketing Petition to Reject the Yucca Mountain License Application at 8-10 (July 31, 2008) (internal citations omitted).

Accordingly, the purported "deficiencies" identified in Nevada's July 2008 Supplement to its Petition to reject the Application create no genuine dispute on a material issue of law or fact.

Furthermore, there is no validity or basis for the assertion that the Application is deficient because it allegedly lacks final design information on the TAD. As discussed above in detail, final design information is not required if it is not reasonably available at the time of docketing. Additionally, using the TAD as an example, because it is the only one Nevada even remotely

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NEV-SAFETY-132. This contention (NEV-SAFETY-146) should also be rejected for the reasons set forth in response to NEV-SAFETY-132.

identifies, the following briefly demonstrates that the level of information contained in the Application is entirely consistent with NRC regulations.

The regulations specify that the SAR must include a “description and discussion of the design of the various components of the [GROA] and the engineered barrier system,” including the “design bases and their relationship to the design criteria.” 10 C.F.R. § 63.21(c)(3)(iii). The engineered barrier system includes the TAD. *See* SAR § 2.1.1.2 and Table 2.1-1 at page 2.1-115.

To satisfy these regulations, the SAR provides an extensive, specific, and detailed description of the TAD design that meets regulatory requirements:

- Table 1.5.1-7 of the SAR provides the preclosure nuclear safety design bases with the TAD design criteria, as specified in 10 C.F.R. § 63.21(c)(3). SAR at 1.5.1-102 to -108.
- The SAR subsection 1.5.1.1.1.2.1.3 states that the safety functions for the TAD canisters include (1) providing containment and (2) reducing the frequency of criticality. SAR at 1.5.1-13.
- The detailed description of the TAD design includes general characteristics, relevant operational processes, thermal controls, criticality controls, shielding and structural requirements. SAR at 1.5.1-14 to -17.
- For criticality control, the SAR subsection 1.5.1.1.1.2.2.2 provides specific dimensions, composition, and analytical requirements for TAD internals. SAR at 1.5.1-16 to -17.
- The SAR also includes a conceptual representation of a TAD. SAR Figure 1.5.1-5. at 1.5.1-237
- For containment characteristics, SAR subsection 1.5.1.1.1.2.6.1.2 provides a description of the backfilling operation and the final closure weld. SAR at 1.5.1-23

- For dose and shielding characteristics, SAR subsection 1.5.1.1.1.2.6.4 addresses source terms and dose rate design objectives. SAR at 1.5.1-24
- The SAR subsection 1.5.1.1.1.2.8 identifies over one dozen design codes and standards that the TAD “shall” meet. SAR at 1.5.1-25 to -26.

Put simply, before it issues a construction authorization, the NRC must make the safety findings set forth in 10 C.F.R. § 63.31(a)(1) and (a)(2). This contention offers no explanation of how the information set forth in the Application regarding TAD or other design information is insufficient for the NRC to make these required findings. Accordingly, this contention fails to demonstrate that there is a genuine dispute on a material issue of law or fact relating to TAD design, or more generally to the completeness of the Application’s design information. For these, and all of the reasons set forth above, this contention must be rejected.

**147. NEV-SAFETY-147 - Evaluation Of Data Used In Drip Shield Failure Probability**

SAR Subsection 2.3.6.8.4.3.2.4 and similar subsections, which give an estimate for the occurrence that a drip shield is improperly installed in the repository, fail to provide an appropriate technical basis for parameter ranges and probability distributions used in the performance assessment due to the use of inappropriate data.

**RESPONSE**

This contention argues that Subsection 2.3.6.8.4.3.2.4, and similar subsections, which estimates the occurrence of a drip shield being improperly installed in the repository, uses inappropriate data for the relevant human error probabilities.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies a number of regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that this contention alleges noncompliance with these regulatory provisions and

therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there

is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

The contention asserts that DOE has erred in its estimate of the occurrence of a drip shield being improperly installed in the repository because it uses inappropriate data for the relevant human error probabilities. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3, above, discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Michael C. Thorne and Douglas F. Hambley) (Thorn Affidavit at 1; Hambley Affidavit at 1), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes DOE for using certain human reliability data from "Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications Final Report", NUREG/CR-1278 (1983), LSN# DN2002064865, and "Savannah River Site Human Error Data Base Development for Nonreactor Nuclear Facilities (U)" (02/28/1994), (LSN# DEN001584210). Based on this allegation, Nevada claims that the overall error in the assessed frequency of improper drip shield installation "could be several orders of magnitude." Petition at 776-77. For several reasons, this contention does not establish a genuine dispute of material fact.

First, while the contention alleges that the human error probabilities (HEPs) used do not relate closely to the activities involved, Nevada does not point to any HEPs that relate more closely to the drip shield installation activities. The contention cites as its only example, inspection of the connection between two drip shields by video camera observation being represented by a HEP entitled, “Error of commission of check reading analog meter with difficult to *see* limit marks, such as scribe lines.” Petition at 867. In DOE’s analysis, this second of the four initiating events for improper installation of the drip shield is described as, “Detection of misplacement on camera” (“Analysis of Mechanisms for Early Waste Package/Drip Shield Failure” (06/2007), LSN# DN2002451287, Figure B-22).

Contrary to Nevada’s assertion, use of the analog meter check reading HEP is appropriate as an analytical representation of the probability of failure to detect drip shield misalignment through inspection with the camera. Interpretation of the display resulting from a camera inspection for the drip shield connections can be modeled by an operator monitoring a visual display on which the view of correctly-connected drip shields is the normal condition. Failure of this inspection occurs when the operator fails to note a deviant condition on the display (i.e., incorrectly connected drip shields); thus classifying this error as an error of commission is appropriate. Moreover, monitoring the analog visual display for deviant conditions is similar to monitoring an analog meter or chart recorder for a reading within acceptable limits, because no quantitative information is recorded, and because the operator will examine more closely any apparent deviation from the normal condition (i.e., gaps, unexpected view of components of a drip shield that should be occluded from view, etc.). DOE Response to RAI 3.2.2.1.2.2-008, Jan. 16, 2009. Furthermore, the design of the drip shield sections, as described in SAR 1.3.4.7.1, is such that any misalignment will be readily apparent to the operator through the camera. If the

drip shields are placed too far apart, the connector guide would be visible, whereas if the shields are placed too close together, the overlying drip shield would be improperly elevated by at least 65 mm (SAR at 1.3.4-46 (Table 1.3.4-3)), which would be large enough to be obvious to the operator. Thus, “check-reading of an analog display” is an appropriate model for the probability of human error in the inspection process during drip shield installation.

Second, the contention does not properly characterize the license application. The contention states that the HEPs used as inputs to the drip shield failure analysis “have not been demonstrated to be relevant to the proposed application.” Petition at 776. Contrary to Nevada’s allegation, all four of the HEPs were developed for estimating human errors associated with operations at nuclear facilities and were determined to be relevant to activities that will occur at Yucca Mountain. The sources of data for the HEPs are an NRC guidance document (“Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications Final Report,” NUREG/CR-1278 (1983), LSN# DN2002064865 and a Savannah River Site study of human error (“Savannah River Site Human Error Data Base Development for Nonreactor Nuclear Facilities (U)” (02/28/1994), LSN# DEN001584210). The data in NUREG/CR-1278 is “applicable to, and has been used in evaluating human reliability in other large process plants, *e.g.*, chemical plants, oil refineries, off-shore oil production, and other power-generating plants” NUREG/CR-1278 (LSN# DN2002064865) at 2-1. The Savannah River study was conducted to develop a human error data base for nonreactor nuclear facilities. Therefore, the HEPs are applicable to nuclear facilities, including nonreactor facilities such as the repository.

In addition, Nevada quotes a paragraph from DOE’s analysis in support of its allegation that DOE failed to adapt the data to the specific conditions at Yucca Mountain. On the contrary, the quoted DOE paragraph does not reflect a failure to adapt the data to specific conditions at

Yucca Mountain. In fact, this very paragraph provides DOE's explanation that it would have been inappropriate to use performance-shaping factors to alter the nominal HEPs to account for specific design and operational factors because the drip shield installation procedures and equipment have not yet been precisely identified.

Third, while the contention claims that the human error probabilities (HEPs) used do not relate closely to the activities involved, the contention does not allege that use of unidentified HEPs that supposedly relate more closely to the drip shield installation activities would have the effect of increasing the rate or extent of degradation of the Engineered Barrier System (EBS). The contention does not allege, much less provide support for an allegation that DOE's estimates of EBS degradation are not conservative or do not bound the rate or extent of degradation that would be estimated if Nevada's approach were adopted. Therefore, the contention does not establish a genuine dispute of material fact. *See* Section V.A.3 above.

Fourth, from a risk-informed perspective, waste package and drip shield early failure is a minor contributor to the calculated mean annual dose, so that even if alternative HEPs that are significantly higher are assumed, their use is unlikely to materially impact the final dose results. As discussed in SAR Section 2.4.2.2.1.2, mean annual doses calculated for both the 10,000-year and the post-10,000-year time periods are dominated by releases from the seismic ground motion and igneous intrusion modeling cases. Mean annual doses from the drip shield early failure and volcanic eruption cases are least important to the total mean annual dose and comprise on the order of 0.1% or less of the total mean annual dose in the first 10,000 years and on the order of 0.01% or less of the total mean annual dose in the post-10,000-year period. Therefore, the contention does not establish a genuine dispute of material fact.

Fifth, as discussed in the applicable Legal Standards section above in Section V.A.3, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. The contention also suffers from this deficiency. Specifically, Nevada states that, “the overall error in the assessed frequency of improper drip shield installation *could be several orders of magnitude.*” Petition at 776 (emphasis added). This statement is pure speculation, with no scientific basis in fact, analysis, or expert support. Nevada’s failure to directly and specifically challenge the calculated frequency of improper drip shield installation renders the contention inadmissible based on the lack of a genuine dispute of material fact. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 93-94 (2003), *aff’d*, CLI-03-14, 58 NRC 207 (2003).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” (Petition at 96) Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact.  
Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**148. NEV-SAFETY-148 - Evaluation Of Computational Procedure Used In Drip Shield Failure Probability**

SAR Subsection 2.3.6.8.4.3.2.4 and similar subsections, which give an estimate for the occurrence that a drip shield is improperly installed in the repository, fail to provide an appropriate technical basis for parameter ranges and probability distributions used in the performance assessment due to manipulation of the underlying human reliability data by use of an inappropriate computational procedure.

**RESPONSE**

This contention asserts that the estimate that a drip shield is improperly installed in the repository, as documented in SAR Subsection 2.3.6.8.4.3.2.4, uses an inappropriate computational procedure. Nevada claims that this results in an underestimation of the frequency of improper drip shield installation, which “directly impacts estimates of the numbers of early waste package failures and hence the overall results from the performance assessment.” Petition at 779, 781-82.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies a number of regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Nevada asserts that DOE has erred in its estimate of the occurrence of a drip shield being improperly installed in the repository because it uses an inappropriate computational procedure.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Michael C. Thorne and Douglas F. Hambley), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada presents no reference which demonstrates, or even remotely suggests, that DOE used an "inappropriate" calculational procedure to estimate the probability that a drip shield is improperly installed. Nevada proffers only one document, a book entitled, *See* "The Psychology of Risk," as ostensible factual support for a single general statement in the contention. "The Psychology of Risk," Glynis M. Breakwell, Cambridge Univ. Press (2007). This book is an overview of the psychology of risk from the perspective of a psychologist who specializes in leadership, identity processes, risk communication, and military cultures. It is not, and does not

purport to be, particularly applicable to the operation of nuclear facilities. The only proposition for which Nevada cites this book is that, “where acts of human volition are involved, it is widely recognized that accidents or failures of performance tend to occur when rules are violated.”

Petition at 780. Because Nevada fails to provide any evidence to overcome the strong presumption that rules will be followed, as explained in f below, this statement is not even applicable. Consequently, Nevada’s citation to “The Psychology of Risk” does not provide any support for this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention asserts that the methodology DOE used to calculate the probability of improper drip shield installation was flawed in that it did not properly account for human error. Based on this allegation, Nevada claims that “DOE has systematically underestimated this frequency.” Petition at 781. For the reasons discussed below, this contention does not establish a genuine dispute of material fact.

First, the contention alleges that one key factor that makes DOE’s approach to the analysis of improper drip shield installation erroneous is that “[i]t assumes that the process malfunction annunciator is operating. If it is not operating then the operator cannot respond to it and the checker cannot recognize that failure to respond.” Petition at 780. This contention neither asserts nor provides any basis for the proposition that annunciator inoperability would have any material effect on the probability of improper drip shield installation. As a licensing board has ruled in another proceeding, the mere fact that a model may not provide completely accurate results, or does not provide an exact representation of the actual conditions, is not a sufficient basis for rejecting the model. The existence of such concerns does not preclude use of a model, provided that the analysis is performed in a conservative manner and margins of safety

exist. *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 and 2), LBP-85-35, 22 NRC 514, 543-44, 550 (1985). See Section V.A.3. above for a more detailed discussion of this principle.

Furthermore, subsequent to Nevada's Petition, and in response to a Request for Additional Information from the NRC, DOE developed an alternate event tree for evaluating the improper emplacement of the drip shield which demonstrates that mechanical or equipment reliability is not significant to the probability of improper drip shield installation. This analysis, which is documented in DOE's response to RAI 3.2.2.1.2.2-008, includes an event sequence that accounts for the possibility that faults in the alarm system (referred to by Nevada as the process malfunction annunciator) may result in improper emplacement of the drip shield. Inclusion of alarm system faults (in addition to mechanical faults in the camera) results in an increase in the probability of drip shield early failure which is three orders of magnitude smaller than the total estimated probability for drip shield early failure, and is therefore insignificant. The analysis and results are or will be reflected in DOE's response to RAI 3.2.2.1.2.2-008, scheduled to be submitted on January 16, 2009.

Second, Nevada's primary basis for its claim that DOE has underestimated the probability of improper drip shield installation is a presumption that DOE's personnel will violate required procedures and circumvent QC measures. Nevada opines that, "there may be a tendency to switch off or ignore such QC measures, or to continue operations when one of the systems is out of operation" and further goes on to speculate that, "if the camera provides ambiguous information then it may cease to be relied upon." Petition at 780. These highly speculative allegations fall far short of the particularized demonstration required to provide a reasonable basis to believe DOE and its personnel would act contrary to its procedures. See

*GPU Corp.* (Oyster Creek Nuclear Generating Station), LBP-96-23, 44 NRC 143, 164 (1996). Assertions that DOE's personnel may violate procedures and circumvent QC measures cannot provide the basis for a contention unless Nevada provides evidence that DOE's workers will ignore or fail to be properly trained on the applicable procedures. *See Private Fuel Storage, LLC*, (Independent Spent Fuel Storage Installation), LBP-00-35, 52 NRC 364, 405-406 (2000). Furthermore, Nevada's argument ignores the fact that "NRC inspections and enforcement action go a long way toward ensuring compliance with our requirements." *GPU Nuclear, Inc.*, (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 207 (2000) (quoting *Louisiana Energy Services, L.P.*, (Claiborne Enrichment Center), CLI-97-15, 294, 306-07 (1997)). Nevada has provided not a scintilla of evidence to overcome the strong presumption that DOE's personnel will comply with the required procedures and controls.

Remarkably, Nevada also claims that, "the very fact that both camera inspection and malfunction annunciator are provided may mean that one of these two sources of information is ignored (*e.g.*, there is no perceived need to look at the camera images because the annunciator will provide an alert as to there being a failure of emplacement)." Petition at 780. In other words, Nevada contends that the very existence of redundant indicators, a fundamental safety measure in the nuclear industry, may lead to DOE's personnel violating operating procedures. Again, Nevada offers no support whatsoever for its conjecture, much less the specific evidence necessary to overcome the presumption that DOE and its personnel will comply with procedures and controls.

Third, as discussed in the applicable Legal Standards section above in Section V.A.3, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine

dispute of material fact or law and are, therefore, inadmissible. The contention also suffers from this infirmity. Specifically, Nevada states that, “the underlying principles are *suspect* and the result is *of little value*.” Petition at 780 (emphasis added). Nevada concludes by stating, “DOE has *systematically underestimated* this frequency.” *Id.* at 781 (emphasis added). These statements are pure speculation, with no scientific basis in fact, analysis, or expert support. Nevada’s failure to directly and specifically challenge the calculated frequency of improper drip shield installation renders the contention inadmissible based on the lack of a genuine dispute of material fact. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), LBP-03-12, 58 NRC 75, 93-94 (2003), *aff’d*, CLI-03-14, 58 NRC 207 (2003).

Fourth, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. Petition at 782. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

Finally, Nevada has not demonstrated that the resolution of this contention would significantly affect any finding the NRC must make to authorize construction. In particular, Nevada is required to demonstrate that the resolution of the issue would prevent the NRC from

finding that there is reasonable expectation that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). In other words, Nevada would have to show that the License Application does not support findings that there is reasonable expectation that the repository will be able to limit radiological exposures and releases as required by 10 C.F.R. § 63.113. Since this contention does not make any such showing, it does not demonstrate that the issue is material.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**149. NEV-SAFETY-149 - Deviations In Design And Waste Emplacement**

Legal issue: In SAR Subsection 2.2.1.2 at 2.2-17, DOE excludes deviations from repository design or errors in HLW emplacement from events considered in the TSPA (FEP 1.1.03.01.0A) on purely legal grounds that are unexplained and erroneous.

**RESPONSE**

This contention claims that DOE improperly excluded FEP 1.1.03.01.0A, “Error in Waste Emplacement,” from consideration in the TSPA on purely legal grounds that it alleges are unexplained and erroneous.

**a. Statement of Issue of Law or Fact to be Controverted**

This contention fails to explain why the exclusion of a FEP on purely legal grounds is incorrect. The Commission requires that a contention “explain, with specificity, particular safety or legal reasons requiring rejection of the contested [application].” *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349, 359-60 (2001).

This contention lacks the specificity required by 10 C.F.R. § 63.309(f)(1)(v) and, therefore, must be rejected.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada asserts that DOE did not comply with regulations regarding compliance with postclosure performance objectives. *See* Petition at 784. Essentially, it alleges that DOE excluded FEP 1.1.03.01.0A, “Error in Waste Emplacement” on “purely legal grounds” that are both “unexplained and erroneous.” Petition at 783-784. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Moreover, Nevada neglects to establish how the alleged deficiency could produce any alternative TSPA results. It fails to provide any qualitative, let alone *quantitative*, results of this alleged deficiency. A petitioner must allege not only that “more accurate input data could be used in applicant’s model, but the use of it “could materially impact the computed outcome.” *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 339-340 (2006).

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 784. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]he issue is therefore material.” Petition at 783. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, (Oconee Nuclear Station), CLI-99-11, 49 NRC at 328, 333 (1999).

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (*U.S. Dep't of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_\_\_ (slip op. at 7) (June 20, 2008) (Case Management Order), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the Case Management Order focused exclusively on "format" and "procedural matters." *Id.* at 3.

Moreover, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing errors in waste emplacement or deviations from design is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses

due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above, (1) the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada fails to provide *any* references or support for the assertions and conclusory statements provided in this contention, despite the requirement to present “claims rooted in fact, documents, or expert opinions.” *Yankee Atomic Elec. Co.*, (Yankee Nuclear Power Station), CLI-96-7, 43 NRC 235, 262 (1996) (referencing 10 C.F.R. § 2.714, the predecessor to 10 C.F.R. § 2.309). A contention “will be ruled inadmissible if the petitioner ‘has offered no tangible information, no experts, no substantive affidavits’, but instead only ‘bare assertions and speculation.’” *Fansteel, Inc.*, (Mukogee, Oklahoma Site) CLI-03-13, 58 NRC 195, 203 (2003) (quoting *Gen. Pub. Utils. Nuclear, Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-06, 51 NRC 193, 208 (2000)).

Accordingly, the statements made in this contention are unsupported assertions of counsel, that fall far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE has already demonstrated that Nevada’s contention regarding DOE’s screening of FEP 1.1.03.01.0A, “Error in Waste Emplacement,” presents an issue that is not material and not adequately supported. For this reason, and because Nevada mischaracterizes the LA and neglects to establish that its alleged deficiencies would result in increased radiological release or exposure, this contention does not establish a genuine dispute of material fact.

First the contention alleges that that FEP 1.1.03.01.0A, “Error in Waste Emplacement,” is excluded from the TSPA on the basis of regulation. Petition at 784. In fact, the FEP is excluded on the basis of low consequence. *See* “Features, Events, and Processes for the Total System Performance Assessment: Analyses,” (LSN# DEN001584824 at 6-39) (Mar. 6, 2008). DOE identified this error in Condition Report 12015 and corrected it in Scientific Analysis/Calculation

Error Resolution Document ANL-WIS-MD-000027 ERD 01, dated May 23, 2008. *See* LSN# DEN001595379. Specifically, the Error Resolution Document identifies the following corrections:

(1) Page 6-39, FEP 1.1.03.01.0A, change the screening decision from "Excluded by Regulation" to "Excluded by Low Consequence."

(2) Page 6-40, FEP 1.1.03.01.0A, change the last sentence from:

In summary, FEP 1.1.03.01.0A (Error in Waste Emplacement) is excluded from the performance assessments conducted to demonstrate compliance with proposed 10 CFR 63.311 and 63.321 (70 FR 53313 [DIRS 178394]), and with 10 CFR 63.331 [DIRS 180319], on the basis of regulation.

to:

In summary, FEP 1.1.03.01.0A (Error in Waste Emplacement) is excluded from the performance assessments conducted to demonstrate compliance with proposed 10 CFR 63.311 and 63.321 (70 FR 53313 [DIRS 178394]), and with 10 CFR 63.331 [DIRS 180319], on the basis of low consequence.

No other changes were required to FEP 1.1.03.01.0A because the rest of the text supports a low consequence screening decision. In addition, the screening decision for this FEP is correctly listed in SAR at 2.2-5 as "Excluded – low consequence." SAR 2.2 at 2.2-212.

Second, Nevada's assertion that the exclusion basis for the subject FEP is "unexplained and erroneous" is simply wrong. To the contrary, the exclusion justification for FEP 1.1.03.01.0A explains that deviations from design or errors in waste emplacement will be of low significance because the quality assurance program and quality control procedures will evaluate and disposition any nonconformances or deviations from design. *See* LSN# DEN001584824 at 6-39. It also directs the reader to excluded FEP 1.1.08.00.0A, "Inadequate Quality Control and Deviations from Design," which contains a more detailed discussion of the exclusion bases. That FEP provides roughly eight single-spaced pages supporting the low-consequence exclusion

of FEPs related to DOE's QA Program. *See* LSN# DEN001584824 at 6-52. Because the allegedly missing information is, in fact, provided, this contention does not raise a genuine dispute. Even if the LA had not contained the allegedly missing information, the contention does not raise a genuine dispute because it fails to explain the consequences of such omissions.

Third, the contention inaccurately portrays the DOE's justification as "the repository will be constructed and operated *exactly* as proposed in the LA." Petition at 784 (emphasis added). To the contrary, DOE explained in its FEP exclusion justification that some deviations or nonconformances are anticipated but that "[t]he regulatory requirements for performance confirmation and quality assurance require that any deviation from design be evaluated for potential impact, and that significant deviations which are detected during the operational period be corrected." LSN# DEN001584824 at 6-39. An imprecise reading such as Nevada's cannot form the basis for a litigable contention. *See Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995).

Nevada also failed to establish a genuine dispute with DOE regarding whether this facility, like others regulated by the NRC, will be constructed and operated as originally designed. In fact, DOE recognizes that some nonconformances or deviations from design may occur, and has established administrative and procedural controls to evaluate and disposition any deviations and ensure that construction and operation of the facility are within analyzed conditions and design bases. LSN# DEN001584824 at 6-53. DOE explains that its QA controls and procedures were developed from those established for Part 50 reactors, which the NRC has found provide reasonable assurance of safety. *See id.* Accordingly, DOE not only agrees with Nevada that decades of nuclear experience have shown that some deviations from design may

occur, but it has drawn on that experience to establish a sound QA Program in accordance with 10 C.F.R. § 63.142.

Finally, this contention does not establish any genuine dispute of material fact because it fails to even suggest that the inclusion of the subject FEP could produce any alternative TSPA results. Nevada fails to suggest either qualitative, or quantitative, results of such inclusion. Moreover, 10 C.F.R. §§ 63.114(e) and (f) – which Nevada cites in its contention – require DOE to provide the technical basis for inclusion or exclusion of a FEP if the dose to the RMEI or release to the accessible environment would be “*significantly* changed” by its omission. *See* 10 C.F.R. § 63.114(e) and (f) (emphasis added). Although DOE provides its low consequence exclusion justification for the subject FEP in multiple pages of supporting documentation, Nevada fails to provide even one sentence of explanation as to how inclusion of this FEP could *significantly* change the outcome of the TSPA, or materially affect the NRC’s findings in this proceeding.

As discussed in Section V.A.3, above, contentions that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. For the aforementioned reasons, this contention does not establish a genuine dispute of material fact and therefore must be dismissed.

### **150. NEV-SAFETY-150 - Basaltic Magma Melting Depth**

SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections, which indicate that the probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year, underestimates that probability, likely by two or more orders of magnitude, because it is assumed incorrectly that melting to produce basaltic magma will be in the shallow lithospheric mantle and not in the deeper asthenosphere.

#### **RESPONSE**

Nevada alleges that DOE underestimates the probability of igneous activity disrupting a repository drift by two or more orders of magnitude because: (1) DOE assumes that basaltic magma will originate in the shallow lithospheric mantle; (2) a shallow lithospheric source for basaltic magma "infers a dwindling supply of new basalt and little chance of future events"; and (3) "published data and interpretations [] indicate that melting to produce basalt [in the vicinity of Yucca Mountain] is in the asthenosphere and not in the lithosphere[,] " which "implies a more active igneous future for Yucca Mountain and a higher probability of igneous activity disrupting repository drifts." Petition at 786. As discussed below, Nevada's argument is not material, lacks appropriate expert support, and fails to raise a genuine issue because, among other things, DOE's assessment of future igneous activity included the possibility that the asthenosphere was the source of basaltic magma.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada sets forth and describes a number of regulations. Petition at 786-87 (citing 10 C.F.R. §§ 63.31(a)(2) and (a)(3), 63.21(c)(9) and (c)(15), 63.113, 63.114, and Subpart E). Nevada concludes its general description of these regulations with the mere assertion that "this contention alleges noncompliance with these provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* at 787. But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ..., " not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (*U.S. Department of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP 08-10, 67 NRC \_\_\_\_ (Slip op. at 7) (June 20, 2008) (Case Management Order) at 7), this direction cannot be read to

dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." Case Management Order at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not "make a difference in the outcome of the licensing proceeding." *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The last paragraph of the contention essentially admits that Nevada does not know whether this contention is material. Petition at 792-93. That paragraph indicates that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *Id.* Since the petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), it is Nevada that must show that its contention raises an issue that is material to this proceeding. In contrast, the last paragraph of the contention essentially argues that DOE must show that Nevada's contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada's Petition does attach several affidavits (Petition Attachments 3 (Dr. Michael Thorne) and 11 (Dr. Eugene Smith)), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, Nevada argues that if the source of basaltic magma in the Yucca Mountain Region is the asthenosphere, then the probability of igneous activity disrupting a repository drift would increase "likely by two or more orders of magnitude." Petition at 792. This statement, which only appears in paragraphs 1 and 6 of the contention, is only adopted by Dr. Thorne. Thorne Affidavit, at 1. Yet Dr. Thorne's adoption of the statement still fails as a valid supporting position because he provides no support for this assertion. He provides no modeling results or evaluations, nor does he state that he performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this 2+ order of magnitude change in probability. Accordingly, the Board must treat Dr. Thorne's conclusory statement as speculation that is inadequate to support admissibility of a contention. Conclusory statements cannot provide "sufficient" support for a contention, simply because they are

proffered by an alleged expert.<sup>84</sup> See *USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board also must dismiss this contention because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact. For background, DOE estimates that the mean annual frequency of a volcanic event disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR at 2.3.11-14 (referencing CRWMS M&O 1996 (PVHA Report) (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

Nevada's entire argument relies on a few sentences in the SAR:

The PVHA experts generally view volcanism in the Yucca Mountain region as a regional-scale phenomenon resulting from melting processes in the upper lithospheric mantle. . . .

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<sup>84</sup> Nevada's conclusion that the probability could change by two or more orders-of-magnitude is presented in six igneous-related contentions. See Petition at 786-822 (NEV-SAFETY-150 to -155). But the claim is made for each contention individually and independently. *Id.* The term "probability" in this context is equivalent to the mean annual frequency of intersection of the repository by an igneous event. PVHA Report at 1-1. DOE assumes that Nevada intended to allege a 2+ order-of-magnitude increase for these six contentions, cumulatively. This is because the mean annual frequency provided in the LA is only  $1.7 \times 10^{-8}$  events/year (SAR at 2.3.11-21), and a 2+ order-of-magnitude increase for each contention, independently, would result in basaltic magma intruding into the repository 10,000 times *each and every* year (12 orders-of-magnitude larger than  $10^{-8}$ ). This clearly has not happened in the past, and could not realistically occur in the future.

Analyses of magmatic processes in the Yucca Mountain region generally indicate that the magnitude of mantle melting has significantly decreased since the middle Miocene. The analyses also suggest that melts in the past few million years were generated within relatively cool ancient lithospheric mantle (compared to asthenospheric mantle), which is a factor that may contribute to the relatively small and decreasing volume of basaltic melt erupted in the Yucca Mountain region since the Miocene period (BSC 2004k, Section 6.3.3).

Petition at 787 (quoting SAR at 2.2-97 and 2.3.11-23). Nevada argues that "[t]hese statements are contrary to published research that clearly points out that melting of lithospheric mantle to produce basalt late in an extensional event, as DOE assumes, is difficult if not impossible." *Id.* at 788. Nevada then lists and discusses scientific articles and papers that purport to support its argument. *Id.* at 788-91. Nevada concludes that "[i]f DOE were to make the correct assumption," that the source of basaltic magma in the Yucca Mountain Region is the asthenosphere, then the mean probability would increase "likely by two or more orders of magnitude." *Id.* at 792.

These arguments and scientific articles do not raise a genuine dispute of material fact or law because Petitioner misreads the SAR, and Petitioner's expert's own published papers acknowledge that his opinion about asthenospheric-origins are in the minority, and that DOE's interpretation is equally valid.

First, Petitioner misreads the SAR. The SAR does not state that DOE's PVHA experts assumed that the lithosphere was the only source of basaltic magma. Rather, it states that the "PVHA experts *generally* view volcanism in the Yucca Mountain region as a regional-scale phenomenon resulting from melting processes in the upper lithospheric mantle." SAR at 2.2-97 (emphasis added). Indeed, there were some experts who specifically discussed the asthenosphere as the possible source of basaltic magma in the Yucca Mountain Region. *See* PVHA Report,

Appendix E, at MK- 2 of 22 (discussion of "volcanic/tectonic setting" in the elicitation interview for Dr. Mel A. Kuntz) ("The low volumes of recent basaltic eruptions and the lack of recent rhyolitic volcanism may be due largely to the fact that both the upper asthenosphere and the entire lithosphere in the [Yucca Mountain] region have been drained of their low-temperature, partial-melting fractions by previous melting events, resulting in an asthenosphere and a lithosphere that are essentially non-fertile with respect to future melting events."); *id* at MS-2 of 22 (discussion of volcanic/tectonic setting in the elicitation interview for Dr. Michael F. Sheridan) ("The basic process leading to volcanism involves generation of a melt from a source zone within the asthenosphere or lower lithosphere and migration of the magma to the surface where it erupts."). If a petitioner alleges that the applicant omits information, but the allegedly missing information is indeed there, then the contention does not raise a genuine issue. *See, e.g., Fla. Power & Light Co. (Turkey Point Plant, Units Nos. 3 & 4), LBP-90-16, 31 NRC 509, 521 n.12 (1990).*

And second, Petitioner's expert acknowledges that his own interpretation is controversial and that DOE's interpretation is valid. Attachment 11 of the Petition includes a list of Petitioner's expert's published papers. In one of those papers, Petitioner's expert states the following about his theory that the asthenosphere will be the origin of future basaltic magma at Yucca Mountain: "We realize that our observations and conclusions are controversial and anticipate that many questions will be asked about both temporal and mantle melting models." Smith, E.I., Keenan, D.L., and Plank, T., "Episodic Volcanism and Hot Mantle: Implications for Volcanic Hazard Studies at the Proposed Nuclear Waste Repository at Yucca Mountain, Nevada, *GSA Today*, (April 2002, v. 12, no. 4) at 7.

In a more recent paper, cited in the Petition at 788, this same expert states that:

Basaltic magmatism beneath the western US derives from the mantle, but considerable uncertainty exists as to the cause and location of mantle melting beneath volcanoes. *There are valid arguments for magma sources in the mantle lithosphere* (the old, cold roots to continents). Equally valid arguments have been made that magma derives from the mantle asthenosphere (the deeper, hot, flowing upper mantle).

Smith, E.I., Conrad, C.P., Plank, T., Tibbetts, A., Keenan, D., “Testing Models for Basaltic Volcanism: Implications For Yucca Mountain, Nevada” American Nuclear Society, Proceedings of the 12th International High-Level Radioactive Waste Management Conference, (2008) at 156 (emphasis added).

Accordingly, this contention does not raise a genuine dispute because DOE considered the very information that Nevada alleges it did not. Because Nevada has failed to controvert a position taken by the applicant in the Application, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_\_ (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

**151. NEV-SAFETY-151 - Time Span Of Basaltic Volcanism**

SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections, which indicate that the probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year, underestimates that probability, likely by two or more orders of magnitude, because DOE ignored the entire 11 million year span of basaltic volcanism near Yucca Mountain.

**RESPONSE**

Nevada alleges that DOE underestimates the probability of igneous activity disrupting a repository drift “likely by two or more orders of magnitude, because DOE ignored the entire 11 million year span of basaltic volcanism near Yucca Mountain.” Petition at 794. As discussed below, Nevada’s argument is not material, lacks appropriate expert support, and fails to raise a genuine dispute because DOE's assessment of future igneous activity did not ignore the entire 11 million year span of basaltic volcanism near Yucca Mountain.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada sets forth and describes a number of regulations. Petition at 795 (citing 10 C.F.R. §§ 63.31(a)(2) and (a)(3), 63.21(c)(9) and (c)(15), 63.113, 63.114, and Subpart E). Nevada concludes its general description of these regulations with the mere assertion that "this contention alleges noncompliance with these provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ..., " not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2),

“because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide

even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The last paragraph of the contention essentially admits that Nevada does not know whether this contention is material. Petition at 798. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Since the petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), it is Nevada that must show that its contention raises an issue that is material to this proceeding. In contrast, the last paragraph of the contention essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Petition, Attachments 3 (Dr. Michael Thorne) and 11 (Dr. Eugene Smith)), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

The contention is not adequately supported for other reasons as well. Nevada does not provide a single citation to a scientific article or scholarly document that supports its factual positions. Nevada cites to the SAR (*see e.g.*, Petition at 796) and to “Valentine, G.A. and Perry, F.V. (2007), ‘Tectonically Controlled, Time-Predictable Basaltic Volcanism from a Lithospheric Source’ (02/07/2007), LSN# DN2002382703 at 201-216,” *Id.*, but solely to explain why these documents are wrong. Accordingly, there is literally no appropriate support for the contention.

And the facts in paragraph 5 of the contention lack citations and/or specificity. For example:

- Nevada says that the “Yucca Mountain core provides a unique opportunity to view the volcanic history of the Yucca Mountain area back to 11 million years ago.” Petition at 796. But the contention does not provide a cite for this sentence, nor does it explain what this “core” is, who collected it, when it was collected, how long it is, etc. Is this core one of the “rock cores from the North Ramp” (SAR at 2.3.11-36), as this is the *only* occurrence of the word “core” in all of SAR § 2.3.11.
- Nevada says that “the record from the core combined with data from surface exposures” supports its position. *Id.* But the contention does not provide a citation for this sentence either, nor does it explain what the “data” are or what the “surface exposures” are.
- Nevada says that there is “chemical evidence of early larger degrees of melt formation followed by a pattern of waning volcanism as revealed by higher Ce/Yb and increasing epsilon Nd values.” *Id.* But the contention does not provide a citation for this sentence either.

Conclusory statements cannot provide “sufficient” support for a contention, simply because they are proffered by an alleged expert. *See* USEC, Inc. (*American Centrifuge Plant*), CLI-06-10, 63 NRC 451, 472 (2006).

Furthermore, Nevada argues that if the DOE had not ignored the entire 11 million year span of basaltic volcanism near Yucca Mountain, then the probability of igneous activity disrupting a repository drift would increase "likely by two or more orders of magnitude." Petition at 794, 797. This statement, which only appears in paragraphs 1 and 6 of the contention, is only adopted by Dr. Thorne. Petition, Attachment 3 at 1. Yet Dr. Thorne’s adoption of the statement still fails as a valid supporting position because he provides no support for this assertion. He provides no modeling results or evaluations, nor does he state that he performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this 2+ order of magnitude change in probability. Accordingly, the Board must treat Dr. Thorne’s conclusory statement as speculation that is inadequate to support admissibility of a contention. Again, conclusory statements cannot provide “sufficient” support for a contention, simply because they are proffered by an alleged expert. *See USEC, Inc.*, CLI-06-10, 63 NRC at 472.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board also must dismiss this contention because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact. For background, DOE estimates that the mean annual frequency of a volcanic event disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated

in a publically-available PVHA Report. SAR 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

Nevada's entire argument relies on a few sentences in the SAR:

The decreased eruptive volume through time, together with geochemical evidence (Perry, Crowe, et al., 1998, p. 4-8) indicates that the intensity of mantle-melting processes beneath the Yucca Mountain region has waned over the past 5 million years (Perry and Crowe 1992, p. 2359; Perry, Crowe, et al., 1998, p. 4-1). Considered in terms of total eruption volume, recurrence intervals, and duration of volcanism during the past 5 million years, the Crater Flat volcanic field, adjacent on the west to Yucca Mountain, is one of the least active basaltic volcanic fields in the western United States (BSC 2004a, Section 6.1.1.1).

Petition at 795-96 (quoting SAR at 2.3.11-16). Nevada argues that “SAR Subsection 2.3.11.2.1 and similar subsections . . . advocate that the volcanic system near Yucca Mountain represents a simple system that began with high volume activity and is now in a waning period.” *Id.* at 797. If DOE used the “entire 11 million year record” it would see that “another super-episode of activity could occur.” *Id.* Therefore, Nevada concludes, DOE’s “probability of igneous activity disrupting a repository drift [of]  $1.7 \times 10^{-8}$  events/year, underestimates that probability, likely by two or more orders of magnitude.” *Id.*

These arguments do not raise a genuine dispute of material fact or law because DOE did not ignore the entire 11 million year record. SAR Section 2.3.11 and the PVHA Report demonstrate that this entire 11 million year period was considered:

- Silicic volcanism was approximately synchronous with a period of major crustal extension or stretching, which occurred between 13 and 9 million years ago. SAR at 2.3.11-15.
- Around 11 million years ago, the character of volcanism changed from rhyolitic (silicic) to basaltic, and the volume of material erupted decreased dramatically compared to the final rhyolitic eruptions. SAR at 2.3.11-16.
- Silicic volcanism has not occurred in the region in the last 7 or 8 million years and, as a result, is not included as part of the igneous conceptual model. SAR at 2.3.11-16.
- Small-volume basaltic volcanism has continued into the Quaternary as part of the general decline in eruption volume over the past 11 million years in the Yucca Mountain region. *Id.*<sup>85</sup>
- The observed record of basaltic volcanism in the Yucca Mountain region during the last 10 million years indicates that volcanic centers have been constructed of both effusive and pyroclastic deposits. *Id.* at 2.3.11-18.

The supporting PVHA Report also confirms that the 11 million year record was not ignored. The expert hazard models developed for the PVHA considered the regional spatial and temporal patterns of igneous activity as a basis to describe event counts at various volcanic centers. *See* PVHA Report, Figures 3-3(a), 3-62 and 3-63. Figure 3-62 summarizes the experts' assessments for various spatial and temporal components of the PVHA model and shows that

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85 Nevada acknowledges this quote from the SAR. Petition at 796. After providing this quote, Nevada argues that DOE's experts, however, placed "emphasis ... on activity over the past 5 million years." *Id.* But the "Statement of the Contention Itself" claims that DOE "ignored" the 11 million year period. Petition at 794; *see also id.* at 794 (DOE "do[es] not consider the entire history of volcanism") (emphasis added). A statement that DOE's experts placed "emphasis" on the past 5 million years (in section 5 of a contention), does not support a contention that DOE "ignored" or "do[es] not consider" the past 11 million years (in paragraphs 1 and 2 of a contention).

events as old as 11 Ma were considered in the PVHA. Hence, the allegation that DOE ignored the entire 11 million year span of basaltic volcanism near Yucca Mountain is not correct.

Nevada's misreading of the SAR and the PVHA does not raise a genuine dispute to litigate in this proceeding.

Because DOE considered the entire 11 million year span of basaltic volcanism near Yucca Mountain, there is no genuine dispute of material fact or law, and the contention must be rejected.

**152. NEV-SAFETY-152 - Focus On Upper Crustal Extension Patterns**

SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections, which indicate that the probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year, underestimate that probability, likely by two or more orders of magnitude, because DOE focuses improperly on upper crustal extension patterns to explain volcano location and the timing of volcanic events.

**RESPONSE**

Nevada alleges that DOE underestimates the probability of igneous activity disrupting a repository drift “likely by two or more orders of magnitude, because DOE focuses improperly on upper crustal extension patterns to explain volcano location and the timing of volcanic events.” Petition at 799. As discussed below, Nevada’s argument is not material, lacks appropriate expert support, and fails to raise a genuine dispute because DOE's assessment of future igneous activity did not focus improperly on upper crustal extension patterns.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada sets forth and describes a number of regulations. Petition at 800 (citing 10 C.F.R. §§ 63.31(a)(2) and (a)(3), 63.21(c)(9) and (c)(15), 63.113, 63.114, and Subpart E). Nevada concludes its general description of these regulations with the mere assertion that "this contention alleges noncompliance with these provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ..., " not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2),

“because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide

even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The last paragraph of the contention essentially admits that Nevada does not know whether this contention is material. Petition at 806-07. That paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. Since the petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), it is Nevada that must show that its contention raises an issue that is material to this proceeding. In contrast, the last paragraph of the contention essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Petition, Attachments 3 (Dr. Michael Thorne) and 11 (Dr. Eugene Smith)), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, Nevada argues that if the DOE had not focused improperly on upper crustal extension patterns, then the probability of igneous activity disrupting a repository drift would increase "likely by two or more orders of magnitude." Petition at 799, 806. This statement, which only appears in paragraphs 1 and 6 of the contention, is only adopted by Dr. Thorne. Petition, Attachment 3 at 1. Yet Dr. Thorne's adoption of the statement still fails as a valid supporting position because he provides no support for this assertion. He provides no modeling results or evaluations, nor does he state that he performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this 2+ order of magnitude change in probability. Accordingly, the Board must treat Dr. Thorne's conclusory statement as speculation that is inadequate to support admissibility of a contention. Again, conclusory statements cannot provide "sufficient" support for a contention, simply because they are proffered by an alleged expert. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472. (2006)

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board also must dismiss this contention because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact. Nevada's entire argument relies on a few sentences in the SAR. The first sentence is:

"[f]or regional volcanism, no single base-case conceptual model is appropriate because the underlying physical processes that control the precise timing and location of volcanic events within a particular region remain uncertain (BSC 2004a, Section 6.3.1.6)."

Petition at 800 (quoting SAR at 2.3.11-23). Nevada concludes from this sentence that "DOE clearly does not understand the processes that control volcanism." *Id.* at 800-01.

This argument does not raise a genuine dispute because Nevada's own expert confirms that underlying physical processes that control the precise timing and location of volcanic events within a particular region remain uncertain. Page 801 cites to articles authored by Nevada's expert to support the contention. In one of those articles (Smith, E.I., Conrad, C.P., Plank, T., Tibbetts, A., Keenan, D., "Testing Models for Basaltic Volcanism: Implications for Yucca Mountain, Nevada," American Nuclear Society, Proceedings of the 12th International High-Level Radioactive Waste Management Conference (2008) (LSN# CLK000000085), Nevada's expert states that:

Basaltic magmatism beneath the western US derives from the mantle, but *considerable uncertainty exists* as to the cause and location of mantle melting beneath volcanoes. *There are valid arguments for magma sources in the mantle lithosphere* (the old, cold roots to continents). Equally valid arguments have been made that magma derives from the mantle asthenosphere (the deeper, hot, flowing upper mantle).

*Id.* at 156 (emphasis added). Thus, although the contention alleges that DOE does not understand the processes that control volcanism, Nevada's expert agrees that there is uncertainty in those processes and that DOE's model is valid.

Nevada then cites other sections of the SAR which it characterizes as DOE "call[ing] upon crustal structures and extension rates to explain the location and timing of volcanism." Petition at 801. Nevada claims that there is "considerable literature that contradicts [DOE's] conclusion for basaltic volcanism and suggests that thermal anomalies, mantle flow patterns, and topography at the base of the lithosphere explain the location and timing of volcanism." *Id.* Nevada further claims that "DOE *ignores* the role of the mantle and published geochemical and geophysical work that suggests that deep melting of asthenospheric mantle caused by upwelling associated with low-viscosity 'pockets' and a step in lithospheric thickness explain the

occurrence of volcanic activity near Yucca Mountain, and the episodic nature of volcanism.” *Id.* (emphasis added). For support, Nevada provides citations to articles published by its expert.

These arguments also do not raise a genuine dispute of material fact or law because DOE neither solely relied upon crustal structures and extension rates to explain the location and timing of volcanism, nor did it ignore the role of the mantle, deep melting from the asthenosphere, etc.

For background, DOE estimates that the mean annual frequency of a volcanic event disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

The SAR and the PVHA Report confirm that DOE did not “focus[] improperly on upper crustal extension patterns to explain volcano location and the timing of volcanic events” (Petition at 799), or “*ignore[]* the role of the mantle and published geochemical and geophysical work that suggests []deep melting of asthenospheric mantle . . .” Petition at 801 (emphasis added). The hazard estimate produced by the PVHA’s expert elicitation process is based on spatial and temporal patterns of volcanism observed in the region surrounding Yucca Mountain. BSC, *Characterize Framework for Igneous Activity at Yucca Mountain, Nevada*, ANL-MGR-GS-000001 REV 02, Section 6.3.1.3 (2004) ( LSN# DN2001632124; DN2002077196; DEN001580092). The hazard estimate described in the SAR was revised based on the PVHA to

consider changes in the repository footprint that occurred after the PVHA was completed. *Id.* The revision also considered alternative conceptual models of volcanism (*Id.*, Section 6.3.1.6) and effects of buried volcanic centers (*Id.*, Section 6.3.1.7), alternative estimates of the probability of intersection (*Id.*, Section 6.3.1.8), and descriptions of the Crater Flat structural domain (*Id.*, Section 6.4).

The upper crustal extension patterns described in Crater Flat were considered by the experts *along with other independent pieces of information*, identified above, that were incorporated into the hazard estimate. PVHA Report, Section 4.3. All of this information, plus information from analog studies completed following completion of the PVHA, were incorporated into the updated hazard estimate (BSC 2004, Table 7-1) that is presented in SAR Sections 2.2.2.2 and 2.3.11.2. Hence, the premise for the contention is wrong.

Accordingly, this contention does not raise a genuine dispute because DOE considered the very information that Nevada alleges it did not. Because Nevada has failed to controvert a position taken by the applicant in the Application, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

**153. NEV-SAFETY-153 - Exclusion Of Death Valley From Volcanism Calculations**

SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections, which indicate that the probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year, underestimate that probability, likely by two or more orders of magnitude, because DOE does not include the Death Valley volcanic field in the Greenwater Range as part of the area to be considered for hazard calculations.

**RESPONSE**

Nevada alleges that DOE underestimates the probability of igneous activity disrupting a repository drift by two or more orders of magnitude because: (1) DOE “does not include the Death Valley volcanic field in the Greenwater Range as part of the area to be considered for hazard calculations”; and (2) DOE “ignores volcanic activity in the Greenwater Range” despite “chemical, mineralogical, and age similarities to those [volcanic rocks] near Yucca Mountain.” Petition at 808. As discussed below, Nevada’s argument is not material, lacks appropriate factual and expert support, and fails to raise a genuine dispute of material fact because, among other things, the Death Valley and Greenwater Range volcanic field *was* considered in DOE’s assessment of future igneous activity.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 809. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges non-compliance with these regulatory provisions, and therefore raises a material issue within the scope of the licensing proceeding." *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ..., " not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be

disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The last paragraph of the contention essentially admits that Nevada does not know whether this contention is material. Petition at 812. This paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *Id.* Since the petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), it is Nevada that must show that its contention raises an issue that is material to this proceeding. In contrast, the last paragraph of the contention essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Petition, Attachments 3 (Dr. Michael Thorne) and 11 (Dr. Eugene Smith)), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in

paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, Nevada argues that if DOE had considered an expanded volcanic region, then the probability of igneous activity disrupting a repository drift would increase "likely by two or more orders of magnitude." Petition at 808, 811. This statement, which only appears in paragraphs 1 and 6 of the contention, is only adopted by Dr. Thorne. Petition, Attachment 3, at 1. Yet Dr. Thorne's adoption of the statement still fails as a valid supporting position because he provides no support for this assertion. He provides no modeling results or evaluations, nor does he state that he performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this 2+ order-of-magnitude change in probability. Accordingly, the Board must treat Dr. Thorne's conclusory statement as speculation that is inadequate to support admissibility of a contention. Conclusory statements cannot provide "sufficient" support for a contention, simply because they are proffered by an alleged expert. *See USEC, Inc.*, CLI-06-10, 63 NRC at 472.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board also must dismiss this contention because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact. For background, DOE estimates that the mean annual frequency of a volcanic event disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR at 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who

participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries). At issue in this contention is the volcanic/tectonic setting of the Yucca Mountain Region.

Nevada's entire argument relies on the assumption that DOE did not “include the Death Valley volcanic field in the Greenwater Range as part of the area to be considered for hazard calculations.” Petition at 808. But DOE did consider this volcanic field. The PVHA was conducted using an expert panel that based its assessments on the spatial and temporal patterns of volcanism in the Yucca Mountain Region and in the region including volcanism in the Death Valley volcanic field in the Greenwater Range. Documentation in the PVHA Report (Figures 3-23, 3-28, 3-32, 3-46, and 3-51), clearly shows that at least 5 experts explicitly considered igneous activity in the Greenwater Range in the development of their models for regional igneous activity. *See also id.* at Appendix E (example discussions in elicitation interviews), at RC-3 of 20 (elicitation interview of Dr. Richard W. Carlson), GW-1 of 15 and GW-3 of 15 (elicitation interview of Dr. George P.L. Walker). Generally, the Greenwater Range activity was considered in the context of alternative regions of interest. *E.g., id.*, Figures 3-23, 3-28, 3-46, and 3-51. Therefore, information related to the Death Valley volcanic field in the Greenwater Range was not ignored by DOE, but was considered by the PVHA expert panel members in their evaluations.

Accordingly, this contention does not raise a genuine dispute because DOE considered the very information that Nevada alleges it did not. Because Nevada has failed to controvert a position taken by the applicant in the Application, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op.

at 18, 29, 39-40, 42) (Sept. 12, 2008); *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

**154. NEV-SAFETY-154 - Igneous Event Probability For 10,000 Years And 1,000,000 Years**

DOE wrongly assumes in SAR Subsections 2.3.11 and 2.3.11.1 and related subsections that its approach to estimating the probability of igneous events for the first 10,000 years is applicable to the probability estimate for the period from 10,000 to 1,000,000 years as well, because its approach fails to consider deep melting models or the entire period of volcanism from 11 million years to the present.

**RESPONSE**

Nevada alleges that DOE wrongly applied its approach for estimating the probability of igneous events for the first 10,000 years is the same for the period from 10,000 to 1,000,000 years because DOE did not “consider deep melting models” or the “period of volcanism from 11 million years to the present.” Petition at 813. Moreover, Nevada alleges that, as a result of this assumption, DOE underestimates the probability of igneous activity disrupting a repository drift “likely by two or more orders of magnitude.” Petition at 816. As discussed below, these arguments are not material, lack appropriate expert support, and fail to raise a genuine dispute of material fact because, among other things, DOE did consider deep melting models and the entire 11 million year period.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 814. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges non-compliance with these regulations provisions and therefore raises a material issue" *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. §

63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. See 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative

analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

The last paragraph of the contention essentially admits that Nevada does not know whether this contention is material. Petition at 817. This paragraph indicates that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *Id.* Since the petitioner has the burden of showing that its proposed contentions meet the requirements in 10 C.F.R. § 2.309(f), it is Nevada that must show that its contention raises an issue that is material to this proceeding. In contrast, the last paragraph of the contention essentially argues that DOE must show that Nevada’s contention is not material. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. *See* 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada’s Petition does attach several affidavits (Petition, Attachments 3 (Dr. Michael Thorne) and 11 (Dr. Eugene Smith)), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply “adopt” the otherwise unsupported assertions made in

paragraph 5 and 6 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, Nevada argues that if DOE had considered deep melting models and volcanism from 11 million years to the present, then the probability of igneous activity disrupting a repository drift would increase "likely by two or more orders of magnitude." Petition at 816. This quote, which only appears in paragraph 6 of the contention, is only adopted by Dr. Thorne. Petition, Attachment 3, at 1. Yet Dr. Thorne's adoption of the statement still fails as a valid supporting position because he provides no support for this assertion. He provides no modeling results or evaluations, nor does he state that he performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this 2+ order of magnitude change in probability. Accordingly, the Board must treat Dr. Thorne's conclusory statement as speculation that is inadequate to support admissibility of a contention. Conclusory statements cannot provide "sufficient" support for a contention, simply because they are proffered by an alleged expert. *See* USEC, Inc., CLI-06-10, 63 NRC at 472.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board also must dismiss this contention because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact. For background, DOE estimates that the mean probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR at 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who

participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

Nevada's entire argument relies on the assumption that DOE did not “consider deep melting models or the entire period of volcanism from 11 million years to the present.” Petition at 813. Nevada relies on its arguments provided in NEV-SAFETY-150 and 151. Petition at 815.

But DOE did consider deep melting models. PVHA Workshop 1 was conducted using an expert panel that identified 27 technical issues of interest to the experts (PVHA Report, Appendix C, Table 1 at C-4), including, *e.g.*, correlation of tectonic activity with recent or synchronous volcanism, structural control of spatial distribution of regional/local volcanic features, definition of “event,” and model for magma generation and migration. The event definition and magma generation and migration items included consideration of deep melting models. PVHA Report, Appendix E, at RC-1 to -3, BC-1 to -3, WD-1, RF-4, WH-1 to -2, MH-1 to -2, AM-1, and GT-1, 9. The PVHA experts requested and were provided information on basalt geochemistry, ages, and melt generation characteristics (PVHA Report, at 2-25), but DOE included no restrictions on the use of that information in the development of conceptual models of volcanism in the Yucca Mountain Region. PVHA Report, Appendix E, at RC-1 to -3, BC-1 to -3, WD-1, RF-4, WH-1 to -2, MH-1 to -2, AM-1, and GT-1, 9. This information is reflected in the definition of an igneous event developed by the experts in the PVHA, which was explicitly based on a mantle melting source for basalts in the Yucca Mountain Region: “In the context of the PVHA, a volcanic event is a spatially and temporally distinct batch of magma ascending from the mantle through the crust as a dike or system of dikes ([PVHA Report,] Appendix E).” BSC, *Characterize Framework for Igneous Activity at Yucca Mountain, Nevada*, ANL-MGR-

GS-000001 REV 02, at 1-2 (LSN: DN2001632124) (2004). In addition, various PVHA experts specifically discussed the asthenosphere as the possible source of basaltic magma in the Yucca Mountain Region. PVHA Report, Appendix E (example discussions in elicitation interviews), at MK-2 of 22 (elicitation interview of Dr. Mel A. Kuntz) and MS-2 of 22 (elicitation interview of Michael F. Sheridan). Therefore, the allegation that DOE's approach fails to consider deep melting models is not correct.

DOE also considered the period from 11 million years to the present. SAR § 2.3.11 demonstrates that this entire 11 million year period was considered:

- “Silicic volcanism was approximately synchronous with a period of major crustal extension or stretching, which occurred between 13 and 9 million years ago.” SAR at 2.3.11-15.
- “Around 11 million years ago, the character of volcanism changed from rhyolitic (silicic) to basaltic, and the volume of material erupted decreased dramatically compared to the final rhyolitic eruptions.” SAR at 2.3.11-16.
- “Silicic volcanism has not occurred in the region in the last 7 or 8 million years and, as a result, is not included as part of the igneous conceptual model.” SAR at 2.3.11-16.
- “Small-volume basaltic volcanism has continued into the Quaternary as part of the general decline in eruption volume over the past 11 million years in the Yucca Mountain region.” SAR at 2.3.11-16.
- “The observed record of basaltic volcanism in the Yucca Mountain region during the last 10 million years indicates that volcanic centers have been constructed of both effusive and pyroclastic deposits.” SAR at 2.3.11-18.

The supporting PVHA Report also confirms that the 11 million year record was not ignored. The expert hazard models developed for the PVHA considered the regional spatial and temporal patterns of igneous activity as a basis to describe event counts at various volcanic centers. *See* PVHA Report, Figures 3-3(a), 3-62 and 3-63. Figure 3-62 summarizes the experts' assessments for various spatial and temporal components of the PVHA model and shows that events as old as 11 Ma were considered in the PVHA. Generally, however, the experts assigned low weights to the significance of events older than about 5 Ma in the development of their hazard models (*e.g., id.*, Figure 3-3(a)), because most experts considered the post-5 Ma events as more relevant to the hazard model. *See id.*, and Appendix E (Elicitation Interview Summaries). Hence, the allegation that DOE did not consider the entire 11 million year span of basaltic volcanism near Yucca Mountain is not correct. Nevada's failure to understand the SAR or the PVHA does not raise a genuine dispute to litigate in this proceeding.

Because DOE considered deep melting models and the entire 11 million year span of basaltic volcanism near Yucca Mountain, there is no genuine dispute of material fact or law, and the contention must be rejected. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

**155. NEV-SAFETY-155 - 11-Million Year vs. 5-Million Year Volcanism Data**

DOE's approach to determining the frequency of future igneous events wrongly ignores the data set obtained from core, which along with surface data provides a record of volcanism back to 11 million years that requires consideration, and wrongly relies instead on the chemistry of surface basalt erupted over the past 5 million years. This approach obscures long-term trends and provides an inaccurate prediction of future events.

**RESPONSE**

Nevada alleges that DOE underestimates the probability of igneous activity disrupting a repository drift "likely by two or more orders of magnitude," Petition at 821, because DOE "ignores the data set obtained from core, which along with surface data provides a record of volcanism back to 11 million years that requires consideration, and [DOE] wrongly relies instead on the chemistry of surface basalt erupted over the past 5 million years." Petition at 818. As discussed below, Nevada's argument is not material, lacks appropriate expert support, and its reasoning is flawed because DOE considered the entire 11 million year record and did not rely on surface basalt chemistry.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 819. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges non-compliance with these regulations provisions and therefore raises a material issue." *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. §

63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. See 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative

analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In Nevada's other igneous contentions, the last paragraph of the contention explains that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Petitioner has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *See e.g.*, Petition at 793 (NEV-SAFETY-150), 798 (NEV-SAFETY-151), and 807 (NEV-SAFETY-152). We have explained in response to those contentions why such a statement is inadequate to demonstrate an issue material to the findings that the NRC must make. But NEV-SAFETY-155 does not even include this language in its last paragraph. All the more reason why this contention does not demonstrate a material issue under 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada's Petition attaches one affidavit (Petition, Attachment 11 (Dr. Eugene Smith)), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Furthermore, Nevada makes an ultimate conclusion in paragraph 6 of the contention that is not even supported by Dr. Smith. It argues that if DOE had done what Nevada suggests, then the probability of igneous activity disrupting a repository drift would increase "likely by two or more orders of magnitude." Petition at 821. This statement only appears in paragraph 6 of the contention and is, therefore, not supported by any expert opinion.

Nevada provides no modeling results or evaluations, nor does it state that its experts performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this 2+ order of magnitude change in probability. Accordingly, the Board must treat this conclusory statement as speculation of counsel that is inadequate to support admissibility of a contention. Again, conclusory statements cannot provide "sufficient" support for a contention, even when proffered by an alleged expert. *See USEC, Inc. (American Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board also must dismiss this contention because it does not establish that a genuine dispute exists with DOE on a material issue of law or fact. For background, DOE estimates that the mean annual frequency of a volcanic event disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the

volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

Nevada's entire argument relies on a few sentences in the SAR:

Major-element, trace-element and isotopic data were obtained from the buried basalt bodies and indicate that all are broadly basaltic in composition with typical SiO<sub>2</sub> contents of 42-50%. These geochemical results are consistent with geochemical analyses of basalt samples from surface exposures near Yucca Mountain (Perry and Bowker 1998).

Petition at 819-20 (quoting SAR at 2.3.11-17).

To refute these sentences in the SAR, Nevada cites to findings in a Research Report that its expert prepared in anticipation of this proceeding. *Id.* at 820 (citing and discussing "Report of Research Activities in 2007 Prepared to Satisfy the Requirements of a Clark County Contract for Volcanic Hazard Assessment of the Proposed Nuclear Waste Repository at Yucca Mountain, Nevada" (07/08/2008), LSN# CLK000000071 at 9-10) (hereafter in this contention response, Smith's Research Report). Nevada provides no other support for its argument.<sup>86</sup>

Nevada lists three alleged findings from Smith's Research Report to refute the SAR: (1) the chemistry in basalt from borings collected in Crater Flat and Amargosa Valley is quite different from the 1.0 million year old cinder cones in Crater Flat; (2) the range of SiO<sub>2</sub> is different between the core (43 to 52 wt. %) and Crater Flat (47-50 wt. %), and has lower light rare-earth element concentrations; and (3) three rock types were observed in the core that were not found at the surface. Petition at 820. Nevada concludes that "[h]ad DOE considered core data, which provides a record from the beginning of basalt volcanism 11 million years ago, [the Application], which indicate[s] that the probability of igneous activity disrupting a repository

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<sup>86</sup> Nevada cites to Valentine, G.A. and Perry, F.V. (2007), "Tectonically Controlled, Time-Predictable Basaltic Volcanism from a Lithospheric Source" (02/07/2007), LSN# DN2002382703 at 1-22, but only to state why its findings are wrong. Petition at 820, 821.

drift is  $1.7 \times 10^{-8}$  events/year, would have had to be revised as [it] underestimate[s] that probability, likely by two or more orders of magnitude.” *Id.* at 821.

The arguments contained within Smith’s Research Report do not raise a genuine dispute of material fact or law for two reasons. First, the contention incorrectly asserts that DOE’s estimate of the annual frequency of intersection ignores data obtained from core and surface studies that provide a record of volcanism back to 11 million years ago. Nevada ignores the PVHA which is the primary input to DOE’s igneous evaluation. The igneous hazard estimate for Yucca Mountain is based on spatial and temporal patterns of volcanism as observed in the region. The record of volcanism in the region was used by the PVHA experts to describe the spatial and temporal patterns of volcanism, and the experts’ considered igneous activity that extended back 11 million years. *See e.g.*, PVHA Report, Figures 3-3(a), 3-62 and 3-63. Figure 3-62 shows that events as old as 11 million years were considered in the PVHA, but generally the experts assigned little weight to events older than about 5 million years in the development of their hazard models. *See e.g.*, Figure 3-3. However, the assignment of little weight by the experts cannot be correctly interpreted as ignoring the record of volcanism back 11 million years; so the contention has misstated the actual method used to develop the hazard estimate.

Second, the contention alleges that the DOE approach wrongly relied on the chemistry of surface basalt erupted over the past 5 million years, but does not explain how basalt chemistry relates to the development of the hazard estimate. The explanation offers tenuous ties between basalt chemistry and basalt ages, but ignores the fact that the basalts intersected by the most recent drilling are 10 million years or older. *See* Smith’s Research Report at 3, 10 and 17. As noted earlier in this response, basalts older than about 5 million years were considered, but given

little weight in the experts' hazard models. Therefore, Nevada has not demonstrated what effect these data would have had on the magnitude of the experts' hazard estimates.

In sum, DOE's igneous hazard estimate is based on the record of volcanism back to 11 million years. Hence, the allegations that DOE ignored the record of volcanism back to 11 million years and wrongly relied on the chemistry of surface basalt erupted over the past 5 million years are not correct. Accordingly, the Licensing Board cannot admit this contention, because it does not meet 10 C.F.R. § 2.309(f)(1)(vi).

**156. NEV-SAFETY-156 - Alternative Igneous Event Conceptual Models**

DOE's assessment of the frequency of igneous events does not consider appropriate alternative conceptual models that are consistent with available data and current scientific understanding, with the result that uncertainty is underestimated and not properly characterized.

**RESPONSE**

This contention is another attempt by Nevada to litigate its expert's controversial theory that the asthenosphere is the source of basaltic magma in the Yucca Mountain region.

Specifically, Nevada alleges that "DOE's assessment of the frequency of igneous events does not consider appropriate alternative conceptual models that are consistent with available data and current scientific understanding, with the result that uncertainty is underestimated and not properly characterized." Petition at 823. As discussed below, this issue is not material, lacks appropriate expert support, and it does not raise a genuine dispute of fact because DOE did consider alternative conceptual models that are consistent with available data and current scientific understanding.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada sets forth and describes a number of regulations. Petition at 823-24 (citing 10 C.F.R. §§ 63.31(a)(2) and (a)(3), 63.21(c)(9) and (c)(15), 63.102(h), 63.113, 63.114, and Subpart E). Nevada concludes its general description of these regulations with the mere assertion that "this contention alleges violations of these provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2),

“because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. See 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide

even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In many of Nevada's other igneous contentions, the last paragraph of the contention explains that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *See e.g.*, Petition at 792 (NEV-SAFETY-150), 298 (NEV-SAFETY-151), and 806 (NEV-SAFETY-152). We have explained in response to those contentions why such a statement is inadequate to demonstrate an issue material to the findings that the NRC must make. But NEV-SAFETY-156 does not even include this language in its last paragraph. All the more reason why this contention does not demonstrate that Nevada has not met its burden under 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The contention does not reference any supporting expert opinion. However, one of the affidavits attached to the Petition states that the affiant "adopts" the discussion of the contention, but only for paragraph 5. Petition, Attachment 11, at 1 (Dr. Eugene Smith). As discussed in more detail in Section V.A.3 of this Answer, such an affidavit is not sufficient to satisfy the requirements of Section 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention asserts that "DOE's assessment of the frequency of igneous events does not consider appropriate alternative conceptual models that are consistent with available data and current scientific understanding, with the result that uncertainty is underestimated and not

properly characterized.” Petition at 823. The fundamental basis for this assertion is an allegation that DOE’s volcanic hazards assessment is based on an outdated PVHA, and that the PVHA experts based their results on the assumption of shallow melting to produce basaltic magma. *Id.* This assertion is incorrect—and therefore does not raise a genuine dispute of material fact—for three reasons: 1) the PVHA experts considered a wide range of alternative conceptual models, 2) neither DOE nor the PVHA experts assumed that shallow melting produces basaltic magma in the Yucca Mountain region, and 3) DOE evaluated data and conceptual models developed since the completion of the PVHA in 1996, and determined that they have no significant effect on the estimates of the mean annual frequency of igneous events, as discussed below.

**(1) Alternative Conceptual Models Were Considered in the PVHA**

For background, DOE estimates that the mean annual frequency of a volcanic event disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

The PVHA was designed and conducted with the fundamental purpose of quantifying the annual frequency of intersection of a basaltic dike with the repository and to estimate the uncertainties associated with that hazard estimate. PVHA Report at 1-1. A key part of the

uncertainty quantification was the identification and evaluation by the experts of alternative conceptual models. For example, two workshops were devoted to the identification and discussion of alternative conceptual models: Workshop 2 on Alternative Hazard Models and Workshop 3 on Alternative Interpretations. PVHA Report, Section 2.1, at 2-20 to 2-21. At those workshops, researchers from the Center for Nuclear Waste Regulatory Analysis, State of Nevada, Los Alamos National Laboratory, US Geological Survey, and several universities discussed their alternative models for characterizing the future spatial and temporal distribution of volcanism. *Id.* at 1-8, 1-9, and 2-20. The PVHA was in essence an exercise in combining multiple alternative conceptual models into a single probability distribution for each expert and, in turn, a probability distribution across all ten experts that captured the uncertainty in the experts' conceptual models of the physical behavior of volcanism in the Yucca Mountain Region. BSC, *Characterize Framework for Igneous Activity at Yucca Mountain, Nevada*, ANL-MGR-GS-000001 REV 02, Section 6.3.1.6, at 6-16 (LSN: DN2001632124) (2004). Contributions of various conceptual models to the hazard results are given in the PVHA Report, Section 4.2, at 4-9 to 4-52.

Therefore, the claim that “DOE’s assessment of the frequency of igneous events does not consider appropriate alternative conceptual models that are consistent with available data and current scientific understanding, with the result that uncertainty is underestimated and not properly characterized” is not correct. If a petitioner alleges that the applicant omits information, but the allegedly missing information is indeed there, then the contention does not raise a genuine dispute. *See e.g. Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

**(2) No Assumption of Shallow Melting Was Made by the PVHA Experts**

Nevada also states that:

The PVHA panel of experts based their results on the *assumption* of shallow melting to produce basaltic magma. Using this *assumption* results in an underestimate of the probability of repository disruption, and at the least, the alternative model whereby melting to produce basalt occurs in the asthenosphere should have been included in the total systems performance assessment.

Petition at 823 (emphasis added). An assumption is something that is taken for granted as true or a supposition arrived at without the benefit of due consideration or evaluation. *See generally* American Heritage Dictionary (2nd ed.). As used in the contention, the implication is that DOE (or the experts on the PVHA panel) began their assessments with a supposition of shallow melting and that this somehow eliminated their ability to consider alternative conceptual models, including the conceptual model that melting occurs in the asthenosphere.

But no such assumption was made by the PVHA experts nor was it imposed by DOE: consistent with an expert elicitation process, all experts were exposed through workshops and field trips to a wide range of technical viewpoints and alternative conceptual models. PVHA Report at 2-25 to -29. In making their technical evaluations, they were encouraged to act as evaluators and consider all viewpoints as well as their own experience in making their assessments and in quantifying their uncertainties. *Id.* at 2-10 to -12 (describing roles of the PVHA participants).

Petitioner also misreads the SAR, because the SAR does not state that DOE's PVHA experts assumed a lithospheric potential source of basaltic magma, thereby ignoring an asthenospheric source. Petition at 825. Rather, it states that the "PVHA experts *generally* view volcanism in the Yucca Mountain region as a regional-scale phenomenon resulting from melting

processes in the upper lithospheric mantle." SAR at 2.2-97. Indeed, there were some experts who specifically discussed the asthenosphere as the possible source of basaltic magma in the Yucca Mountain Region. *See* PVHA Report, Appendix E, at MK- 2 of 22 (discussion of "volcanic/tectonic setting" in the elicitation interview for Dr. Mel A. Kuntz) ("The low volumes of recent basaltic eruptions and the lack of recent rhyolitic volcanism may be due largely to the fact that both the upper asthenosphere and the entire lithosphere in the [Yucca Mountain] region have been drained of their low-temperature, partial-melting fractions by previous melting events, resulting in an asthenosphere and a lithosphere that are essentially non-fertile with respect to future melting events."); *id* at MS-2 of 22 (discussion of volcanic/tectonic setting in the elicitation interview for Dr. Michael F. Sheridan) ("The basic process leading to volcanism involves generation of a melt from a source zone within the asthenosphere or lower lithosphere and migration of the magma to the surface where it erupts."). Again, if a petitioner alleges that the applicant omits information, but the allegedly missing information is indeed there, then the contention does not raise a genuine dispute. *See e.g. Florida Power & Light Co. (Turkey Point Nuclear Generating Plant, Units 3 & 4)*, LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

**(3) Data and Conceptual Models Developed Since the Completion of the PVHA Have No Significant Effect on the Estimates of the Frequency of Igneous Events**

In the basis for the contention, Nevada also states that:

SAR Subsection 2.2.2.3 and related subsections indicate that the license application relies on the results of the 1996 report of [the PVHA] expert panel report released in 1996 as the basis for hazard assessment. Except for new work on the tectonics of the Crater Flat area and a brief mention of buried basalt, DOE has not updated the PVHA findings, but still bases its conclusions on this out-dated report."

Petition at 823. This statement ignores the information that is provided in the SAR that identifies and evaluates the information that has become available since the conclusion of the PVHA and the findings that this information confirms the conclusions of the PVHA.

Nevada is factually incorrect because DOE did consider post-1996 information. The evaluation of information developed after the completion of the PVHA is plainly identified in the SAR and supporting documents. For example:

- Following the completion of the PVHA in 1996, DOE identified and evaluated additional conceptual models for volcanism in the Yucca Mountain Region. BSC, *Characterize Framework for Igneous Activity at Yucca Mountain, Nevada*, ANL-MGR-GS-000001 REV 02, Table 6-4, at 6-16 to 6-17 (LSN: DN2001632124; DN2002077196; DEN001580092) (2004).
- Published estimates from 1982 to 2000 of the probability of a volcanic event intersecting the repository footprint are summarized in SAR Table 2.3.11-4 (SAR at 2.3.11-96). As evident from that Table, the estimates, including the mean intersection probability estimated in the PVHA, “cluster at slightly greater than  $10^{-8}$  per year, providing confidence that the PVHA probability estimate is robust.” SAR at 2.3.11-24.
- In addition, DOE evaluated the potential significance of aeromagnetic data gathered after the PVHA was completed for its potential significance to the hazard estimate. SAR at 2.3.11-25. The SAR identifies three separate sensitivity studies, completed following the PVHA, which included evaluations of the sensitivity of the intersection probability to the presence of postulated buried volcanoes. *Id.* Even if all aeromagnetic anomalies identified in a 1999 aeromagnetic survey and beneath Crater Flat, Jackass Flats, and northern Amargosa Desert were assumed to be buried basalts of Pliocene and younger

age, the SAR concludes that the hazard estimate would be  $2.2 \times 10^{-8}$ . *Id.* Each of the sensitivity studies described in SAR Section 2.3.11.2.2.6 shows that effects of information developed following completion of the PVHA are similarly insignificant.

Finally, an update to the PVHA (PVHA-U) was performed. The PVHA-U was conducted using a panel of eight experts, whose evaluations included data that had become available since the conclusion of the PVHA, including high-resolution aeromagnetic data, drilling, geochemical, and geochronological analyses conducted specifically to support the PVHA-U. "Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada Rev. 01" (09/02/2008) (LSN# DEN001601965) (cited in Petition at 833). As summarized in DOE's letter to NRC dated October 17, 2008:

The differences between the PVHA-96 and PVHA-U distributions would not significantly affect the estimates of repository performance for either 10,000 years or 1,000,000 years, demonstrating that the PVHA-U results are confirmatory of the PVHA-96 technical basis. As a result, the volcanic hazard results presented in the License Application (LA) are robust and suitable for evaluating the expected performance of the repository, and no change to the technical basis presented in the LA is necessary.

Boyle, W.J., "Transmittal of Report: [PVHA-U] for Yucca Mountain, Nevada, to NRC (Oct. 17, 2008) (LSN# DEN001606520). Nevada is simply incorrect that DOE ignored post-1996 information.

Nevada's allegation that DOE did not consider alternative conceptual models is not correct. Because Nevada has failed to controvert a position taken by the applicant, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_\_ (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).



**157. NEV-SAFETY-157 - Igneous Event Data In The TSPA**

DOE's assessment of the frequency of igneous events in the LA ignores information and analyses since 1996 which would, if considered, have required a significant change in the total systems performance assessment, and as a result, the LA is not complete and accurate in all material respects.

**RESPONSE**

This contention appears to raise two separate issues. First, Nevada alleges that DOE has not submitted an application that is complete and accurate, in violation of 10 C.F.R. §§ 63.10 and 63.21(a), because "the LA ignores information and analyses [generated] since 1996." Petition at 831. Nevada separately claims that, if these information and analyses had been considered, it would "have required a significant change in the [TSPA]." *Id.* As discussed below, these issues are not material, lack appropriate expert support, and/or fail to raise a genuine dispute of material fact because DOE did consider post-1996 information.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada's challenge that the Application violates 10 C.F.R. § 63.10 is not material. Section 63.10 requires that "[i]nformation provided to the Commission by an applicant for a license . . . must be complete and accurate in all material respects." This is not one of the standards for which the NRC must make a positive finding before issuing construction authorization. 10 C.F.R. § 63.41. Moreover, the NRC Staff need not, and never has, made a finding of completeness and accuracy as part of its licensing review. Rather, whether an applicant has been complete and accurate is purely a matter for NRC's inspection and enforcement process, which is a matter entirely reserved and committed to agency discretion. *See generally Bellotti v. NRC*, 725 F.2d 1380, 1382 (D.C. Cir. 1983) (affirming NRC's rejection of Massachusetts Attorney General's Petition to Intervene which sought to impose a greater sanction against a licensee than NRC sought to impose through enforcement). Neither the Board nor a petitioner can require the Staff to take enforcement action. Therefore, Nevada's allegation does not raise a material issue.

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies only two regulations: 10 C.F.R. §§ 63.10 and 63.21(a). Petition at 831. Nevada concludes its general description of these regulations with the mere assertion that "this contention alleges violations of these provisions." *Id.* at 832. But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . .," not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and

reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. See 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not "make a difference in the outcome of the licensing proceeding." *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In Nevada's other igneous contentions, the last paragraph of the contention explains that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Petitioner has not attempted to determine what effect, if any, acceptance of their contention would have on doses. *See e.g.*, Petition at 792 (NEV-SAFETY-150), 798 (NEV-SAFETY-151), and 806 (NEV-SAFETY-152). We have explained in response to those contentions why such a statement is inadequate to demonstrate an issue material to the findings that the NRC must make. But NEV-SAFETY-157 does not even include this language in its last paragraph. All the more reason why this contention does not demonstrate that Petitioner has not met its burden under 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada's Petition attaches one affidavit (Petition, Attachment 11 (Dr. Eugene Smith)), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada concludes that "[o]mission of all this work results in an underestimate of the probability of repository disruption and of the related uncertainties, which in turn leads to an erroneous total systems performance assessment." Petition at 833. Nevada provides no support for this conclusion. Nevada provides no modeling results or evaluations, nor does it state that its experts performed any such evaluations. There is no evidence in the Petition or its attachments as to how Nevada arrived at this conclusion. Accordingly, the Board must treat this conclusory statement as speculation that is inadequate to support admissibility of a contention. Conclusory statements cannot provide "sufficient" support for a contention, even when proffered by an alleged expert. *See USEC, CLI-06-10, 63 NRC at 472.*

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

DOE demonstrates why neither of the two claims raised in this contention raise a genuine dispute on a material issue of law or fact.

**(1) No Genuine Dispute about complying with 10 C.F.R. §§ 63.10 or 63.21(a).**

As clearly set forth in 10 C.F.R. § 2.209(f)(1)(vi), Nevada—as the Petitioner—has the burden to demonstrate how its contention raises a genuine dispute. Nevada first relies upon Section 63.10, which requires that “[i]nformation provided to the Commission by an applicant for a license . . . must be complete and accurate in all material respects,” and 10 C.F.R. § 63.21(a), which states that the “application must be as complete as possible in the light of information that is reasonably available at the time of docketing.” To support its claim that the Application is not complete and accurate, Nevada states that “[s]ince 1996, DOE, NRC, the State of Nevada and Clark County have done *much work that is pertinent* to volcanic hazard analysis at Yucca Mountain but is not considered in the license application.” Petition at 832 (emphasis added). To support this statement, in turn, Nevada lists 13 LSN documents. Petition at 832-33.

But merely listing 13 documents that might be “pertinent” is clearly insufficient to demonstrate that the Application violates 10 C.F.R. § 63.10. Nevada provides the list of the 13 documents, without citations to specific pages, and without any further explanation. And Nevada makes no attempt to explain the materiality of the post-1996 references it cites.<sup>87</sup> Even assuming that “much work” has been done in this scientific area, and that this work is “pertinent to volcanic hazards analysis at Yucca Mountain,” these statements, without further explanation, in no way create a genuine dispute that the information in the Application is not complete and accurate in all material respects (Section 63.10), or that the application was not complete as

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87 Nevada does provide a brief explanation for one of the LSN documents—the update to DOE’s PVHA (known as the PVHA-U). Petition at 833. But that explanation suggests that including the PVHA-U would not change DOE’s analyses in a material way, contrary to what would need to be shown for a violation of Section 63.10 (“must be complete and accurate in all material respects”). *Id.* (“Despite the possibility that changes in hazard assessment models and calculations [in the PVHA-U] are modest, it is critical that this report be included in the license application”).

possible in the light of information that was reasonably available at the time of docketing (Section 63.21(a)).

**(2) No genuine dispute regarding considering the new information and analyses.**

The contention also states that “DOE’s assessment of the frequency of igneous events in the LA ignores information and analyses since 1996 which would, if considered, have required a significant change in the [TSPA].” Petition at 831. Nevada cites 13 LSN documents and then alleges that “[o]mission” of the studies contained in these documents “results in an underestimate of the probability of repository disruption and of the related uncertainties, which in turn leads to an erroneous [TSPA].” Petition at 833.

The Licensing Board also must dismiss this contention because these statements ignore the Application and supporting documents that identify and evaluate information that has become available since the conclusion of the PVHA, and DOE’s finding that this information confirms the conclusions of the PVHA. For background, DOE estimates that the probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR at 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

First, Nevada points to no legal requirement—other than Sections 63.10 and 63.21(a)—that DOE must mention or incorporate the results of studies performed, and papers published,

after issuance of the PVHA in 1996. As demonstrated above, there is no genuine dispute to be litigated in this proceeding that the information in the Application is not complete and accurate in all material respects (Section 63.10), or that the application was not complete as possible in the light of information that was reasonably available at the time of docketing (Section 63.21(a)). And there are, in fact, no regulations requiring DOE to mention or incorporate the results of those studies.

Second, although Nevada alleges that there is new information and analyses that have been developed or published since 1996 that DOE did not consider, Nevada is factually incorrect because DOE did consider post-1996 information and analyses. The evaluation of information and analyses developed after the completion of the PVHA is plainly identified in the SAR and supporting documents. For example:

- Following the completion of the PVHA in 1996, DOE identified and evaluated additional conceptual models for volcanism in the Yucca Mountain Region. BSC, “Characterize Framework for Igneous Activity at Yucca Mountain, Nevada,” ANL-MGR-GS-000001 REV 02, Table 6-4, at 6-16 to 6-17 (LSN: DN2001632124; DN2002077196; DEN001580092) (2004).
- Published estimates from 1982 to 2000 of the probability of a volcanic event intersecting the repository footprint are summarized in SAR Table 2.3.11-4 (SAR at 2.3.11-96). As evident from that Table, the estimates, including the mean intersection probability estimated in the PVHA, “cluster at slightly greater than  $10^{-8}$  per year, providing confidence that the PVHA probability estimate is robust.” SAR at 2.3.11-24.
- In addition, DOE evaluated the potential significance of aeromagnetic data gathered after the PVHA was completed for its potential significance to the hazard estimate. SAR at

2.3.11-25. The SAR identifies three separate sensitivity studies, completed following the PVHA, which included evaluations of the sensitivity of the intersection probability to the presence of postulated buried volcanoes. *Id.* Even if all aeromagnetic anomalies identified in a 1999 aeromagnetic survey and beneath Crater Flat, Jackass Flats, and northern Amargosa Desert were assumed to be buried basalts of Pliocene and younger age, the SAR concludes that the hazard estimate would be  $2.2 \times 10^{-8}$ . *Id.* Each of the sensitivity studies described in SAR Section 2.3.11.2.2.6 shows that effects of information developed following completion of the PVHA are similarly insignificant.

Finally, the PVHA-U was conducted using a panel of eight experts, whose evaluations included data that had become available since the conclusion of the PVHA, including high-resolution aeromagnetic data, drilling, geochemical, and geochronological analyses conducted specifically to support the PVHA-U. "Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada Rev. 01" (09/02/2008), (LSN# DEN001601965) (cited in Petition at 833). As summarized in DOE's letter to NRC dated October 17, 2008:

The differences between the PVHA-96 and PVHA-U distributions would not significantly affect the estimates of repository performance for either 10,000 years or 1,000,000 years, demonstrating that the PVHA-U results are confirmatory of the PVHA-96 technical basis. As a result, the volcanic hazard results presented in the License Application (LA) are robust and suitable for evaluating the expected performance of the repository, and no change to the technical basis presented in the LA is necessary.

Letter from W. Boyle (DOE) to NRC, "Transmittal of Report: Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada" (October 17, 2008) (LSN# DEN001606520). Thus, Nevada is simply incorrect that DOE ignored post-1996 information and analyses.

In sum, Nevada has failed to demonstrate that DOE violated Sections 63.10 and 63.21(a), as alleged. Nevada has also failed to demonstrate that the information and analyses generated after the PVHA was completed in 1996 would result in a significant change in the TSPA, and that even if there was a significant change, that it would result in an exceedance of the repository performance standards. Because Nevada has failed to controvert a position taken by the applicant in the Application, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_ (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

### **158. NEV-SAFETY-158 - Geophysical Data In Doe's Volcanic Model**

High-quality geophysical data is necessary to answer the fundamental question as to whether volcanoes are primarily controlled by upper crustal structure or mantle. DOE's approach to predicting the location and frequency of future eruptions, as reflected in SAR Subsection 2.2.2.2.3.1 and related subsections, relies heavily on upper crustal structures and the local stress field, but does not provide sufficient geophysical data to support this model. This is inadequate because high-quality geophysical data are necessary to confirm or rule out the proposition, supported by the currently available data, that the primary control of the location of a basaltic field near Yucca Mountain is asthenospheric mantle processes.

#### **RESPONSE**

This contention is another attempt by Nevada to litigate its expert's controversial theory that the asthenosphere is the source of basaltic magma in the Yucca Mountain region. Specifically, Nevada alleges that the Application is "inadequate" because it "does not provide sufficient geophysical data" to support DOE's alleged position about the origin of volcanic events. Petition at 835. Even more specifically, Nevada alleges that DOE was required to generate "high-quality geophysical data" to "confirm or rule out" Nevada's theory "that the primary control of the location of a basaltic field near Yucca Mountain is asthenospheric mantle processes." *Id.* As discussed below, this issue is not material, lacks appropriate expert support, and fails to raise a genuine dispute of material fact because DOE did consider high-quality geophysical data.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada sets forth and describes a number of regulations. Petition at 836 (citing 10 C.F.R. §§ 63.31(a)(2) and (a)(3), 63.21(c)(9) and (c)(15), 63.113, 63.114, and Subpart E). Nevada concludes its general description of these regulations with the mere assertion that "this contention alleges [violations of] these . . . provisions and therefore raises a material issue within the scope of the licensing proceeding." *Id.* But 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . .," not merely a citation to regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, (Oconee Nuclear Station), CLI-99-11, 49 NRC at 328, 333 (1999).

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (*U.S. Department of Energy* (High-Level Waste Repository: Pre-Application Matters Advisory PAPO Board), LBP-08-10, 67 NRC \_\_\_ (slip op. at 7) (June 20, 2008) (Case Management Order)), this direction cannot be read to dispense with

the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the Case Management Order focused exclusively on "format" and "procedural matters." *Id.* at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the potential impacts to the repository from an igneous event is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

However, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. See 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not "make a difference in the outcome of the licensing proceeding." *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In many of Nevada's other igneous contentions, the last paragraph of the contention explains that, because of the "burden and complexity of showing the dose effects of acceptance of Nevada's contentions," Nevada has not attempted to determine what effect, if any, acceptance of their contention would have on doses. See *e.g.*, Petition at 792 (NEV-SAFETY-150), 798 (NEV-SAFETY-151), and 806 (NEV-SAFETY-152). We have explained in response to those contentions why such a statement is inadequate to demonstrate an issue material to the findings that the NRC must make. But NEV-SAFETY-158 does not even include this language in its last paragraph. All the more reason why this contention does not demonstrate that Nevada has not met its burden under 10 C.F.R. § 2.309(f)(1)(iv).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because the contention does not reference any expert opinion. Nevada's Petition attaches one affidavit (Petition, Attachment 11 (Dr. Eugene Smith)), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention does not raise a genuine dispute because Nevada misreads the SAR and its supporting documents.

For background, DOE estimates that the mean probability of igneous activity disrupting a repository drift is  $1.7 \times 10^{-8}$  events/year. SAR at 2.3.11-21. This probability "was developed from the results of an expert elicitation that was completed in 1996." SAR at 2.3.11-9. This expert elicitation process was the basis for DOE's Probabilistic Volcanic Hazards Assessment (PVHA) which culminated in a publicly-available PVHA Report. SAR at 2.3.11-14 (referencing CRWMS M&O 1996 (LSN# DEN000861156)). The PVHA Report documents the judgments of the ten experts who participated in the elicitation process on various aspects of the PVHA, including the volcanic/tectonic setting, event definition, region of interest, and event counts. PVHA Report, Appendix E (Elicitation Interview Summaries).

### (1) Use of Geophysical Data in the Igneous Hazard Assessment

Although the contention asserts that “the fundamental question as to whether volcanoes are primarily controlled by upper crustal structure or mantle” must be addressed with high-quality geophysical data (Petition at 835), no clear definition is given for what “high-quality” geophysical data is, nor is a connection made between these data and the associated implications to the PVHA that might result, and the associated implications to the TSPA. Nor does Nevada explain where in the regulations DOE is required to generate “high-quality geophysical data” to “confirm or rule out” Nevada’s controversial theory<sup>88</sup> “that the primary control of the location of a basaltic field near Yucca Mountain is asthenospheric mantle.” Petition at 835. These flaws in Nevada’s argument fail to create a genuine dispute.

Also, Nevada states that “Without geophysical data to determine the subsurface geometry of faults, the thickness and geometry of the crust and lithospheric mantle, and the identification of low velocity zones (hot areas) in the crust and mantle, conclusions that relate volcano location to upper crustal structure and the local stress state are not supportable.” Petition at 837. The implication is that the PVHA experts were not provided with, and/or did not consider, high-quality geophysical data. This is not true. A simple review of the list of references distributed to the PVHA expert panel members indicates the following types of geophysical data were provided to the experts can specifically be used for the purposes alleged by Nevada:

- Paleomagnetic data
- Seismic tomography
- Teleseismic tomography
- Ground magnetic

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88 Clark County’s expert acknowledges that his own interpretation is controversial: “We realize that our observations and conclusions are controversial and anticipate that many questions will be asked about both temporal and mantle melting models.” Smith, E.I., Keenan, D.L., and Plank, T., 2002, *Episodic Volcanism and Hot Mantle: Implications for Volcanic Hazard Studies at the Proposed Nuclear Waste Repository at Yucca Mountain, Nevada*: GSA Today, v. 12, no. 4, at 7.”

- Geochronologic data
- Seismic reflection profiles
- Bouguer gravity map
- Total intensity gravity
- Aeromagnetic data
- Isostatic gravity map

PVHA Report, Appendix B, at B-1 – B-7. This list indicates that the expert panel was provided with a significant quantity of geophysical data and these data were evaluated, along with other types of data such as geologic and geochemical data, to develop their interpretations for the PVHA.

## (2) No Reliance on Assumptions

Nevada also states that “DOE relies heavily on an *assumption* of control exerted by upper crustal structures and the local stress field to predict the location of future eruptions.” Petition at 837 (referencing SAR at 2.2-97) (emphasis added). An assumption is something that is taken for granted as true or a supposition arrived at without the benefit of due consideration or evaluation. *See generally* American Heritage Dictionary (2nd ed.). Nevada implies that DOE (or the experts on the PVHA panel) began their assessments with a supposition of upper crustal structures and the local stress field controlling the location of future eruptions.

But no such assumption was made by the PVHA experts nor was it imposed by DOE: consistent with an expert elicitation process, all experts were exposed through workshops and field trips to a wide range of technical viewpoints and alternative conceptual models. PVHA Report at 2-25 to -29. In making their technical evaluations, they were encouraged to act as evaluators and consider all viewpoints as well as their own experience in making their assessments and in quantifying their uncertainties. *Id.* at 2-10 to -12 (describing roles of the PVHA participants).

Because Nevada does not contest DOE's analysis and has failed to controvert a position taken by the applicant in the Application, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plants Units 3 and 4), LBP-08-16, 68 NRC \_\_\_ (slip op. at 18, 29, 39-40, 42), (Sept. 12, 2008); *Texas Utilities Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

**159. NEV-SAFETY-159 - Propagation of Conceptual And Parametric Uncertainties Through the Safety Assessment**

SAR Subsection 2.4.1.1 and similar subsections, which claim that the TSPA approach combines the underlying model abstractions in such a way that it incorporates the estimated ranges of uncertainty in the parameter distributions, model abstractions, and disruptive events and then propagates this uncertainty into estimates of the annual dose, fail to propagate a full range of uncertainties and doing so would require the performance of a substantial number of additional modeling cases.”

**RESPONSE**

This contention asserts that the TSPA, as described in “SAR Subsection 2.4.1.1 and similar subsections,” fail to propagate a full range of uncertainties through the analysis and, therefore, do not meet the requirements of 10 C.F.R. §§ 63.114(b) and (c). Petition at 845.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada asserts that “a full appreciation of the potential overall bias in [DOE’s] assessment can only be achieved by propagating the alternatives separately through the assessment and determining their overall effect on the compliance results set out in 10 C.F.R. § 63.303.” Nevada Pet. at 847. In other words, Nevada is claiming that in order to satisfy the requirements of 10 C.F.R. §§ 63.114(b) and (c), DOE was required to quantitatively include

alternative conceptual models and uncertainties in those models in the estimates of repository performance. To that extent, the contention represents an impermissible collateral attack on NRC regulation §§ 63.114 (c) which requires only that DOE consider and evaluate the effects of those models on performance. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R. § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would

make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

In making its "reasonable expectation" determination, the NRC must evaluate DOE's compliance with the applicable provisions of Part 63, including, among other things, whether DOE has described the proposed geologic repository as specified in § 63.21, and whether the site

and design comply with the Part 63 performance objectives and requirements. Proposed safety contentions that fail to raise issues that are material to these findings are inadmissible. Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. As stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded.

Instead, Nevada merely asserts that by using what Nevada considers to be a small number of scenario classes and taking only limited account of alternative ways of partitioning the calculations, selecting alternative models or selecting parameter value distributions, DOE has limited “the range of uncertainty included in the results of the performance assessment.” Petition at 845. Nevada’s contention asserts no link whatsoever between the claimed lack of required detail in the SAR and an issue that is material to a finding the NRC must make.

Nevada asserts that the applicable regulations require that DOE’s TSPA should have considered a broader range of modeling and parameter alternatives in order to comply with the regulatory requirements for accounting for uncertainties and variabilities and for alternative conceptual models. Petition at 846. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository.

Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach one affidavit (Michael C. Thorne), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in this contention, the affidavit simply "adopts" Paragraph 5 of the otherwise unsupported assertions made in the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed above, DOE has already demonstrated that Nevada's claims are outside the scope of the proceeding and are also not material. Accordingly, Nevada's claims also do not raise a genuine dispute of material fact or law. But the contention also contains other arguments which, as DOE demonstrates below, also do not raise a genuine dispute.

Nevada asserts that the applicable regulations require that DOE's TSPA must propagate a full range of uncertainties into estimates of the annual dose through alternative scenarios, alternative partitioning of the scenarios into modeling cases, alternative choices of model

abstractions, and alternative parameter value distributions. Petition at 846. For the reasons discussed below, these arguments do not raise a genuine dispute of material fact or law and must be dismissed.

First, although this contention asserts that DOE should have considered “alternative possibilities” for scenario identification and steps in the modeling process, the contention does not allege that doing so would have produced results that are significantly different than the results of the TSPA. In fact, the strongest statement that Nevada makes about the impact of its allegations is that “the range of uncertainty in the assessment is *reduced*.” Petition at 846 (emphasis added). As discussed in Section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches, without specifying the ramifications or results of such alleged deficiencies, fail to raise a genuine dispute of material fact.

Second, Nevada’s assertion that “alternative possibilities” exist for the identification of scenarios and steps in the modeling process is a general statement that is so broad as to be virtually meaningless. *Id.* at 846. Nevada does not provide any indication as to which specific scenarios should have been identified, nor do its counsel’s unsupported musings about theoretical alternatives to elements of the TSPA modeling process establish the existence of a genuine dispute of material fact.

Third, in its assertion that DOE should have considered “alternative possibilities for the identification of scenarios,” Nevada fails to directly controvert DOE’s process for identifying and screening scenarios. *See Tex. Utils. Electric Co. (Comanche Peak Steam Electric Station, Unit 2)*, LBP-92-37, 36 NRC 370, 384 (1992). The contention does not address DOE’s FEP identification and screening process or provide any indication that Nevada’s assertion about “alternative possibilities” for the scenarios is anything more than a vague, undeveloped concept

which Nevada cannot yet articulate or describe in sufficient specificity to raise a genuine dispute of material fact.

Similarly, with respect to each of the other claims by Nevada that DOE has taken “limited account” of alternative ways of partitioning the calculations, selecting alternative models, or selecting parameter distributions, Nevada has presented only vague, unsupported theories and has failed to directly controvert DOE’s position as presented in the SAR. A brief summary of the SAR descriptions of each of the claims follows:

- With regard to the partitioning of scenarios into modeling cases, included FEPs are grouped into scenario classes (SAR § 2.2.1.4), which are further partitioned into modeling cases to enable quantitative evaluation (SAR § 2.4.1.2). DOE considered combinations of modeling cases (SAR § 2.4.1.7), and demonstrated that the results are a conservative overestimate of consequences from the repository system. For each modeling case, DOE also considered a wide range of future conditions (SAR Table 2.4-5). Thus, DOE considered the effects on performance assessment of the partitioning of scenario classes into modeling cases and of the variability inherent in each modeling case.
- With regard to alternate model abstractions, conceptual and numerical models for the included FEPs (SAR Table 2.2-5) are developed that describe the evolution of the repository system. In model development, DOE considered alternative conceptual models and evaluated the effects of alternative conceptual models on the performance of the repository system. Alternative conceptual model details and the results of DOE’s evaluation of each model are provided in the subsection of the SAR applicable to each model topic, and the details of the corresponding evaluations are in the referenced

analysis/model reports (AMRs) referenced in each SAR section. Thus, DOE considered alternate model abstractions in the TSPA.

- With regard to parameter value distributions, categories of epistemic uncertain parameters in the TSPA are listed in SAR Table 2.4-6. The selection of a probability distribution for each epistemic uncertain parameter is guided by the principle of maximum entropy. See “Total System Performance Assessment Model/Analysis for the License Application”, LSN# DEN001579005, at ES-33 and “Guidelines for Developing and Documenting Alternative Conceptual Models, Model Abstractions, and Parameter Uncertainty in the Total System Performance Assessment for the License Application”, LSN# DN2002011095 at 45. Because the selected distribution represents the broadest range of uncertainty in the parameter consistent with available information, DOE determined that no sensitivity studies on distribution shapes were appropriate.

Nevada has failed to directly controvert DOE’s position in each of the above areas, and therefore, the contention is subject to dismissal. See *Tex. Utils. Electric Co. (Comanche Peak Steam Electric Station, Unit 2)*, LBP-92-37, 36 NRC 370, 384 (1992).

Fourth, although the contention fails to directly controvert any of DOE’s documented positions on its treatment of uncertainties in its TSPA and makes only the most general statements about the theoretical possibilities that might be available to further evaluate uncertainties, Nevada attempts to cure these defects by citing to “other contentions.” Petition at 847. Apparently, Nevada is pointing the Board to the balance of its 228 contentions to ferret out more specific assertions of “these various conceptual uncertainties...that have not been addressed by DOE.” *Id.* at 847. This attempt to sweep into this contention unspecified material

from the balance of its petition in order to bootstrap its otherwise unsupported and overly general assertions into a litigable contention must necessarily fail. *See* Section V.A.3 above.

Fifth, even if Nevada's general theories about uncertainty analysis could be construed to be an argument for use of alternative models and codes, its contention still fails to meet admissibility standards. Although it would have been permissible for DOE to use alternative codes to satisfy 10 C.F.R. § 63.114(b) and (c), those regulations do not require DOE to do so. Instead, DOE assessed alternative conceptual models and considered and accounted for uncertainties as summarized above. As stated by the licensing board in *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station Units 1 and 2), LBP-03-017, 58 NRC 221, 240 (2003):

The Board views this proposed contention or subpart as an attempt to challenge the use by Duke of various models used in its calculation of accident consequences. But the Intervenors have made no showing either that the models used by Duke are defective or incorrect for the purpose used or that those models were used incorrectly by Duke. Nor have the Intervenors demonstrated that the models they are recommending are superior in any way to those employed by Duke. The Intervenors merely point out that, by using their models in the manner they are recommending, a different result would be achieved. That is an insufficient basis to formulate a valid contention.

Finally, paragraph 6 of the contention, in addition to not having been "adopted" by any of Nevada's experts, essentially admits that Nevada does not know whether this contention is material. That paragraph indicates that "Implementation of this strategy would require the performance of a substantial number of additional modeling cases." Petition at 848. Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel

Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises an issue that is material to this proceeding. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**160. NEV-SAFETY-160 - Probability Density Functions Used In The TSPA**

SAR Subsection 2.4 and similar subsections, which describe and rely upon results from the TSPA, fail to recognize that the probability density functions used in the modeling rely on arbitrary and implicit assumptions, and hence do not fully account for uncertainties and variabilities in parameter values and do not provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.

**RESPONSE**

This contention asserts that the TSPA, as described in “SAR Section 2.4 and similar subsections,” uses probability density functions that are not justified or well constrained by the available information, and that DOE should have performed sensitivity studies of the TSPA to the shapes chosen for the probability density functions. Petition at 849.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. Nevada concludes this

general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

In making its “reasonable expectation” determination, the NRC must evaluate DOE’s compliance with the applicable provisions of Part 63, including, among other things, whether DOE has described the proposed geologic repository as specified in § 63.21, and whether the site and design comply with the Part 63 performance objectives and requirements. Proposed safety contentions that fail to raise issues that are material to these findings are inadmissible. For example, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. As stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada asserts that the applicable regulations require that DOE justify the shapes of the probability density functions used in the TSPA, ensure that each selected distribution was constrained by the available information, and systematically explore the sensitivity of the model to the selected shapes. Petition at 853. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding. Petition at 849-50.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention contains unsupported assertions of counsel; and (2) the contention does not reference any expert opinion. Nevada's Petition does attach one affidavit (Michael C. Thorne), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in this contention, the affidavit simply "adopts" Paragraphs 5 and 6 of the otherwise unsupported assertions made in the contention. That approach falls far short of the requirement in 10 C.F.R. § 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation.

The only document the contention does reference other than the SAR and its references is a 350 page compilation of screenshots from the TSPA model (LSN# NEV000005505), but it makes no attempt to point the Board to the specific portions of the document on which it relies. As discussed in Section V.A.3 above, vague references to voluminous documents of this nature

are not permissible. Therefore, the contention is not supported by adequate factual information or expert opinion under 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed above, DOE has already demonstrated that Nevada's claims are not material. Accordingly, Nevada's claims also do not raise a genuine dispute of material fact or law. But the contention also contains other arguments which, as DOE demonstrates below, also do not raise a genuine dispute.

In particular, Nevada asserts that the probability density functions used in the TSPA modeling are based on arbitrary and implicit assumptions. Therefore, it asserts that the selected probability density functions do not fully account for uncertainties and variabilities in parameter values. Petition at 849. For the reasons discussed below, these arguments do not raise a genuine dispute of material fact or law and must be dismissed.

First, although this contention asserts that DOE should have better justified the shapes of the probability density functions, chosen distribution shapes less arbitrarily, and explored the sensitivity of the model to the chosen shapes, the contention does not allege that doing so would have produced results that are significantly different than the results of the TSPA. In fact, the strongest statements that Nevada makes about the impact of its allegations are that "a significant source of uncertainty in the assessment has not been quantified or reported," Petition at 849, and "the results of the assessment are *likely* to be biased." Petition at 854 (emphasis added).

In addition in alleging that DOE's justification of shapes of probability density functions does not adequately consider uncertainties, Nevada fails to identify alternatives that Nevada believes would more accurately characterize the properties. Accordingly, it is impossible to assess what effect, if at all, Nevada's claims would have on radiological dose results.

Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990). Furthermore, as stated above in Section d, because 10 C.F.R. Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses and to report those doses as mean doses, contentions failing to allege an increase in the mean dose above regulatory limits are inadmissible. Thus, as discussed in Section V.A.3 above, contentions, such as this, that allege errors, omissions, uncertainties or alternative approaches, without specifying the ramifications or results of such alleged deficiencies, fail to raise a genuine dispute of material fact.

Second, in its assertion that DOE does not justify the shapes of the probability density functions used in the TSPA, Nevada asserts that “the justification for selecting one distribution shape over another is not provided by DOE either in the LA or in the documentation incorporated within the TSPA model.” Petition at 851. This statement is incorrect, as DOE has provided in the LA and its supporting documentation the justification for the shapes of the probability density functions used in the TSPA. Basically, the specific information for each uncertain parameter in Appendix K of “Total System Performance Assessment Model/Analysis for the License Application” (LSN# DOC.20080312.0001), the primary reference for SAR Section 2.4, includes references to documentation that discusses the basis for characterizing uncertainty in each parameter. As explained in Section V.A.3 above, Nevada has had full access to these documents through the LSN. Since Nevada’s imprecise reading of a document cannot be the basis for a litigable contention, *Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-

95-6, 41 NRC 281, 300 (1995), this contention does not establish a genuine issue of material fact.

The contention also presents several examples that purport to demonstrate that DOE has not justified the shape of certain probability density functions. However, Nevada fails to direct the Board to any references or documentation whatsoever. Even if the contention is read to direct the Board to Nevada's compilation of screenshots from the TSPA (LSN# NEV000005505), Nevada has failed to specify any particular portions of the 350-page document as its basis for its assertions. *See e* above. Furthermore, because the document provides only screenshots of distributions for certain TSPA variables, without any description or discussion of the distributions, it contains no information about DOE's rationale for selecting a particular distribution for any of the variables, nor could it be expected to do so. Therefore, the assertion that DOE has not justified its selection of the shape of probability density functions is unsupported, in addition to being erroneous.

Third, with respect to Nevada's assertions that DOE has arbitrarily chosen the shapes of the probability density functions and has not conducted sensitivity analyses of the model to the selected shapes, Nevada fails to directly controvert DOE's documented position in the SAR and its supporting documents. As explained in "Guidelines for Developing and Documenting Alternative Conceptual Models, Model Abstractions, and Parameter Uncertainty in the Total System Performance Assessment for the License Application" (LSN# DN2002011095) at 45, the principle of maximum entropy is applied to the selection of the chosen distribution. This results in a distribution that encompasses the widest range of uncertainty that is consistent with available information. DOE's approach is not "arbitrary," but is a standard technique for characterizing

uncertainty for probabilistic risk assessment of nuclear power plants. *See* NUREG/CR-6823, Appendix B.

Application of the principle of maximum entropy also means that no sensitivity studies on distribution shape are appropriate, since capturing the broadest range of uncertainty in the parameter consistent with the available information already accounts for all available information that would otherwise form the basis for the sensitivity study. Nevada's failure to address DOE's basis for selection of the probability density functions, including its use of the maximum entropy principle, means that Nevada has failed to directly controvert DOE's position, and therefore, the contention is subject to dismissal. *See Tex. Utils. Electric Co. (Comanche Peak Steam Electric Station, Unit 2)*, LBP-92037, 36 NRC 370, 384 (1992).

Finally, paragraph 6 of the contention essentially admits that Nevada does not know whether this contention raises a genuine and material dispute. That paragraph indicates that "a determination whether acceptance of this contention would necessarily lead to calculated doses in excess of EPA's dose standards would require DOE to perform a substantial number of additional modeling cases that are not included in the LA and that are beyond the practical ability of anyone else to perform." Petition at 854. Nevada has not attempted to determine what effect, if any, acceptance of its contention would have on doses. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster (Savannah River Mixed Oxide Fuel Fabrication Facility)*, LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada's burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected.

In summary, this contention does not establish a genuine issue on a material issue of fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**161. NEV-SAFETY-161 - Critical Role Of Drip Shield**

The LA violates the requirements that there be “multiple barriers,” because its safety depends dispositively upon a single element of the engineered barrier system – the drip shield.

**RESPONSE**

In this contention, Nevada alleges that the Application violates statutory and regulatory requirements “that there be multiple barriers, because its safety depends dispositively upon a single element of the engineered barrier system – the drip shield.” Petition at 857. SAR § 2.1, however, provides for “multiple barriers,” as that term is defined in law and regulation, so Nevada’s contention fails as a matter of law. As explained further below, this contention is inadmissible because it is outside the scope of this proceeding, is immaterial to the NRC’s findings, lacks support in fact or expert opinion, and fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of this contention.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention misinterprets the NWPA, and does so in the face of clear NRC and judicial precedent. Nevada construes the requirement, in NWPA § 121(b)(1)(B), 42 U.S.C. § 10141(b)(1)(B)), that the repository use a “system of multiple barriers,” to mean that “the safety

of the repository does not rest upon a single barrier.” Petition at 857.<sup>89</sup> Nevada offers no legal authority in support of its interpretation of the NWPA. The NRC and the United States Court of Appeals, however, have already rejected Nevada’s prior attempt to advance this faulty interpretation. Thus, as explained in the Legal Standards section above, this contention is an impermissible collateral attack on both statute and regulation and is outside the scope of this proceeding.

In 10 C.F.R. § 63.115, the NRC implements the “multiple barriers” requirement of NWPA § 121(b)(1)(B). In promulgating this rule, the NRC considered the multiple barrier provision in the NWPA, and interpreted it to provide the NRC with the flexibility to promulgate regulations that addressed this issue in a *qualitative* rather than a *quantitative* manner. In its comments on the proposed rule, the Commission explained that, “Although it is relatively easy to identify multiple, diverse barriers that comprise the engineered and geologic systems, the performance of these systems cannot and should not be considered either truly independent or totally redundant.” Proposed Rule, Disposal of High-Level Radioactive Waste in a Proposed Geologic Repository at Yucca Mountain, Nevada, 64 Fed. Reg. 8,640, 8,649 (Feb. 22, 1999). During the 1990s, both the National Academy of Sciences and the Commission’s Advisory Committee on Nuclear Waste (“ACNW”) advised against the implementation of quantitative subsystem performance requirements for Yucca Mountain, and based on the current state of research, recommended only an overall quantitative performance standard for the repository. *See id.* As a result, the Commission expressed concern that “for the Yucca Mountain site, the application of the subsystem performance criteria [that had been earlier promulgated for Part 60]

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89 Nevada also provides a “back of the envelope” calculation purportedly showing that, without the drip shields, the regulatory dose limits will be exceeded. *See* Petition at 858-59. As explained in Section e, below, this calculation contains incurable flaws.

may impose significant additional expenditure of resources on the nation's HLW program, without producing any commensurate increase in the protection of the public health and safety.”

*Id.*

The Commission adopted the same approach in the final rule. In response to comments suggesting that the NRC should set quantitative requirements for specific barriers, such as the drip shields, the Commission reaffirmed its previous approach. Final Rule, Disposal of High-Level Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,773, 55,783 (Nov. 2, 2001). Specifically, advancements in techniques of performance assessment “obviate, in the Commission’s view, the need to prescribe arbitrary, minimum performance standards for subsystems to build confidence in the system’s overall performance.” *Id.* Thus, the Commission rejected a quantitative assessment of each barrier’s capability in favor of a qualitative assessment, in part because, “[i]t gives the Commission the flexibility to consider the nature and extent of conservatism in the evaluations used for compliance demonstration . . . .” *Id.* at 55,759.<sup>90</sup>

In summary, under the Commission’s rules, DOE must identify and describe the natural and engineered barriers that are important to waste isolation. 10 C.F.R. § 63.115; *see also* 66 Fed. Reg. at 55,783. DOE must address uncertainties in barrier performance, but need not do so in a quantitative manner. *See* 10 C.F.R. § 63.115(b); 66 Fed. Reg. at 55,759. Nowhere in Section 63.115 is there any requirement, as Nevada assumes, for a quantitative demonstration of the performance of any individual barrier. *See* 10 C.F.R. § 63.115.

Nevada challenged the NRC’s Part 63 rulemaking on this point, but the U.S. Court of Appeals for the D.C. Circuit upheld the NRC’s rule. In its appeal, Nevada claimed that the

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<sup>90</sup> As explained in Section e, below, it is precisely such “conservatisms” that Nevada misapplies to purportedly show that without drip shields, regulatory dose requirements are not met.

NRC's rule "violated the NWPA's requirement that a repository incorporate a multiple barriers system by failing to include any specific requirement for any barrier to provide any degree of protection that is substantially independent of the others." *Nuclear Energy Inst. v. EPA*, 373 F.3d 1251, 1294-95 (D.C. Cir. 2004) (internal quotations omitted). The court upheld the NRC's interpretation of the NWPA, and rejected Nevada's claim, however, because:

Section 121 does not, as Nevada contends, require that each barrier type provide a quantified amount of protection or, indeed, independent protection. Its silence instead gives NRC flexibility in determining how best to "provid[e] for the use of a system of multiple barriers in the design of the repository." We think that NRC, in implementing this requirement in the manner discussed above, acted reasonably and permissibly.

Id. at 1295 (citing *Chevron U.S.A. Inc. v. Natural Resources Def. Council, Inc.*, 467 U.S. 837, 843 (1984) (internal citations omitted))

Thus, by seeking to require a quantitative demonstration of repository performance without drip shields, this contention attempts to overturn 10 C.F.R. § 63.115 and the Commission's interpretation of NWPA § 121(b)(1)(B) in the Part 63 rulemaking, as upheld by the D.C. Circuit. As such, it is an impermissible collateral attack on both statute and regulation and is outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Because Nevada raises issues that, as explained in Section c, above, are outside the scope of this proceeding, it also raises issues that are not material to the findings that the NRC must make.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

This contention lacks adequate support in facts or expert opinion for three reasons. First, Nevada's affidavit impermissibly adopts the arguments of counsel. Second, the contention is based on unsupported speculation about the absence of drip shields. Third, the contention is based on a calculation that reaches unsupportable results by misapplying significant conservative assumptions in DOE's analysis.

**(1) Adoption of Assertions of Counsel**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the Application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach an affidavit (by Michael C. Thorne), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopts" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**(2) Baseless Speculation About the Absence of Drip Shields**

Tellingly, this contention rests solely upon speculation that the drip shield "*may*" not be there. Petition at 859 (emphasis added). Nevada states six vague and completely unsupported

reasons why it believes that drip shields will not be present. *Id.* None of these reasons withstand the most rudimentary scrutiny:

(a) “the over \$4 billion of titanium and palladium required for the drip shield to be procured”

- Even if we assume this unsupported assertion to be true, Nevada ignores the fact that drip shields need not be procured for a century. In any case, as explained in Section f below, the allegation that drip shields will not be installed due to cost is not litigable in this proceeding.

(b) “the drip shield cannot be fabricated on the schedule necessary to install it”

- This is a bare assertion with no supporting evidence.

(c) “the integrity of the drip shields cannot be sufficiently maintained in transportation”

- This is a bare assertion with no supporting evidence.

(d) “the technology to construct them does not exist”

- This is a bare assertion that fails to address or refute the information in SAR § 1.3.4.7.

(e) “errors, cave-ins, or even rocks on the ground of the drifts prevent the nearly 11,500 pieces of the drip shield from interlocking flush”

- This is a bare assertion that fails to address or refute the information in SAR § 1.3.4.4 (“Ground Support System”).

(f) “any of a number of technical problems prevent installation of all or any significant portion of the drip shield”

- This is a bare assertion that is also exceptionally vague. DOE addresses all of the specific “technical problems” associated with drip shield installation that Nevada raises in its other contentions, but does not raise here. *See, e.g.*, DOE’s responses to NEV-SAFETY-130, -131, -133, -140, -143.

In sum, Nevada provides absolutely no evidence to support its speculation that the drip shields “may” not be installed.

### (3) Flawed Mathematical “Analysis”

With respect to the consequences of omitting the drip shields, Nevada’s “recalculation” is equally flawed. Petition at 858. Instead of providing a credible technical analysis in support of its claim Nevada instead relies upon a rudimentary, “back-of-the-envelope” calculation. As explained below, Nevada’s calculation reaches unjustifiable results by misapplying significant conservative assumptions in DOE’s analysis. Therefore, it fails to provide the requisite factual or expert opinion support for this contention. *See USEC, Inc., CLI-06-10, 63 NRC at 472* (requiring expert opinions to be supported by a reasoned basis or explanation).

Nevada begins with DOE’s early drip shield failure analysis. Notably, this analysis includes the “bounding assumption” that “the waste package under an early-failed drip shield is assumed to experience localized corrosion over its entire surface as soon as seepage contacts the waste package. Because the drip shield early failure modeling case contributes only negligibly to the total dose . . . this bounding assumption is justified.” SAR at 2.4-16. In other words, the early drip shield failure analysis includes the conservative assumption that the waste package underneath the failed drip shield fails as well.

Nevada then assumes that, instead of a small number of drip shields experiencing early failure, no drip shields are present. Petition at 859. Crucially, Nevada retains the assumption of complete waste package failure underneath the absent drip shields—an assumption that, as the Application explains, is unjustified under the scenario Nevada posits. SAR at 2.4-16 (“Because the drip shield early failure modeling case contributes only negligibly to total dose . . . this bounding assumption is justified.”). *Nevada provides no explanation or basis for its assumption that all waste packages in the entire repository fail.* Nevada then “rescales” DOE’s dose curves to reach a value that exceeds the regulatory standards. *Id.* The unrealistic and unjustifiable

nature of this approach is clear: Nevada's calculation is not an analysis of the engineered barrier system without drip shields; it is an "analysis" of the repository without an engineered barrier system, contrary to NWPA § 121(b)(1)(B) (42 U.S.C. § 10141(b)(1)(B)) and 10 C.F.R. § 63.115. Nevada's contention is therefore unsupported by sufficient facts or expert opinion.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Because Nevada raises issues that, as explained in Section c, d, and e above, are outside the scope of this proceeding, not material to the NRC's findings, and are unsupported by facts or expert opinion, it also fails to raise a genuine dispute on a material issue of law or fact.

Finally, as explained in Section e, above, this contention rests solely upon speculation that the drip shield "may" not be installed. Petition at 859. Not only is this speculation unsupported, it also fails to raise a genuine dispute because the repository design, as described in the Application, contains drip shields. *See, e.g.*, SAR § 1.3.4.7. Nevada asks the Board, however, to assume that DOE will violate the terms of its license and not install drip shields.

The Commission has rejected this kind of contention before. In *Private Fuel Storage*, the State of Utah argued that, after operation commenced, the applicant might fail to generate sufficient revenue, and so might attempt to cut operating costs by reducing the number of trained firefighting personnel, contrary to the licensee's commitments. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-01-9, 53 NRC 232, 234 (2001). The Commission rejected this argument on appeal, stating that "we will neither assume that PFS will operate without sufficient financing, nor will we assume that an unexpected funding shortfall will induce PFS to ignore its responsibility to train and employ a sufficient number of firefighters." *Id.* at 235; *see also Curators of the Univ. of Mo.*, CLI-95-8, 41 NRC 386, 400 (1995) (rejecting intervenor's request "to base our findings on the assumption that the University

will violate an explicit and unambiguous condition of the license”). Here, Nevada presents similar speculation that DOE will be unable or unwilling to implement the repository design as described in the Application. This contention therefore fails to raise a genuine dispute and is inadmissible.

## **162. NEV-SAFETY-162 - Drip Shield Installation Schedule**

From SAR Subsections 1.1.3.1 and 1.1.3.2, and related subsections, it is clear that DOE plans to install the drip shields about one-hundred years from now, after all of the wastes are emplaced in the tunnels and just prior to repository closure, but this cannot be justified as safe because if installation of the drip shields proves to be defective or impossible it will be too late to assure safety by alternative means.

### **RESPONSE**

Nevada argues that DOE fails to provide an adequate plan for retrieval and alternate storage of radioactive wastes, and consequently has not provided reasonable assurance that retrieval can be performed safely in the event retrieval becomes necessary, specifically due to installation of drip shields becoming either defective or impossible.

#### **a. Statement of Issue of Law or Fact to be Controverted**

In this contention at paragraph 1, Nevada states that “from SAR Subsections 1.1.3.1 and 1.1.3.2, and related subsections, it is clear that DOE plans to install the drip shields about one-hundred years from now,” and that if installation cannot be performed, “it will be too late to assure safety by alternative means.” Petition at 861. Nevada then, however, raises for the first time at paragraph 5, SAR Subsection 1.11, in the context of attacking DOE’s proposed plans for retrieval of radioactive waste. Nevada cites to four other contentions (NEV-SAFETY-130, 134, 161, and 168) in paragraph 5 as well. Petition at 862. Nevada’s reference to this litany of sources is precisely what the Advisory PAPO Board sought to avoid in the June 20, 2008 Case Management Order’s requirement that petitioners submit single-issue contentions. *See U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6).

Indeed, it is impossible to discern precisely what the focus of this contention is and which section of the LA it is that Nevada seeks to challenge. 10 C.F.R. § 2.309(f)(1)(i) requires that “a specific statement of the issue of law or fact to be raised or controverted.” The June 20, 2008 Case Management Order further notes that “this [§ 2.309(f)(1)(i)] statement shall set forth petitioner’s contention in precisely the form it wishes the contention to be considered.” *U.S. Dep’t of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6). Nevada’s ambiguous statements regarding the specific SAR sections and various other contentions that it wishes to challenge or reference make it clear that Nevada has not met the pleading specificity requirements of 10 CFR § 2.309(f)(1)(i) and its related obligations specified in the June 20, 2008 Case Management Order.

Accordingly, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding and must be dismissed. Nevada argues that “the absence of any plans or detailed information about retrieval makes it impossible now to find reasonable assurance that retrieval will be a feasible option.” Petition at 862. This contention challenges 10 C.F.R. Part 63 and amounts to a collateral attack on NRC regulations. 10 C.F.R. § 63.21(c)(7) requires that the SAR include “a description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary,” and does not require a “plan or detailed information about retrieval,” as Nevada contends. Petition at 862. To the extent that Nevada alleges that DOE must submit a retrieval plan, this is an improper challenge

to NRC regulations and should be dismissed. *See* 10 C.F.R. § 2.335(a) and (b) (“no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding”). Furthermore, by alleging that DOE must include a “plan or detailed information” rather than “a description of plans” as § 63.21(c)(7) provides, Nevada impermissibly advocates a stricter requirement than is required. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff’d*, CLI-01-17, 54 NRC 3 (2001). Accordingly, because this contention challenges NRC regulations, it is outside the scope of this proceeding and must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations in Part 63, and concludes this litany with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

Furthermore, the legal citations provided by Nevada are not only vague, but also immaterial to this contention. Nevada claims that the LA does not comply with 10 C.F.R. § 63.31(a)(2), 10 C.F.R. § 63.113(b), and Section 121(b)(1)(B) of the Nuclear Waste Policy Act. But Nevada fails to demonstrate how any of these provisions are relevant to its contention.

Indeed, Nevada fails to even cite 10 C.F.R. § 63.21(c)(7), the provision requiring that DOE describe its plans for retrieval.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

Moreover, Nevada claims that if drip shields are impossible to install or are defective, "it will obviously be too late to assure safety by alternative methods short of retrieving the wastes from the tunnels." Petition at 862. Nevada claims that these concerns are "not speculative but well founded," and cites to paragraph 5 of two other safety contentions. This aspect of this contention also fails to raise an issue that is material to this proceeding.

As explained more fully in our answers to NEV-SAFETY-130 and NEV-SAFETY-161, referenced by Nevada in paragraph 5 of its contention, Nevada's speculation that installation of drip shields may be defective or impossible cannot provide the basis for a litigable contention because it is vague and unsupported, and because the repository design, as described in the LA, contains drip shields. *See, e.g.*, SAR § 1.3.4.7. In this contention, Nevada asks the Board to assume that DOE will violate the terms of its license in not installing drip shields after waste emplacement. An admissible contention cannot rely on the premise that an applicant will not implement the licensed design. DOE, as the applicant and ultimate licensee, is entitled to a presumption that it will construct and operate the repository as analyzed in the LA and ultimately authorized by the license. Thus, Nevada may not base its contention on the premise that DOE, as

the applicant and ultimate licensee, will not do so. Accordingly, this contention must be dismissed.

Nevada also alleges that DOE has failed to provide “any plans or detailed information about retrieval,” and fails to demonstrate that retrieval can be conducted safely in the future in the event drip shields cannot be installed. Petition at 862. This contention is immaterial to the proceeding, and must be dismissed.

As discussed above, Section 63.21(c)(7) requires that the SAR include “a description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary.” That description need only contain information that was reasonably available *at the time of docketing*. See 10 C.F.R. § 63.21(a) (requiring that the LA “be as complete as possible in light of information that is reasonably available at the time of docketing”)

Because DOE is not required to submit a retrieval plan at the time of LA submittal, Nevada’s allegation attacking the adequacy of DOE’s description of its retrieval plan is immaterial to the findings that the NRC must make to authorize construction of the repository. Because a contention is material only if its resolution would make a difference in the outcome of the proceeding, this contention must be dismissed. *Nuclear Management Company, LLC* (Palisades Nuclear Plant), LBP 06-10, 63 NRC 314, 353 (2006), *aff’d*, CLI-06-17, 63 NRC 727; Final Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Meaning Processing, 54 Fed. Reg. 33,168, 33,172 (Aug. 11, 1989).

For the reasons stated above, this contention is not material to the findings that the NRC must make in this proceeding, and must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3. above and the specific response below: (1) the contention does not reference any documents, other than the LA and DOE's supporting documents, and portions of other Nevada contentions (NEV-SAFETY-130, paragraph 5, NEV-SAFETY-161, paragraph 5, NEV-SAFETY-134 (no specific reference), NEV-SAFETY-168 (no specific reference)); (2) the contention contains unsupported assertions of counsel; and (3) the contention does not reference any expert opinion.

Nevada's Petition does attach an affidavit (by Stephen A. Frishman), which purportedly provides expert opinions in support of its admission. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopt[s]" the otherwise unsupported assertions made in paragraph 5 of the contention. That circular approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nor can the multiple references to other Nevada contentions be allowed to provide bases for this contention. Not only do they plainly violate the rule of the Case Management Order requiring each contention to raise a single issue that stands on its own, but they also, as a matter of logic, postulate as fact that which would need to be proven, should the other contentions be admitted. This cart-before-horse logic cannot serve to hypothecate a basis for a contention which, on its own as pleaded, has none. Accordingly, this contention must be dismissed.

Accordingly, this contention does not meet the pleading requirements of 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada violates the June 20, 2008 Case Management Order with its failure to comply with the requirement that petitioners separately explain the criteria of 10 C.F.R. § 2.309(f)(1). In paragraph 6 of this contention, addressing the criterion of Section 2.309(f)(1)(vi), Nevada makes a lone, vague, unsubstantiated assertion: “This contention challenges SAR Subsections 1.1.3.1 and 1.1.3.2 and related subsections, from which it is clear that that [sic] DOE plans to install the drip shields about one-hundred years from now, after all of the wastes are emplaced in the tunnels and just prior to repository closure, and therefore raises a material issue.” Petition at 862-63. In addition to this disregard of the June 20, 2008 Case Management Order, Nevada has plainly failed to raise a genuine dispute of material fact with this terse, unsupported and ambiguous claim. For this reason alone, this contention should be dismissed.

In other sections of this contention, Nevada claims that if drip shields are impossible to install or are defective, then DOE will have to retrieve the radioactive waste from the repository because no other options will be available. This aspect of this contention fails to raise a genuine dispute on a material fact or law.

As explained above, this contention must be dismissed because Nevada provides no facts or reasoned explanation supporting its allegation that installation of drip shields may be impossible or defective. Furthermore, this contention rests on impermissible speculation that DOE will not implement the repository design as submitted in the LA. Accordingly, this contention fails to raise a genuine dispute of material fact, and must be dismissed.

Nevada also alleges that DOE's description of its retrieval plan is insufficient, "making it impossible now to find reasonable assurance that retrieval will be a feasible protective option" if the need for retrieval arises, specifically by reason of drip shields not being installed or if they are defective. Petition at 862. This contention does not give rise to a genuine dispute for several reasons.

First, the contention is unsupported by facts or a reasoned analysis as to why the plan provided is deficient. SAR § 1.11, "Plans for Retrieval and Alternate Storage of Radioactive Wastes," describes the plan DOE will follow in the event it determines retrieval to be necessary. Among other things, SAR § 1.11 explains the following:

- Retrieval operations would be conducted using mobile transportation and emplacement (TEV) equipment used for emplacement, unless equipment is later designed specifically for retrieval and described in a license amendment.
- Retrieval operations will begin with cooling of the emplacement drifts using subsurface ventilation systems. Once the emplacement drifts are sufficiently cool, the TEV would begin waste package retrieval with removal of the packages emplaced nearest drift entrances. Waste packages would be removed in reverse sequence to emplacement. The TEV would load waste packages, transport packages to the surface, and move waste packages to an alternate storage facility. Detailed procedures would be prepared and approved prior to commencement of retrieval operations. Operational events with the potential to impact the TEV are analyzed in SAR § 1.6.
- Various conditions beyond the licensing bases possibly affecting retrieval are considered and accounted for, including draft collapse, backfill removal, and loose surface contamination.
- Methodologies have been provided for recovery from off-normal events and other potential retrieval problems.
- Although occupational dose estimates for retrieval have yet to be developed, ALARA principles will be accounted for through the use of engineering features, administrative controls, and radiation safety considerations. Remote technology will be used to avoid worker presence in high-radiation areas, and the ventilation system is designed to reduce the spread of radiation into occupied areas.

Because DOE has submitted a description of its retrieval plan, the only issue for consideration is whether the description provided is sufficient. Nevada argues that the description of retrieval plans in SAR §1.11 “makes it impossible” to find reasonable assurance that retrieval can be conducted safely. Petition at 862. Nevada, however, fails to provide any reason whatsoever why the description contained in this section is inadequate, alleging only that the description is presented in a “scant sixteen pages, and provides only limited information about basic retrieval concepts.” *Id.* As explained above, it is beyond dispute that the description of the retrieval and alternate storage plan is more than adequate to comply with Section 63.21(c)(7). Accordingly, this contention fails to raise a genuine dispute of material fact or law and must be dismissed.

Furthermore, Nevada’s allegation that it is “impossible now” to find reasonable assurance that retrieval will be feasible, (Petition at 862) fails to recognize that “development of detailed plans for the retrieval of waste packages would be driven by the reason for retrieval” and accordingly will not be developed until the need for retrieval arises in the future, if at all. SAR § 1.11 at 1.11-2. Accordingly, “the repository design preserves the ability to retrieve any or all of the emplaced waste prior to closure based on a reasonable schedule. The design approach to address this requirement is to ensure that the repository design and emplacement processes do not preclude the retrieval of any or all waste packages during that period.” SAR § 1.11.1 at 1.11-3. This design complies with 10 C.F.R. 63.111(e), which requires that the GROA “be designed to preserve the option of waste retrieval.” Accordingly, DOE’s compliance with this design criterion is what the NRC will consider when deciding whether the requisite determinations for construction authorization can be made under 10 C.F.R. § 63.31(a). At the time the need for retrieval is determined, safety analyses will be performed, which will “include the specific

details about how retrieval operations would be performed and will include material control and accounting, and physical protection considerations.” SAR § 1.11.1 at 1.11-2.

This approach is consistent with Part 63, which provides DOE with flexibility in the amount of detail that it provides at the time of LA submittal, requiring only that the LA “be as complete as possible in light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a). The Statements of Consideration accompanying the Commission’s final rule on “Disposal of High-Level Radioactive Wastes in a Proposed Geological Repository at Yucca Mountain, Nevada” state that:

[P]art 63 provides for a multi-staged licensing process that affords the Commission the flexibility to make decisions in a logical time sequence that accounts for DOE collecting and analyzing additional information over the construction and operational phases of the repository. The multi-staged approach comprises four major decisions by the Commission: (1) Construction authorization; (2) license to receive and emplace waste; (3) license amendment for permanent closure; (4) termination of license. The time required to complete the stages of this process . . . is extensive and will allow for the generation of additional information. Clearly, the knowledge available at the time of construction authorization will be less than at the subsequent stages.

Final Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geological Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55,738-39 (Nov. 2, 2001).

For all of the reasons discussed above this contention must be dismissed in its entirety.

**163. NEV-SAFETY-163 - Screening Of Near-Field Criticality**

SAR Subsection 2.2.1.4.1.3.3 and similar subsections estimate an unreasonably low probability of the occurrence of advective seepage onto a waste package for nominal scenarios, which leads to near-field criticality being inappropriately screened from consideration.

**RESPONSE**

This contention asserts that the estimate of the probability of advective seepage onto a waste package for nominal scenarios as documented in SAR Subsection 2.2.1.4.1.3.3, is unreasonably low, which leads to near-field criticality being inappropriately screened from consideration. As support for this assertion, Nevada claims that DOE's estimate of the occurrence of improper drip shield installation is erroneous because the human error probabilities (HEPs) used do not relate closely to the activities involved (NEV-SAFETY-147) and the approach to the calculation is erroneous (NEV-SAFETY-148).

**a. Statement of Issue of Law or Fact to be Controverted**

This contention repeats verbatim the entire statement of the facts from both NEV-SAFETY-147-148, Petition at 775-76, 779-81 thereby attempting to raise all of the issues from both prior contentions. Consequently, this contention does not comply with the direction of the June 20, 2008, Case Management Order for this proceeding that contentions be "narrow, single-issue contentions" that are "sufficiently specific as to define the relevant issues for eventual rulings on the merits, and do not require" extensive narrowing or clarification by the parties or boards. *U.S. Dep't of Energy*, LBP-08-10, 67 NRC \_\_ (slip op. at 6). For this reason, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies a number of regulations in the contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a “reasonable expectation” that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

In making its “reasonable expectation” determination, the NRC must evaluate DOE’s compliance with the applicable provisions of Part 63, including, among other things, whether DOE has described the proposed geologic repository as specified in § 63.21, and whether the site and design comply with the Part 63 performance objectives and requirements. Proposed safety contentions that fail to raise issues that are material to these findings are inadmissible. For

example, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. As stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada asserts that because DOE has erred in its estimate of the occurrence of a drip shield being improperly installed in the repository, DOE has inappropriately screened near-field criticality from consideration. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains unsupported assertions of counsel;

and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Michael C. Thorne and Douglas F. Hambley), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada references no documents which support its claim that DOE's approach to the calculation is erroneous. As discussed in DOE's Response to NEV-SAFETY-148, the one document, other than the SAR and its references, that Nevada cites for a single general statement in the contention is a book entitled, *The Psychology of Risk*, by G.M. Breakwell, Cambridge Univ. Press (2007), which is inapplicable and provides no support for the contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The contention criticizes DOE for having inappropriately screened near-field criticality from consideration because of errors in the calculated probability of occurrence of improperly placed drip shields. Nevada claims that because the probability of improperly installed drip shields is likely to be several orders of magnitude too low, "the frequency of occurrence of improperly installed drip shields is also likely to be several orders of magnitude larger than the screening criterion of one in 10,000." Petition at 870. Nevada goes on to assert that "early entry of water into waste packages and rapid leaching of fissile materials to the near field can occur, potentially resulting in criticality in the first 10,000 years." *Id.* For the reasons discussed below, these arguments do not raise a genuine dispute of material fact or law and must be dismissed.

Nevada's contention that criticality can potentially result in the first 10,000 years does not properly characterize the license application and supporting documents. Its statement that

“rapid leaching of fissile materials to the near field can occur, potentially resulting in criticality in the first 10,000 years” is based on an incorrect reading of the SAR. The probability of near-field criticality is not solely dependent upon the probability of improperly-placed drip shields. Rather, a number of events must occur to create a potential for near-field criticality in addition to a waste package breach.

Although Nevada is correct that DOE applies a bounding assumption that “the waste package under an early failed drip shield is assumed to experience localized corrosion over its entire surface as soon as seepage contacts the waste package,” Nevada’s unsupported conclusion that “rapid leaching of fissile materials to the near field can occur, potentially resulting in criticality in the first 10,000 years” is incorrect. Petition at 870. As DOE explains in the SAR, sufficient fissile material to achieve criticality external to the waste packages in either the seismic or igneous scenarios (which are bounding) would not accumulate over 10,000 years. SAR 2.2.1.4.1.3.3, citing *Geochemistry Model Validation Report: External Accumulation Model*, (SNL 2007a, Section 8.1.4[a]), LSN# DN2002501514. The actual masses of fissile material that would be necessary to achieve criticality are far greater than the mass of material that would accumulate or be released from the waste package, as shown in SAR at 2.2-292 (Table 2.2-14). As a result, the probability of near-field criticality is insignificant. Even if the probability of advective seepage were to change, as is asserted by Nevada, near-field criticality would still be screened out. Therefore, Nevada’s claim that near-field criticality was inappropriately screened from consideration is incorrect. Since Nevada’s imprecise reading of a document cannot be the basis for a litigable contention, *Ga. Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 300 (1995), this contention does not establish a genuine issue of material fact. Furthermore, because DOE’s position in SAR Section

2.2.1.4.1.3.3 that insufficient fissile material would accumulate to achieve near-field criticality over 10,000 years is the primary basis for screening out near-field criticality, and Nevada fails to directly controvert that position, the contention is subject to dismissal. *See Tex. Utils. Electric Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

Nevada's sole basis for the contention is alleged errors in the calculated probability of improperly placed drip shields. The contention repeats verbatim in its statement of facts, paragraph 5, the corresponding sections from NEV-SAFETY-147 and -148. Therefore, the reasons that NEV-SAFETY-147 and -148 do not establish a genuine dispute of material fact are equally applicable here and are summarized below. Nevada fails to identify any HEPs that relate more closely to the drip shield installation activities than those used by DOE, and the one HEP challenged by Nevada is in fact based on an appropriate model of the drip shield inspection process. The HEPs used in the analysis were determined to be relevant to activities that will occur at Yucca Mountain. Nevada has not claimed that use of other HEPs would increase the rate or extent of degradation of the EBS, nor that DOE's estimates of EBS degradation are not conservative. Even if significantly higher HEPs were used, a material impact on the final dose results is unlikely. Inclusion of mechanical or equipment reliability considerations in DOE's probability calculation for improper drip shield installation, produces an immaterial change in the results. Nevada's speculation that DOE's personnel will violate procedures, thereby increasing the probability of improper drip shield installation, is unsupported and therefore, insufficient to overcome the strong presumption that the personnel will comply with required procedures. Since Nevada has failed to directly and specifically challenge the calculated frequency of improper drip shield installation, the contention fails to raise a genuine dispute of material fact. Finally, Nevada has not demonstrated that the resolution of this contention would

significantly affect any finding the NRC must make to authorize construction. See DOE's Responses to NEV-SAFETY-147 and -148.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

#### **164. NEV-SAFETY-164 - Aggregation Of Probability Distributions**

The process described for the conduct of expert elicitation in SAR Subsections 5.4.1 for probabilistic volcanic hazard analysis (PVHA), 5.4.2 for probabilistic seismic hazard analysis (PSHA), and 5.4.3 for saturated zone flow and transport (SZFT) and similar subsections was realized by using only one method for aggregating probability distributions from groups of experts, so failing to demonstrate the results of other equally valid aggregations that could have been less favorable to the safety case.

#### **RESPONSE**

In this contention Nevada challenges DOE's method of aggregating probability distributions from multiple experts in the expert elicitation process described in SAR Section 5.4, covering the probabilistic volcanic hazard analysis, probabilistic seismic hazard analysis, and saturated zone flow and transport analysis. Petition at 873. This contention is based on Nevada's incorrect legal interpretation of 10 C.F.R. § 63.114(c), which requires consideration of alternative conceptual models of features and processes that may affect repository performance. Relying on its faulty interpretation, Nevada incorrectly treats the "method" DOE used to aggregate probability in its expert elicitation as itself a "model" of a feature or process under Section 63.114(c) and concludes that DOE therefore must consider alternative methodologies that Nevada proffers. The Board must reject this contention because such methodologies for conducting expert elicitation are not "models" subject to Section 63.114(c). Instead, the only relevant and material question is whether the method described by the applicant is sufficiently transparent and accounts for disparate views. Nevada fails to show that DOE's method departed from this standard. Having failed to show that DOE's aggregation methodology fails to account for uncertainties, this contention fails to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of NEV-SAFETY-164, as set forth in Section 1 of the contention.

**b. Brief Explanation of Basis**

Section 2 of NEV-Safety-164 does not satisfy 10 C.F.R. § 2.309(f)(1)(ii) because it does not identify what, if any, regulatory requirement(s) the Application allegedly fails to satisfy. Petition at 873. Nevada suggests that DOE's method for aggregating probability distributions should have reflected the "central tendency" or a "consensus" of the experts' probability distributions, but Nevada offers no foundation for this statement. In fact, Section 2 of this contention fails to cite any legal requirement whatsoever.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of NEV-SAFETY-164.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention is not material because Nevada fails to identify any regulation that would not be satisfied by reason of the alleged deficiency in the elicitation process. Nevada confuses its objection to DOE's method for conducting expert elicitation (which is governed by section 63.21(c)(19)) with the question whether DOE properly considered the output – alternative conceptual models – of that process. Section 63.114(c) requires consideration of alternative conceptual models of "features and processes" of the geologic site that affect repository performance; the method for aggregating expert opinions simply is not a model of geologic features and processes that is addressed by section 63.114(c). An aggregation methodology –

essentially the tool for combining the output (the conceptual models) from the elicitation process – cannot be equated with the conceptual models themselves. Absent identifying any “alternative conceptual models” of features and process that DOE should have evaluated, this contention cannot stand.

Even if DOE should have considered alternative aggregation methods in the expert elicitation process – which DOE denies – Nevada does not show that it would make a material difference. Although Nevada suggests that different aggregation methodologies can lead to different results (Petition at 877), it fails to show that DOE’s methodology is unreliable. A contention is material only if its resolution would make a difference in the outcome of the proceeding. *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999). Nevada has not shown that resolution of this issue would prevent the NRC from finding that there is a reasonable expectation that radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). In short, this contention is not material because Nevada has not demonstrated that resolution of this contention would significantly affect any findings that the NRC must make to authorize construction of a repository.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v) and the specific response below: (1) for the most part, the contention does not reference any documents, other than the license application and DOE’s supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does

not reference any expert opinion. Nevada's Petition does attach the affidavits of Michael C. Thorne and Lawrence D. Phillips, which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Although Nevada suggests that different aggregation methodologies may yield different results, it has not shown that DOE's methodology is materially insufficient or falls short of any regulatory requirement. As discussed in the applicable Legal Standards section above, contentions expressing only generalized "uncertainties" in DOE models or analysis represent an improper challenge to 10 C.F.R. Part 63, which recognizes that uncertainties exist and cannot be eliminated.

Furthermore, Nevada essentially admits that it does not know whether this contention is material – ambiguity that renders the contention inadmissible. Specifically, Nevada admits that "more research is needed to provide solid empirical evidence" for its assertion that its preferred aggregation methodology is superior to DOE's approach. Petition at 878. Accordingly, it is impossible to assess what effect, if any, Nevada's claims would have on radiological dose results. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the material ramifications or results of such alleged deficiencies – fail to raise a material issue of fact or law and are, therefore, inadmissible. *See Fla. Power & Light Co. (Turkey Point Plant, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

This contention suffers from this deficiency. Nevada states that, because of the “burden and complexity of showing the dose effects of acceptance of Nevada’s contentions,” it has not even attempted to determine what effect, if any, acceptance of the contention would have on doses. Petition at 879. The petitioner has the burden of showing that its proposed contention meets the requirements in 10 C.F.R. § 2.309(f). *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-01-35, 54 NRC 403, 422 (2001). Therefore, it is Nevada’s burden to show that its contention raises a genuine material dispute. In contrast, paragraph 6 essentially argues that DOE must demonstrate that no such genuine dispute exists. This argument constitutes an improper attempt by Nevada to shift its burden to DOE, and should be rejected. Moreover, from a substantive perspective, NEV-SAFETY-164 also fails to raise a genuine dispute because Nevada relies on a mistaken premise to challenge DOE’s method for aggregating expert judgments in the expert elicitation process. In short, Nevada confuses its objection to DOE’s method for conducting expert elicitation (which is governed by Section 63.21(c)(19)) with the question whether DOE properly considered the output – alternative conceptual models – of that process (which is governed by Section 63.114(c)). By conflating these two regulations, Nevada tries to impose a de facto new requirement for expert elicitation that simply does not exist.

Nevada in effect ignores Section 63.21(c)(19), which governs expert elicitation. That section requires only an explanation of how the applicant used expert elicitation. It does not prescribe any specific methodology for aggregating expert judgments (or for any other aspect of the elicitation). DOE properly explained its use of expert elicitation process in SAR Section 5.4, which is based on NRC guidance contained in NUREG-1563. *See* Kotra, J.P.; Lee, M.P.; Eisenberg, N.A.; and DeWispelare, A.R., “Branch Technical Position on the Use of Expert

Elicitation in the High-Level Radioactive Waste Program,” NUREG-1563, U.S. Nuclear Regulatory Commission, TIC: 226832 (1996). Nevada has not challenged that explanation and thus cannot show non-compliance with Section 63.21(c)(19).

Instead, Nevada tries to shoehorn its objection into the requirement in Section 63.114(c) that the applicant evaluate the effects that alternative conceptual models of the site’s geologic “features and processes” have on the repository’s performance. The *method* for aggregating expert opinions, however, is not addressed by Section 63.114(c)’s requirements for evaluating *models* of geologic features and processes.

Nevada’s faulty interpretation of Section 63.114(c) is betrayed by Nevada’s own citation to NUREG-1563, which provides detailed guidelines for using expert elicitation. Nevada incorrectly asserts that NUREG-1563 “does not provide guidelines” for aggregating expert judgments. Petition at 874. To the contrary, NUREG-1563 (at 28-29) discusses three approaches to aggregation (behavioral, mechanical, and blended approaches) and discusses the pros and cons associated with each. One of the approaches discussed is the “SSHAC” approach,<sup>91</sup> a blended, “stepwise” approach (*id.* at 29) that was used by DOE for the expert elicitations at issue here. NUREG-1563 does not prescribe or recommend any particular aggregation methodology, nor does it prescribe or recommend that multiple aggregation methodologies be considered and exercised: “It is not the intent of the NRC staff to prescribe any particular algorithm or aggregation technique, or require aggregation itself. Choice of an appropriate method or methods of aggregation may be highly issue-specific.” NUREG-1563 at 29.

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91 *See Id.* (citing SSHAC (1995), which was published as NUREG/CR-6372, Budnitz et al. 1997 [DIRS 103635])

Significantly, the NRC Staff concluded that a stepwise approach (like the SSHAC approach used by DOE here) “will tend to foster conditions where equal weighting of individual judgments may be most appropriate. *Id.* By contrast, NUREG-1563 specifically discourages using a consensus approach like the one Nevada recommends. *Id.* Whereas Nevada favors a consensus approach where “no individual assessments would be carried out (Petition at 876), NUREG-1563 cautions that “the professional judgment of each subject-matter expert must be explicitly documented . . . [and a] unanimous, consensus, or summary opinion without such documentation will generally not be suitable to support a compliance demonstration, for purposes of licensing.” NUREG-1563 at 29.

In any event, NUREG-1563 contemplates applicants using any number of aggregation methods as long as the process is transparent: “Whatever aggregation method is employed, the individual expert’s opinions must be preserved, documented, and provided to the NRC staff.” NUREG-1563 at 17. In addition, NUREG-1563 provides that the applicant should supply a rationale for the aggregation method selected. As reflected in SAR Section 5.4, DOE has done just that.

Despite the fact that neither Section 63.114(c) nor NUREG-1563 prescribe any particular aggregation methodology – and notwithstanding NUREG-1563 accepting the applicant’s use of “whatever aggregation method,” provided there is transparency – Nevada concludes that the supposed lack of clear guidelines somehow requires DOE to “report” alternative aggregation approaches. Petition at 874. Nevada reasons that this is necessary because alternative methodologies “might” result in different impacts on the repository’s performance assessment. *Id.* But that is pure, impermissible speculation, as Nevada offers no facts or expert opinion to support what “might” happen. *Fansteel*, CLI-03-13, 58 NRC at 203. Nevada concedes as

much, admitting that “more research is needed to provide solid empirical evidence” in support of its assertion that an alternative methodology should be used. Petition at 878.

Having failed to articulate any deficiency with respect to the expert elicitation requirements, Nevada then suggests that DOE’s expert elicitation process also does not comply with Section 63.114(b), which requires a performance assessment to “account for uncertainties and variabilities in parameter values and provide for the technical basis for parameter ranges, probability distributions, or bounding values used in the performance assessment.” This argument is beside the point. The very purpose of elicitation is to account for significant uncertainties that are difficult to quantify. SAR at 5.4-2. Nevada’s argument therefore does nothing more than state the case for using expert elicitation, which DOE has done. As discussed in the applicable Legal Standards section above, contentions expressing only generalized “uncertainties” in DOE models or analyses represent an improper challenge to Part 63, which recognizes that uncertainties exist and cannot be eliminated. This contention suffers from that deficiency.

DOE’s expert elicitations also provide a technical basis for the probability distributions. Nevada again confuses methods for aggregation with the resulting models that the aggregation produces. “Whatever aggregation method is employed” (NUREG-1563 at 17), the question is whether that method is sufficiently transparent and accounts for disparate views. Nevada fails to show that DOE’s method departed from that standard. In fact, DOE’s equal weighting method has been explicitly endorsed. *See, e.g.*, NUREG/CR-6607 at 10 (noting that the Senior Seismic Hazard Analysis Committee designed its process “to allow the equal-weights strategy to be implemented in a defensible manner”). Nor does Nevada even show that its alternative aggregation methodology – which Nevada concedes lacks “solid empirical evidence” to

commend it (Petition at 878) – would do a better job of satisfying Section 63.114(b). Indeed, as discussed above, the NRC Staff discourages using the consensus approach. NUREG-1563 at 29. Having failed to show that DOE’s aggregation methodology fails to account for uncertainties or otherwise fails to meet a regulatory requirement, this contention fails to raise a genuine dispute on a material issue of law or fact.

**165. NEV-SAFETY-165 - Saturated Zone Expert Elicitation**

SAR Section 5, Subsections 5.1, 5.4, 5.4.3, and similar subsections, and QARD 2.2.9 and 2.2.13.B.7, and similar subsections, which describe DOE's conduct of an expert elicitation relating to saturated zone flow and transport (SZEE) that is directly relied upon by DOE in its License Application (as well as the expert elicitation itself, DEN000672365), disclose a methodology so contrary to that which is required and that which DOE committed to employ as to render the SZEE inadequate and unusable in support of DOE's License Application.

**RESPONSE**

In this contention Nevada challenges DOE's methodology for expert elicitation relating to saturated zone flow and transport as described in SAR Sections 5.1, 5.4, and 5.4.3, and QARD Subsections 2.2.9 and 2.2.13.B.7, and "similar subsections." Petition at 880. Nevada essentially complains that the elicitation methodology was "biased" and "predetermined" to elicit findings in support of DOE's application. *Id.* This contention is deficient for failing to articulate a basis, demonstrate it is within the scope of the proceedings, and show a genuine dispute as required by section 2.309(f)(1)'s minimum pleading standards. The contention provides no extrinsic support or sponsoring expert to substantiate any of the alleged bias or to show that the supposed bias rendered DOE's elicitation process unreliable. Furthermore, the expert elicitation is entirely consistent with the NRC's NUREG-1563 guidance. For all these reasons, the Board must reject this contention as unfounded.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement to the extent the contention states that it challenges SAR Sections 5.1, 5.4, and 5.4.3, and QARD Subsections 2.2.9 and 2.2.13.B.7.

**b. Brief Explanation of Basis**

Section 2 of NEV-Safety-165 fails to articulate any basis for this contention. It merely alleges that DOE's expert elicitation methodology is "calculated to be biased" to result in "predetermined" outcomes, but it offers no hint of reason for that conclusion. The bare citation to 10 C.F.R. § 63.21(c)(19) and NUREG-1804 does not explain how DOE allegedly violated those provisions and therefore is inadequate for satisfying Nevada's burden, as petitioner, to provide a brief explanation of the basis for its contention as required by section 2.309(f)(1)(ii).

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations and guidelines in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 and NUREG guidance with the mere assertion that "this contention alleges noncompliance with these regulatory provisions (and DOE's own commitments) and therefore raises a material issue within the scope of the licensing proceeding." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ," not merely a citation of the relevant regulations and guidelines. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The elicitation method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304 and the NUREG guidance, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and

reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

This contention amounts to nothing more than unsubstantiated criticism and legal argument. Nevada’s fundamental argument is that the expert elicitation was allegedly “biased” and prone to an “unreliable outcome.” Petition at 882. Nevada goes so far as to accuse DOE of “disregard[ing]” expert opinions “until those opinions were deemed acceptable fodder for elicitation.” Petition at 888. But Nevada provides no substantial facts or expert opinion to show that the elicitation process in fact was biased, as distinguished from being a process that

attempted to identify and select from the acknowledged experts in a relatively rarefied field. It identifies no experts of its own who have a substantially different view of the analysis of saturated zone flow and transport. Nor does it point to any analysis that suggests that DOE's elicitation process in fact was flawed or resulted in an unreliable outcome. It does not even hint how the elicitation would have come out differently if DOE had changed its elicitation methodology. In sum, this contention presents only unsupported arguments of counsel and speculation and therefore should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Section 6 of NEV-Safety-165 does not satisfy section 2.309(f)(1)(vi) because it does not describe any dispute, let alone a genuine dispute on a material issue. The mere conclusory statement that the Application relies on a "methodology so contrary to that which is required" (Nevada Petition at 888) does not satisfy Nevada's obligation to articulate the contours of the alleged dispute.

Nevada fares no better when considering the balance of assertions made in other Sections of NEV-Safety-165. Nevada contends that DOE deviated from NUREG-1563's guidelines for conducting expert elicitation, resulting in a biased process that is a "recipe for an improperly conducted elicitation and an unreliable outcome." Petition at 882. Nevada's argument fails, however, because, as is shown below, DOE in fact complied with the applicable guidelines for conducting expert elicitation. Moreover, Nevada fails to demonstrate that the elicitation was biased or unreliable, and thus the contention fails to raise a genuine dispute on any material issue.

The majority of Nevada's lengthy discussion reflects its editorial comments blended into a loose collection of imprecise quotations from NUREG-1563's guidelines for conducting expert

elicitation. While Nevada infers that DOE's process was somehow "biased," it never explains how DOE in fact materially deviated from NUREG-1563's guidelines. Nevada's argument seems to boil down to two key allegations: (1) DOE's elicitation team is composed of DOE insiders who have supposed conflicts of interest, and (2) the elicitation process was designed to steer the experts' opinions into conformity with DOE's preferred outcomes. As discussed in detail below, both of these arguments are unfounded. Whatever alleged conflicts exist, those conflicts were properly disclosed. Furthermore, DOE's process closely followed NUREG-1563's guidelines, and the entirety of that process was thoroughly and transparently documented precisely as contemplated by the guidelines. At bottom, however, Nevada never shows that the process was in fact biased, never specifies any actual error or unreliability in the process, and never shows any material deviations from NUREG-1563. This contention thus amounts to nothing more than unsubstantiated allegations that lack any merit.

Nevada's argument depends on several mistaken assertions. First, Nevada contends that DOE failed to supply a rationale, as required by NUREG-1804, for any departures from the procedures for expert elicitation set forth in NUREG-1563. Petition at 883. Specifically, Nevada complains that DOE omitted "documentation of experts' rationale for revising their elicitations after receiving feedback," which Nevada suggests was part of a scheme "calculated to prevent exposing the degree to which the DOE process (aimed at pressuring the subject-matter experts into conformity with DOE's views) was successful or not." *Id.*

This argument does not raise a genuine dispute on a material issue. Seizing only on DOE's statement in the QARD that "OCRWM does not require documentation of the rationale for revisions to an expert's initial assessment," (Petition at 883), Nevada ignores the actual rationale, which DOE made explicit in the SAR. As explained in SAR Subsection 5.4.3, DOE

did not require individual experts to document revisions to their evaluations because it “has the potential to anchor experts to their initial evaluations, making experts reluctant to revise an evaluation after the feedback process.” SAR at 5.4-12. This also is consistent with guidance contained in NUREG/CR-6372 used for probabilistic seismic hazard expert elicitation. Budnitz, R.J.; Apostolakis, G.; Boore, D.M.; Cluff, L.S.; Coppersmith, K.J.; Cornell, C.A.; and Morris, P.A. 1997. Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on the Uncertainty and Use of Experts. NUREG/CR-6372. Two volumes. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 235076, 235074, LSN# DN2001909102.<sup>92</sup> That guidance emphasizes that experts should be encouraged to revise their assessments in light of feedback from their preliminary assessments, and “it should be emphasized by the TFI [technical facilitator/integrator] that there is no need nor any desire for the experts to agree with each other after having seen where their assessments stand relative to the other experts' assessments.” NUREG/CR-6372 at 76. NUREG/CR-6372 elaborates that experts will have greater buy-in to the process and will be more willing to revise their opinions based on information from different points of view if they do not feel that they are being personally attacked, *id.* at J-9, which could result if experts are made to document a justification for their change of opinion. Thus, this process was designed to encourage experts to keep an open mind, not to pressure them into adopting a particular point of view. Nevada simply ignores this inconvenient fact.

Second, Nevada contends that DOE failed to explain why its expert selection criteria did not require experts to disclose conflicts of interest. Petition at 884. Nevada then insists that DOE “literally invited” conflicts by permitting experts with a major role in the site

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92 The saturated zone expert elicitation is modeled upon the procedural guidance established for eliciting expert judgment for seismic hazards (which is set forth in NUREG/CR-6372). See CRWMS M&O (Jan. 1998). Saturated Zone Flow and Transport Expert Elicitation Project. Deliverable SL5X4AM3. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980825.0008, LSN# DEN000672365, at 2-3 (hereinafter, “SZEE”).

characterization project (and thus presumably biased in DOE's favor) to be included on the expert panel. *Id.*

This argument is as specious as the first. Again, DOE plainly set forth its rationale in SAR Section 5.4.3: "While the expert selection criteria did not specifically include this criterion [to disclose conflicts], the experts themselves did not oppose this obligation. This is evidenced by the fact that the experts disclosed their experience and then-current affiliations during the elicitation, as well as in their biographies provided in the final report." SAR at 5.4-10. In fact, DOE set forth the experts' affiliations and biographies in the SZEE report. *See* SZEE at 1-6 and Appendix A. Nevada's charge that DOE "squirreled away in unpublished files" evidence of conflicts (Petition at 884), which apparently amounts to no more than the experts' professional affiliations, is belied by the fact that Nevada apparently had no difficulty identifying the supposed conflicts (*see* Petition at 886-87). More fundamentally, Nevada makes no showing, or even a proffer of a showing, as to any biasing effect from the affiliations of the experts chosen within this quite specialized field.

Nevada also misses the mark when it complains that DOE "literally invited" conflicted subject-matter experts to join the elicitation panel. *See* Petition at 884. DOE established detailed guidelines for selecting experts. At minimum, proposed experts were required to have a "good professional reputation and widely recognized competence based on academic training and relevant experience." SZEE at 2-5. Naturally, experts were required to have relevant experience, but (contrary to Nevada's suggestion that the selection criteria were tilted fatally toward inbreeding) they were *not* required to have experience with the Yucca Mountain Site Characterization Project. *Id.* at 2-6. Furthermore, the selection criteria described in the SZEE report addresses this issue directly: "Individuals will be asked specifically not to act as

representative of technical positions taken by their organizations, but rather to provide their individual interpretations and assessments of uncertainties” *Id.*

The methodology development team conducted a broad search for nominations, which led to 59 peer nominations, of which 17 received extensive consideration. *Id.* After thorough vetting, only five agreed to participate and commit to devoting the necessary time and effort to the project. *Id.* at 2-7. The resulting panel “consisted not only of experts of considerable stature and prominence in the professional community, but of individuals with reputations as independent thinkers.” *Id.*

As discussed in the SZEE report (at 2-1), the Generalists and Normative Expert on the SZEE have significant experience in expert elicitations conducted using accepted methodologies and meet the required attributes described in NUREG-1563. For example, Generalist Dr. Kevin J. Coppersmith and Normative expert Dr. Peter A. Morris were members of the committee that developed guidance in NUREG/CR-6372 on expert elicitations. In sum, these individuals are acknowledged experts who have the skills that meet the selection criteria discussed in NUREG-1563 and the significant experience in expert elicitations. Although several of the experts are affiliated with DOE and its contractors (*see* Petition at 886-7), that is not a disqualifying factor. To the contrary, NUREG-1563 makes clear that the guidelines are “not intended to preclude the ability of DOE to use its own staff or its contractor's staff in any elicitation panel. NRC has traditionally considered, for review, the technical analyses prepared by the licensee (and its contractors) and will continue to do so.” NUREG-1563 at 25.

Furthermore, the NRC Staff has recognized, there are relatively few experts with relevant knowledge and experience in the HLW program, thus conflicts may be “unavoidable” given that the “population of known experts has probably been involved with one or more of the

interested/affected parties.” NUREG-1563 at 24. Indeed, the NRC Staff “does not assume” that any proposed expert with a “perceived or real conflict of interest will permit this conflict to influence his or her professional judgments.” *Id.* To that end, NUREG-1563 counsels transparency and documentation. *Id.* DOE did just that. “Information on potential sources of conflict of interest was provided by each expert and documented in SZEE administrative files.” SZEE at 2-7. The experts also disclosed “their experience and then-current affiliations during the elicitation, as well as in their biographies provided in the final report.” SAR at 5.4-10. The five panelists were asked to document any potential conflicts of interest, which is part of the public project record: MOL.19990428.0233 (LSN#: DEN000223137), MOL.19990429.0123 (LSN#: DEN000223152), MOL.19990429.0124, (LSN#: DEN000227356), MOL.19990429.0125, (LSN#: DEN000216962), MOL.19990429.0126 (LSN#: DEN000229691).

In a series of bullet points (Petition at 885-86), Nevada purports to enumerate several other criteria from NUREG-1563 for conducting unbiased expert elicitations. This enumeration focuses as much on Nevada’s views as it does on the extensive guidance found in NUREG-1563. For example, Nevada asserts that “one of the stated purposes of NUREG-1563 is to describe acceptable procedures for conducting expert elicitation” (Petition at 885), but it fails to note that in the very next sentence the NRC Staff cautioned that “rigid adherence to the specific steps proposed” is “not sought so much as the use of a consistent process that produces an accurate and properly documented assessment of the state of scientific uncertainty.” NUREG-1563 at 4 n.5. Thus, Nevada’s selective (and often mistaken) citation to this regulatory guidance reflects Nevada’s view rather than the considered judgment of the NRC Staff.

More importantly, Nevada consistently fails to demonstrate that DOE's elicitation materially deviated from the NRC Staff's guidance. The substantive arguments that can be discerned from Nevada's bullet points all suffer this deficiency. Nevada repeatedly recites the NRC Staff's concern that "care should be taken" in selecting normative experts, and that both generalist and normative experts should be screened using the same selection criteria as subject-matter experts. Petition at 885-86. Beyond identifying potential conflicts among the selected experts, however, Nevada fails to demonstrate any dispute of material fact regarding the selection of experts. As discussed above, and as evidenced by Nevada's recitation of organizational affiliations, DOE ensured proper transparency, and Nevada does not even attempt to show that any of these supposed potential conflicts have *in fact* tainted the elicitation.

Nevada observes that NUREG-1563 requires individually documenting each expert's judgments. Petition at 885. Contrary to Nevada's suggestion, DOE did precisely that and included the individual experts' elicitation summaries in the SZEE report. *See* SZEE at 2-10-11 and Appendix D.

Nevada asserts (in an imprecisely excerpted quote from NUREG-1563) that "[w]hen expert judgments are used to support a demonstration of compliance, sufficient documentation should exist to allow external examination of why the judgments were used instead of obtaining objective information." Petition at 886. But that assertion merely states the reason for using a formal elicitation process. There is no dispute that the SZEE report reflects the formal elicitation process, and it details the reasons for conducting the elicitation, namely, to "capture the uncertainties involved in assessing the saturated flow processes, including uncertainty in both the *models* used to represent the physical process controlling saturated zone flow and transport, and the *parameter values* used in the models." SZEE at 1-1; *see also* SAR 5.4-10.

Nevada criticizes the age of this particular elicitation (Petition at 886), but it does not demonstrate any flaw in the process or the resulting output. In effect, Nevada merely speculates that a newer study would provide different data, but it has not met its burden, as petitioner, to demonstrate that there is any material flaw with DOE's elicitation. *Cf. Duke COGEMA Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-4, 61 N.R.C. 71, 94-96 (2005) (holding on motion for summary disposition that contention challenging probabilistic seismic hazards analyses as being outdated raised no genuine issue of material fact where intervenor did not identify any previously unknown or uncharacterized potential hazards that would significantly increase the site's seismic hazard).

To the same effect, Nevada seems to question whether DOE could rely on the SZEE in support of its Application when, by Nevada's reckoning, that current use differs somewhat from the original stated purpose of the SZEE to "support the TSPA-VA (a much earlier version of DOE's TSPA) by providing an expression of uncertainties regarding key issues for the saturated zone." Petition at 886. Once again, however, Nevada does not explain how any supposed difference in purpose undercuts the utility of the data for supporting the Application. Nevada does not suggest that the original SZEE failed to capture any uncertainties that are relevant to the Application.

Nevada also makes the self-evident point that elicitation can be influenced by the data provided to the experts (Petition at 886), but once again it fails to aver, much less demonstrate, any genuine dispute following from that proposition. DOE uniformly distributed literature and technical data sets to all the experts, and that data is described in the SZEE report. SAR at 5.4-11; SZEE at Appendix B. Nevada presents no evidence that DOE failed to distribute a suitably broad range of materials and data, and it certainly does not show that the elicitation as conducted

produced an inaccurate result as a result of the data sample provided to the experts or otherwise fell short of the regulatory requirements.

In its closest approach to a substantive argument, Nevada recites the undisputed organizational affiliations and experience of the experts chosen, and its own version of the interactive deliberative process followed to develop consensus views as well as fully considered individual ones. Petition, 886-87. This reflects Nevada's fundamental misreading of NUREG-1563. For example, Nevada mistakenly contends that NUREG-1563 requires eliciting expert opinion before expert training, workshops, and field trips. Petition at 887. But DOE in fact followed the elicitation guidelines. Both NUREG-1563 and NUREG/CR-6372 make clear that elicitation training should occur in advance of the elicitations in order for the experts to take advantage of the information provided. NUREG 1563 at 17; NUREG/CR-6372 at 44-45. Likewise, both guidelines recommend that expert interactions such as workshops and field trips be conducted in advance of the final elicitation interviews in order for the experts to receive the information and feedback prior to the finalization of their assessments. NUREG-1563 at 27; NUREG/CR-6372 at 45-46. Thus, contrary to Nevada's unsupported accusation that DOE's process was "calculated to have the effect of revising and orchestrating the 'independent' thinking of the subject-matter experts" (Petition at 887), this process is specifically encouraged by the relevant guidelines.

Moreover, out of all this, Nevada comes up only with the unsupported concern that this process "creates the risk of introducing error into the LA and its analyses," which in turn, according to Nevada, "could lead to adverse health and safety consequences for workers and the public." Petition at 888. However, not a single independent basis is advanced in support of this concern, not a single concrete allegation is made about the supposed results of these alleged

biases, and not a single expert is listed in Nevada's table of experts in support of it. Thus, this contention is legally insufficient. As discussed in the applicable Legal Standards section above (Section V.A.3), contentions, like this one, that allege errors, omissions, uncertainties or alternative approaches – without specifying the deficiencies and making a prima facie demonstration of the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible.

Nevada has clearly stated its unhappiness with several aspects of DOE's expert elicitation process. However, it has neither made a prima facie case that DOE's process violated specific regulatory requirements, nor demonstrated that the alleged defects have produced (as distinguished from unsupported speculation that they might have tended to produce) distorted results. As the petitioner, Nevada has the burden of showing that its issues raise a genuine dispute worthy of litigating in this proceeding. An allegation that some aspect of the Application is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the Application is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). Nevada has not met this burden, and the contention should be dismissed.

**166. NEV-SAFETY-166 - Probabilistic Seismic Hazard Analysis Expert Elicitation**

SAR Section 5, Subsections 5.4 and 5.4.2, and similar subsections, and QARD 2.2.9, 2.2.13.B.7, and similar subsections, which describe DOE's conduct of an expert elicitation relating to Probabilistic Seismic Hazard Analysis (PSHA) that is directly relied upon in its License Application (as well as the expert elicitation itself, DEN000866273), disclose a methodology so contrary to that which is required and that which DOE committed to employ, as to render the PSHA inadequate and unusable in support of DOE's License Application.

**RESPONSE**

In this contention Nevada challenges DOE's methodology for expert elicitation relating to probabilistic seismic hazard analysis (PSHA) as described in SAR Sections 5.4, and 5.4.2, and QARD Subsections 2.2.9 and 2.2.13.B.7, and "similar subsections." Petition at 889. Nevada essentially complains that the elicitation methodology was "biased" and "predetermined" to elicit findings in support of DOE's application. *Id.* This contention is deficient for failing to articulate a basis, demonstrate it is within the scope of the proceedings, and show a genuine dispute as required by section 2.309(f)(1)'s minimum pleading standards. The contention provides no extrinsic support or sponsoring expert to substantiate any of the alleged bias or to show that the supposed bias rendered DOE's elicitation process unreliable. Furthermore, the expert elicitation is entirely consistent with the NRC's NUREG-1563 guidance. For all these reasons, the Board must reject this contention as unfounded.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement to the extent the contention states that it challenges SAR Sections 5.1, 5.4, and 5.4.2, and QARD Subsections 2.2.9 and 2.2.13.B.7.

**b. Brief Explanation of Basis**

Section 2 of NEV-Safety-166 fails to articulate any basis for this contention. It declares that DOE's expert elicitation methodology is "calculated to be biased" to result in "predetermined" outcomes (Petition at 889), but it offers no hint of reason for that conclusion. The bare citation to 10 C.F.R. § 63.21(c)(19) and NUREG-1804 (*id.*) does not explain how DOE allegedly violated those provisions and therefore is wholly inadequate for satisfying Nevada's burden, as petitioner, to provide a brief explanation of the basis for its contention as required by section 2.309(f)(1)(ii).

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement with respect to the admissibility of NEV-SAFETY-166.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations and guidelines in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 and NUREG guidance with the mere assertion that "this contention alleges noncompliance with these regulatory provisions (and DOE's own commitments) and therefore raises a material issue within the scope of the licensing proceeding." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ," not merely a citation of the relevant regulations and guidelines. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The elicitation method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304 and the NUREG guidance, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and

reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

This contention amounts to nothing more than unsubstantiated criticism and legal argument. Nevada’s fundamental argument is that the expert elicitation was allegedly “biased” and prone to an “unreliable outcome.” Petition at 891. Nevada goes so far as to accuse DOE of “disregard[ing]” expert opinions “until those opinions were deemed acceptable fodder for elicitation.” Petition at 897. But Nevada provides no substantial facts or expert opinion to show that the elicitation process in fact was biased, as distinguished from being a process that

attempted to identify and select from the acknowledged experts in a relatively rarefied field. It identifies no experts of its own who have a substantially different view of the analysis of probabilistic seismic hazards. Nor does it point to any analysis that suggests that DOE's elicitation process in fact was flawed or resulted in an unreliable outcome. It does not even hint how the elicitation would have come out differently if DOE had changed its elicitation methodology. In sum, this contention presents only unsupported arguments of counsel and speculation and therefore should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Section 6 of NEV-Safety-166 does not satisfy section 2.309(f)(1)(vi) because it does not describe any dispute, let alone a genuine dispute on a material issue. The mere conclusory statement that the Application relies on a "methodology so contrary to that which is required" (Nevada Petition at 897) does not satisfy Nevada's obligation to articulate the contours of the alleged dispute.

Nevada fares no better when considering the balance of assertions made in other Sections of NEV-Safety-166. Nevada contends that DOE deviated from NUREG-1563's guidelines for conducting expert elicitation, resulting in a biased process that is a "recipe for an improperly conducted elicitation and an unreliable outcome." Petition at 891. Nevada's argument fails, however, because, as is shown below, DOE in fact complied with the applicable guidelines for conducting expert elicitation. Moreover, Nevada fails to demonstrate that the elicitation was biased or unreliable, and thus the contention fails to raise a genuine dispute on any material issue.

The majority of Nevada's lengthy discussion reflects its editorial comments blended into a loose collection of imprecise quotations from NUREG-1563's guidelines for conducting expert

elicitation. While Nevada infers that DOE's process was somehow "biased," it never explains how DOE in fact materially deviated from NUREG-1563's guidelines. Nevada's argument seems to boil down to two key allegations: (1) DOE's elicitation team is composed of DOE insiders who have supposed conflicts of interest, and (2) the elicitation process was designed to steer the experts' opinions into conformity with DOE's preferred outcomes. As discussed in detail below, both of these arguments are unfounded. Whatever alleged conflicts exist, those conflicts were properly disclosed. Furthermore, DOE's process closely followed NUREG-1563's guidelines, and the entirety of that process was thoroughly and transparently documented precisely as contemplated by the guidelines. At bottom, Nevada never shows that the process was in fact biased, never specifies any actual error or unreliability in the process, and never shows any material deviations from NUREG-1563. This contention thus amounts to nothing more than unsubstantiated allegations that lack any merit.

Nevada's argument depends on several mistaken assertions. First, Nevada contends that DOE failed to supply a rationale, as required by NUREG-1804, for any departures from the procedures for expert elicitation set forth in NUREG-1563. Petition at 892. Specifically, Nevada complains that DOE omitted "documentation of experts' rationale for revising their elicitations after receiving feedback," which Nevada suggests was part of a scheme "calculated to prevent exposing the degree to which the DOE process (aimed at pressuring the subject-matter experts into conformity with DOE's views) was successful or not." *Id.*

This argument does not raise a genuine dispute on a material issue. Seizing only on DOE's statement in the QARD that "OCRWM does not require documentation of the rationale for revisions to an expert's initial assessment," (Petition at 892), Nevada ignores the actual rationale, which DOE made explicit in the SAR. As explained in SAR Subsection 5.4.2, DOE

did not require individual experts to document revisions to their evaluations because it “has the potential to anchor experts to their initial evaluations, making experts reluctant to revise an evaluation after the feedback process.” SAR at 5.4-9; *see also* CRWMS M&O 1998.

Probabilistic Seismic Hazard Analyses for Fault Displacement and Vibratory Ground Motion at Yucca Mountain, Nevada. Milestone SP32IM3, September 23, 1998. Three volumes. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19981207.0393. LSN#: DEN000866273 [hereinafter, “PSHA”] at 1-18.

This rationale also is consistent with guidance contained in NUREG/CR-6372 used for probabilistic seismic hazard expert elicitation. Budnitz, R.J.; Apostolakis, G.; Boore, D.M.; Cluff, L.S.; Coppersmith, K.J.; Cornell, C.A.; and Morris, P.A. 1997. Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on the Uncertainty and Use of Experts. NUREG/CR-6372. Two volumes. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 235076, 235074, LSN# DN2001909102. That guidance emphasizes that experts should be encouraged to revise their assessments in light of feedback from their preliminary assessments, and “it should be emphasized by the TFI [technical facilitator/integrator] that there is no need nor any desire for the experts to agree with each other after having seen where their assessments stand relative to the other experts' assessments.” NUREG/CR-6372 at 76. NUREG/CR-6372 elaborates that experts will have greater buy-in to the process and will be more willing to revise their opinions based on information from different points of view if they do not feel that they are being personally attacked, *id.* at J-9, which could result if experts are made to document a justification for their change of opinion. Thus, this process was designed to encourage experts to keep an open mind, not to pressure them into adopting a particular point of view. Nevada simply ignores this inconvenient fact.

Second, Nevada contends that DOE failed to explain why its expert selection criteria did not require experts to disclose conflicts of interest. Petition at 893. Nevada then insists that DOE “literally invited” conflicts by permitting experts with a major role in the site characterization project (and thus presumably biased in DOE’s favor) to be included on the expert panel. *Id.*

This argument is as specious as the first. Again, DOE plainly set forth its rationale in SAR Section 5.4.2: “While the expert selection criteria did not specifically include this criterion [to disclose conflicts], the experts themselves did not oppose this obligation. This is evidenced by the fact that the experts disclosed their experience and then-current affiliations during the elicitation, as well as in their biographies provided in the final report prepared for the PSHA.” SAR at 5.4-7. The PSHA experts also completed conflict of interest forms modeled after those used by the National Academy of Science to document potential conflicts. *Id.* In fact, DOE set forth the experts’ affiliations and biographies in the PSHA report. *See* PSHA at Tables 1-1, 1-2, 1-3, and 1-4 and Appendix A. Nevada’s charge that DOE “squirreled away in unpublished files” evidence of conflicts (Petition at 893), which apparently amounts to no more than the experts’ professional affiliations, is belied by the fact that Nevada apparently had no difficulty identifying the supposed conflicts (*see* Petition at 895-96). More fundamentally, Nevada makes no showing, or even proffer of a showing, as to any biasing effect from the affiliations of the experts chosen within this quite specialized field.

Nevada also misses the mark when it complains that DOE “literally invited” conflicted subject-matter experts to join the elicitation panel. *See* Petition at 884. As discussed in the PSHA report (Section 2.3 at 2-5 – 2-7), six selection criteria were defined that are consistent with the recommended criteria in NUREG-1563 (at 15). Among other things, the selection criteria

specifically required proposed experts to demonstrate the “[w]illingness to forsake the role of proponent of any model, hypothesis, or theory and to perform as an impartial expert who considers all hypotheses and theories and evaluates their relative credibility as indicated by the data.” PSHA at 2-6.

Naturally, the experts were required to have “strong relevant expertise.” PSHA at 2-6. But the experts were not required to have specific knowledge of the Yucca Mountain area, contrary to Nevada’s suggestion that the selection criteria were tilted fatally toward inbreeding. *See* Petition at 893. The selection criteria explicitly sought persons with “specific knowledge of the Yucca Mountain area, the Basin and Range Province, *or* ground motion characterization.” PSHA at 2-7 (emphasis added). Candidates were “nominated to capture the needed breadth of scientific expertise and technical knowledge and to obtain a *range of organizational representations.*” *Id.* (emphasis added).

The six selection criteria were applied in a stepwise fashion to narrow a total pool of candidate seismic source characterization and fault displacement (SSFD) and ground motion (GM) experts nominated by their peers to eighteen SSFD and seven GM finalists for participation on the panel. Each of the experts on the panels completed a conflicts of interest statement, which was included as part of the public record. PSHA at 2-8 to 2-9.<sup>93</sup> Several of those initially invited to become experts in fact declined on the basis of “perceived conflicts of interest.” PSHA at 2-7.

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93 Conflicts are documented in Murray, M. (1999), “Potential Sources of Conflict of Interest Forms for Seismic Experts and Ground Motion Experts.” Tracking Nos: SCP: 8.3.1.17.3.6.2. Las Vegas, Nevada: U.S. Geological Survey. ACC: MOL.19990527.0043; MOL.19990527.0044; MOL.19990527.0045; MOL.19990527.0046; MOL.19990527.0047; MOL.19990527.0048; MOL.19990527.0049; MOL.19990527.0050; MOL.19990527.0051; MOL.19990527.0052; MOL.19990527.0053; MOL.19990527.0054; MOL.19990527.0055; MOL.19990527.0056; MOL.19990527.0057; MOL.19990527.0058; MOL.19990527.0059; MOL.19990527.0060; MOL.19990527.0061; MOL.19990527.0062; MOL.19990527.0063; MOL.19990527.0064; MOL.19990527.0065; MOL.19990527.0066; MOL.19990527.0067; MOL.19990527.0068.

The Generalists and Normative Expert on the PSHA also have significant experience in expert elicitations conducted using accepted methodologies and meet the required attributes described in NUREG-1563 (at 23). For example, Generalist Dr. Kevin J. Coppersmith and Normative expert Dr. Peter A. Morris were members of the committee that developed guidance in NUREG/CR-6372 on expert elicitations. Thus, these individuals are acknowledged experts who have the skills that meet the selection criteria discussed in NUREG-1563.

Although several of the experts are affiliated with DOE and its contractors (*see* Petition at 895-96), that is not a disqualifying factor. To the contrary, NUREG-1563 makes clear that the guidelines are “not intended to preclude the ability of DOE to use its own staff or its contractor's staff in any elicitation panel. NRC has traditionally considered, for review, the technical analyses prepared by the licensee (and its contractors) and will continue to do so.” NUREG-1563 at 25.

Furthermore, the NRC Staff has recognized, there are relatively few experts with relevant knowledge and experience in the HLW program, thus conflicts may be “unavoidable” given that the “population of known experts has probably been involved with one or more of the interested/affected parties.” NUREG-1563 at 24. Indeed, the NRC Staff “does not assume” that any proposed expert with a “perceived or real conflict of interest will permit this conflict to influence his or her professional judgments.” *Id.* To that end, NUREG-1563 counsels transparency and documentation. *Id.* DOE did just that. As discussed above, each of the elicitation panel experts completed a conflicts of interest statement, which was included as part of the public record. PSHA at 2-8 to 2-9.

In a series of bullet points (Petition at 894-95), Nevada purports to enumerate several other criteria from NUREG-1563 for conducting unbiased expert elicitations. In reality, this

enumeration is so loaded with Nevada's own views that it is only casually representative of the extensive guidance found in NUREG-1563. For example, Nevada asserts that "one of the stated purposes of NUREG-1563 is to describe acceptable procedures for conducting expert elicitation" (Petition at 894), but it fails to note that in the very next sentence the NRC Staff cautioned that "rigid adherence to the specific steps proposed" is "not sought so much as the use of a consistent process that produces an accurate and properly documented assessment of the state of scientific uncertainty." NUREG-1563 at 4 n.5. Thus, Nevada's selective (and often mistaken) citation to this regulatory guidance often reflects Nevada's pure editorial view rather than the considered judgment of the NRC Staff.

More importantly, Nevada consistently fails to demonstrate that DOE's elicitation materially deviated from the NRC Staff's guidance. The substantive arguments that can be discerned from Nevada's bullet points all suffer this deficiency. Nevada repeatedly recites the NRC Staff's concern that "care should be taken" in selecting normative experts, and that both generalist and normative experts should be screened using the same selection criteria as subject-matter experts. Petition at 894-95. Beyond identifying potential conflicts among the selected experts, however, Nevada fails to demonstrate any dispute of material fact regarding the selection of experts. As discussed above, and as evidenced by Nevada's recitation of organizational affiliations, DOE ensured proper transparency, and Nevada does not even attempt to show that any of these supposed potential conflicts have *in fact* tainted the elicitation.

Nevada observes that NUREG-1563 requires individually documenting each expert's judgments. Petition at 894. Contrary to Nevada's suggestion, DOE did precisely that and included detailed summaries of various expert teams' conclusions and elicitation summaries in the PSHA report. *See* PSHA at 1-18, 3-9 to 3-12, 4-28 to 4-46, 5-3 to 5-6, and Appendices C-F.

Nevada asserts (in an imprecisely excerpted quote from NUREG-1563) that “[w]hen expert judgments are used to support a demonstration of compliance, sufficient documentation should exist to allow external examination of why the judgments were used instead of obtaining objective information.” Petition at 895. But that assertion merely states the reason for using a formal elicitation process. There is no dispute that the PSHA report reflects the formal elicitation process, and it details the reasons for conducting the elicitation, namely, to “(1) evaluate the fault displacement and vibratory ground motion hazards and their uncertainty at the Yucca Mountain site and (2) provide documentation of the technical basis for determining these hazards.” PSHA at 1-2; *see also* SAR 5.4-7.

Nevada seems to further criticize the age of this particular elicitation (Petition at 895), but it does not demonstrate any flaw in the process or the resulting output. In effect, Nevada merely speculates that a newer study would provide different data, but it has not met its burden, as petitioner, to demonstrate that there is any material flaw with DOE’s elicitation. *Cf. Duke COGEMA Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-4, 61 N.R.C. 71, 94-96 (2005) (holding on motion for summary disposition that contention challenging probabilistic seismic hazards analyses as being outdated raised no genuine issue of material fact where intervenor did not identify any previously unknown or uncharacterized potential hazards that would significantly increase the site’s seismic hazard).

To the same effect, Nevada seems to question whether DOE could rely on the PSHA in support of its Application when, by Nevada’s reckoning, that current use differs somewhat from the original stated purpose of the PSHA to use the results of that analysis “directly together with the refined component model response analyses, in subsequent TSPA-VA.” Petition at 895. Once again, however, Nevada does not explain how any supposed difference in purpose

undercuts the utility of the data for supporting the Application. Nevada does not suggest that the original PSHA failed to capture any uncertainties that are relevant to the Application.

Nevada also makes the self-evident point that elicitation can be influenced by the data provided to the experts (Petition at 895), but once again it fails to aver, much less demonstrate, any genuine dispute following from that proposition. DOE uniformly distributed literature and technical data sets to all the experts, and that data is described in the PSHA report. SAR at 5.4-11; PSHA at 1-11, 3-1, 5-2, 5-7 to 5-11, and Appendix B. Nevada presents no evidence that DOE failed to distribute a suitably broad range of materials and data, and it certainly does not show that the elicitation as conducted produced an inaccurate result as a result of the data sample provided to the experts or otherwise fell short of the regulatory requirements.

In its closest approach to a substantive argument, Nevada recites the undisputed organizational affiliations and experience of the experts chosen, and its own version of the interactive deliberative process followed to develop consensus views as well as fully considered individual ones. Petition at 895-96. This reflects Nevada's fundamental misreading of NUREG-1563. For example, Nevada mistakenly contends that NUREG-1563 requires eliciting expert opinion before expert training, workshops, and field trips. Petition at 896. But DOE in fact followed the elicitation guidelines. Both NUREG-1563 and NUREG/CR-6372 make clear that elicitation training should occur in advance of the elicitation in order for the experts to take advantage of the information provided. NUREG 1563 at 17; NUREG/CR-6372 at 44-45. Likewise, both guidelines recommend that expert interactions such as workshops and field trips be conducted in advance of the final elicitation interviews in order for the experts to receive the information and feedback prior to the finalization of their assessments. NUREG-1563 at 27; NUREG/CR-6372 at 45-46. Thus, contrary to Nevada's unsupported accusation that DOE's

process was “calculated to have the effect of revising and orchestrating the ‘independent’ thinking of the subject-matter experts” (Petition at 896), this process is specifically encouraged by the relevant guidelines.

Moreover, out of all this, Nevada comes up only with the unsupported concern that this process “creates the risk of introducing error into the LA and its analyses,” which in turn, according to Nevada, “could lead to adverse health and safety consequences for workers and the public.” Petition at 897. However, not a single independent basis is advanced in support of this concern, not a single concrete allegation is made about the supposed results of these alleged biases, and not a single expert is listed in Nevada’s table of experts in support of it. Thus, this contention is legally insufficient. As discussed in the applicable Legal Standards section above (Section V.A.3), contentions, like this one, that allege errors, omissions, uncertainties or alternative approaches – without specifying the and making a prima facie demonstration of the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible.

Nevada has clearly stated its unhappiness with several aspects of DOE’s expert elicitation process. However, it has neither made a prima facie case that DOE’s process violated specific regulatory requirements, nor demonstrated that the alleged defects have produced (as distinguished from unsupported speculation that they might have tended to produce) distorted results. As the petitioner, Nevada has the burden of showing that its issues raise a genuine dispute worthy of litigating in this proceeding. An allegation that some aspect of the Application is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the Application is unacceptable in some material respect. *See*

*Fla. Power & Light Co.* (Turkey Point Plan, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). Nevada has not met this burden, and the contention should be dismissed.

**167. NEV-SAFETY-167 - Probabilistic Volcanic Hazard Analysis Expert Elicitation**

SAR Section 5, Subsections 5.1, 5.4, 5.4.1, and similar subsections, and QARD 2.2.9, 2.2.13.B.7, and similar subsections, which describe DOE's conduct of an expert elicitation relating to Probabilistic Volcanic Hazard Analysis (PVHA) that is directly relied upon in its License Application (as well as the expert elicitation itself, DEN000861156), disclose a methodology so contrary to that which is required and that which DOE committed to employ, as to render the PVHA inadequate and unusable in support of DOE's License Application.

**RESPONSE**

Nevada challenges DOE's methodology for expert elicitation relating to its probabilistic volcanic hazard analysis (PVHA) as described in SAR Sections 5.1, 5.4, and 5.4.1, and QARD Subsections 2.2.9 and 2.2.13.B.7, and "similar subsections." Petition at 898. Nevada essentially complains that the elicitation methodology was "biased" and "predetermined" to elicit findings in support of DOE's Application. *Id.* This contention is deficient for failing to articulate a basis, demonstrate it is within the scope of the proceeding, and show a genuine dispute as required by section 2.309(f)(1)'s minimum pleading standards. The contention provides no extrinsic support or sponsoring expert to substantiate any of the alleged bias or to show that the supposed bias rendered DOE's elicitation process unreliable. Furthermore, the expert elicitation is entirely consistent with the NRC's NUREG-1563 guidance. For all these reasons, the Board must reject this contention as unfounded.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement to the extent the contention states that it challenges SAR Sections 5.1, 5.4, and 5.4.1, and QARD Subsections 2.2.9 and 2.2.13.B.7.

**b. Brief Explanation of Basis**

Section 2 of NEV-Safety-167 fails to articulate any basis for this contention. It declares that DOE's expert elicitation methodology is "calculated to be biased" to result in "predetermined" outcomes (Petition at 898), but it offers no hint of a reason for that conclusion. The bare citation to 10 C.F.R. § 63.21(c)(19) and NUREG-1804 does not explain how DOE allegedly violated those provisions and therefore is wholly inadequate for satisfying Nevada's burden, as petitioner, to provide a brief explanation of the basis for its contention as required by section 2.309(f)(1)(ii).

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada lists various regulations and guidelines in section (e) of this contention. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 and NUREG guidance with the mere assertion that "this contention alleges noncompliance with these regulatory provisions (and DOE's own commitments) and therefore raises a material issue within the scope of the licensing proceeding." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . , " not merely a citation of the relevant regulations and guidelines. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3, *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The elicitation method the DOE used in addressing the issue in this contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304 and the NUREG guidance, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and

reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

Here, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

This contention amounts to nothing more than unsubstantiated criticism and legal argument. Nevada’s fundamental argument is that the expert elicitation was allegedly “biased” and prone to an “unreliable outcome.” Petition at 900. Nevada goes so far as to accuse DOE of “disregard[ing]” expert opinions “until those opinions were deemed acceptable fodder for elicitation.” Petition at 906. But Nevada provides no substantial facts or expert opinion to show that the elicitation process in fact was biased, as distinguished from being a process that

attempted to identify and select from the acknowledged experts in a relatively rarefied field. It identifies no experts of its own who have a substantially different view of the analysis of probabilistic volcanic hazards. Nor does it point to any analysis that suggests that DOE's elicitation process in fact was flawed or resulted in an unreliable outcome. It does not even hint how the elicitation would have come out differently if DOE had changed its elicitation methodology. In sum, this contention presents only unsupported arguments of counsel and speculation and therefore should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Section 6 of NEV-Safety-167 does not satisfy section 2.309(f)(1)(vi) because it does not describe any dispute, let alone a genuine dispute on a material issue. The mere conclusory statement that the Application relies on a "methodology so contrary to that which is required" (Nevada Petition at 906) does not satisfy Nevada's obligation to articulate the contours of the alleged dispute.

Nevada fares no better when considering the balance of assertions made in other Sections of NEV-Safety-167. Nevada contends that DOE deviated from NUREG-1563's guidelines for conducting expert elicitation, resulting in a biased process that is a "recipe for an improperly conducted elicitation and an unreliable outcome." Petition at 900. Nevada's argument fails, however, because, as is shown below, DOE in fact complied with the applicable guidelines for conducting expert elicitation. Moreover, Nevada fails to demonstrate that the elicitation was biased or unreliable, and thus the contention fails to raise a genuine dispute on any material issue.

The majority of Nevada's lengthy discussion reflects its editorial comments blended into a loose collection of imprecise quotations from NUREG-1563's guidelines for conducting expert

elicitation. While Nevada infers that DOE's process was somehow "biased," it never explains how DOE in fact materially deviated from NUREG-1563's guidelines. Nevada's argument seems to boil down to two key allegations: (1) the elicitation process was designed to steer the experts' opinions into conformity with DOE's preferred outcomes, and (2) DOE's elicitation team is composed of DOE insiders who have supposed conflicts of interest. As discussed in detail below, both of these arguments are unfounded. Whatever alleged conflicts exist, those conflicts were properly disclosed. Furthermore, DOE's process closely followed NUREG-1563's guidelines, and the entirety of that process was thoroughly and transparently documented precisely as contemplated by the guidelines. At bottom, Nevada never shows that the process was in fact biased, never specifies any actual error or unreliability in the process, and never shows any material deviations from NUREG-1563. This contention thus amounts to nothing more than unsubstantiated allegations that lack any merit.

Nevada's argument depends on several mistaken assertions. First, Nevada contends that DOE failed to supply a rationale, as required by NUREG-1804, for any departures from the procedures for expert elicitation set forth in NUREG-1563. Petition at 901. Specifically, Nevada complains that DOE omitted "documentation of experts' rationale for revising their elicitations after receiving feedback," which Nevada suggests was part of a scheme "calculated to prevent exposing the degree to which the DOE process (aimed at pressuring the subject-matter experts into conformity with DOE's views) was successful or not." *Id.*

This argument does not raise a genuine dispute on a material issue. Seizing only on DOE's statement in the QARD that "OCRWM does not require documentation of the rationale for revisions to an expert's initial assessment" (Petition at 901), Nevada ignores the actual rationale, which DOE made explicit in the SAR. As explained in SAR Subsection 5.4.1, DOE

did not require individual experts to document revisions to their evaluations because it “can anchor the experts to their initial evaluations, making them reluctant to revise an evaluation after the feedback process.” SAR at 5.4-6.

This rationale also is consistent with guidance contained in NUREG/CR-6372,<sup>94</sup> used for probabilistic seismic hazard expert elicitation, on which the PVHA elicitation was modeled. See CRWMS M&O 1996. Probabilistic Volcanic Hazard Analysis for Yucca Mountain, Nevada. BA0000000-01717-2200-00082 REV 0. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19971201.0221. LSN# DEN000861156 [hereinafter, “PVHA Report”] at 2-2 to 2-5. That guidance emphasizes that experts should be encouraged to revise their assessments in light of feedback from their preliminary assessments, and “it should be emphasized by the TFI [technical facilitator/integrator] that there is no need nor any desire for the experts to agree with each other after having seen where their assessments stand relative to the other experts' assessments.” NUREG/CR-6372 at 76. NUREG/CR-6372 elaborates that experts will have greater buy-in to the process and will be more willing to revise their opinions based on information from different points of view if they do not feel that they are being personally attacked, *id.* at J-9, which could result if experts are made to document a justification for their change of opinion. Thus, this process was designed to encourage experts to keep an open mind, not to pressure them into adopting a particular point of view. Nevada simply ignores this inconvenient fact.

Second, Nevada contends that DOE failed to explain why its expert selection criteria did not require experts to disclose conflicts of interest. Petition at 902. Nevada then insists that DOE “literally invited” conflicts by permitting experts with a major role in the site

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94 NUREG/CR-6372, Budnitz, R.J.; Apostolakis, G.; Boore, D.M.; Cluff, L.S.; Coppersmith, K.J.; Cornell, C.A.; and Morris, P.A. 1997. Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on the Uncertainty and Use of Experts. Two volumes. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 235076, 235074, LSN# DN2001909102.

characterization project (and thus presumably biased in DOE's favor) to be included on the expert panel. *Id.*

This argument is as specious as the first. Again, DOE plainly set forth its rationale in SAR Section 5.4.1: "While the expert selection criteria did not specifically include this criterion [to disclose conflicts], the experts themselves did not oppose this obligation. This is evidenced by the fact that the experts disclosed their experience and then-current affiliations during the elicitation, as well as in their biographies provided in the final report prepared for the PVHA." SAR at 5.4-4; PVHA Report Appendix A. Nevada apparently had no difficulty identifying the supposed conflicts – which apparently amounts to no more than the experts' professional affiliations. *See* Petition at 904-05 (citing PVHA biographies and discussing one expert's affiliations). More fundamentally, Nevada makes no showing, or even proffer of a showing, as to any biasing effect from the affiliations of the experts chosen within this quite specialized field.

Nevada also misses the mark when it complains that DOE "literally invited" conflicted subject-matter experts to join the elicitation panel. Petition at 902. As discussed in the PVHA Report at 2-22 to 2-24), five selection criteria were defined that are consistent with the recommended criteria in NUREG-1563 (at 15). At minimum, proposed experts were required to have a "good professional reputation and widely recognized competence based on academic training and relevant experience." PVHA Report at 2-22. Experts were required to have relevant experience, including "experience collecting and analyzing research data for relevant volcanic studies in the southern Great Basin or similar extensional tectonic environments." *Id.* Although experience with the Yucca Mountain site was considered an asset in that regard, it explicitly was "not a requirement" (*id.*), contrary to Nevada's suggestion that the selection criteria were tilted fatally toward inbreeding. *See* Petition at 902. Furthermore, the selection

criteria described in the PVHA Report addressed this issue directly: “Individuals will be asked specifically not to act as representative of technical positions taken by their organizations, but rather to provide their own technical interpretations and uncertainties.” PVHA Report at 2-23.

In fact, candidates were sought to provide a panel “balanced to include experts with diverse opinions, areas of technical expertise and institutional backgrounds (e.g., from government agencies, academic institutions, and private industry). The panel should include some researchers who have worked in the YMR and some who have not.” *Id.* To that end, and considering the “importance of process issues” when conducting a multi-expert elicitation, DOE established a Methodology Development Team (MDT), including Generalists and Normative Experts, to identify experts for the panel and to oversee the elicitation process. PVHA Report at 2-1, 2-23.

Using the selection criteria discussed above, the MDT sought nominations of qualified experts for the expert panel, giving “careful consideration” to selecting individuals “to obtain a balance with respect to areas of technical expertise . . . as well as to include individuals from varied institutional backgrounds . . . .” PVHA Report at 2-23. In light of this requirement, seventeen individuals were invited to join the expert panel from a pool of seventy nominations. *Id.* Ten accepted and agreed to the extensive time commitment; three declined citing “potential conflicts of interest.” *Id.* The resulting panel consisted “not only of experts of considerable stature and prominence in the volcanological community, but individuals with reputations for being independent thinkers capable of coming to conclusions after evaluating all of the available data.” *Id.* at 2-24. The panel was selected to be “representative of the larger informed technical community,” which was intended to expose the experts to a “variety of views purposely designed to promote a broadening of the perspectives of each expert.” *Id.* at 2-16.

Although several of the experts are affiliated with DOE and its contractors (*see* Petition at 904-05), that is not a disqualifying factor. The NRC Staff recognizes there are relatively few experts with relevant knowledge and experience in the HLW program, thus conflicts may be “unavoidable” given that the “population of known experts has probably been involved with one or more of the interested/affected parties.” NUREG-1563 at 24. Nevertheless, the NRC Staff “does not assume” that any proposed expert with a “perceived or real conflict of interest will permit this conflict to influence his or her professional judgments.” *Id.* To that end, NUREG-1563 counsels transparency and documentation. *Id.* DOE did just that. As discussed above, the experts in fact disclosed their experience and affiliations, which is reflected in their biographies that are appended to the PVHA Report. PVHA Report Appendix A; SAR at 5.4-4. In sum, DOE developed a well-balanced panel and transparently documented the selection process, all in accordance with well established elicitation guidelines, including NUREG-1563.

In a series of bullet points (Petition at 903-04), Nevada purports to enumerate several other criteria from NUREG-1563 for conducting unbiased expert elicitations. Nevada’s enumeration contains mostly Nevada’s own views and is not representative of the extensive guidance found in NUREG-1563. For example, Nevada asserts that “one of the stated purposes of NUREG-1563 is to describe acceptable procedures for conducting expert elicitation” (Petition at 903), but it fails to note that in the very next sentence the NRC Staff cautioned that “rigid adherence to the specific steps proposed” is “not sought so much as the use of a consistent process that produces an accurate and properly documented assessment of the state of scientific uncertainty.” NUREG-1563 at 4 n.5. Thus, Nevada’s selective (and often mistaken) citation to this regulatory guidance often reflects Nevada’s editorial view rather than the considered judgment of the NRC Staff.

More importantly, Nevada fails to demonstrate that DOE's elicitation materially deviated from the NRC Staff's guidance. The substantive arguments that can be discerned from Nevada's bullet points all suffer this deficiency. Nevada repeatedly recites the NRC Staff's concern that "care should be taken" in selecting normative experts, and that both generalist and normative experts should be screened using the same selection criteria as subject-matter experts. Petition at 903-04. Generalist Dr. Kevin J. Coppersmith and Normative experts Dr. Peter A. Morris and Dr. Allin A. Cornell were members of the committee that developed guidance in NUREG/CR-6372 on expert elicitations. Thus, these individuals are acknowledged experts who have the skills that meet the selection criteria discussed in NUREG-1563. Furthermore, beyond identifying potential conflicts among the selected experts, however, Nevada fails to demonstrate any dispute of material fact regarding the selection of experts. As discussed above, and as evidenced by Nevada's recitation of organizational affiliations, DOE ensured proper transparency, and Nevada does not even attempt to show that any of these supposed potential conflicts have *in fact* tainted the elicitation.

Nevada observes that NUREG-1563 requires individually documenting each expert's judgments. Petition at 903. DOE did precisely that and included the individual experts' elicitation summaries in the PVHA Report. *See* PVHA Report at 2-16 to 2-17, 2-31 to 2-33, and Appendix E.

Nevada asserts (in an imprecisely excerpted quote from NUREG-1563) that "[w]hen expert judgments are used to support a demonstration of compliance, sufficient documentation should exist to allow external examination of why the judgments were used instead of obtaining objective information." Petition at 903. But that assertion merely states the reason for using a

formal elicitation process. There is no dispute that the PVHA report reflects the formal elicitation process, and it details the reasons for conducting the elicitation, namely, to

assess the probability of disruption by a volcanic event of the proposed high level waste repository at Yucca Mountain and to quantify the uncertainties associated with this assessment. . . . A major goal of the project was to capture uncertainties that are involved in the assessment of the volcanic hazard including uncertainty in both the *models* used to represent the key physical controls on volcanism and the *parameter values* used in the models. To ensure that a wide range of perspectives was considered in the hazard analysis, individual judgments were elicited from members of an expert panel.

PVHA Report at 1-1; *see also* SAR at 5.4-4.

Nevada seems to further criticize the age of this particular elicitation (Petition at 903-04), but it does not demonstrate any flaw in the process or the resulting output. In effect, Nevada merely speculates that a newer study would provide a different annual frequency of intersection of a repository drift by a volcanic event, but it has not met its burden, as petitioner, to demonstrate that there is any material flaw with DOE's elicitation. *Cf. Duke COGEMA Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-4, 61 N.R.C. 71, 94-96 (2005) (holding on motion for summary disposition that contention challenging probabilistic seismic hazards analyses as being outdated raised no genuine issue of material fact where intervenor did not identify any previously unknown or uncharacterized potential hazards that would significantly increase the site's seismic hazard).

Nevada questions DOE's reliance on the 1996 PVHA in support of its Application when, by Nevada's reckoning, there is new information (including allegedly new "aeromagnetic information") developed since the 1996 PVHA that DOE allegedly did not consider. Petition at 904. Nevada is factually incorrect because DOE did consider post-1996 information and analyses.

As discussed in DOE's response to contention NEV-Safety-157, the evaluation of information and analyses developed after the completion of the PVHA is plainly identified in the SAR and supporting documents. *See, e.g.*, SAR Section 2.3.11; BSC, *Characterize Framework for Igneous Activity at Yucca Mountain, Nevada*, ANL-MGR-GS-000001 REV 02, Table 6-4, at 6-16 to 6-17 (LSN: DEN2001632124; DEN2002077196; DEN001580092) (2004). After analyzing published estimates from 1982 to 2000 of the probability of a volcanic event intersecting the repository footprint, DOE concluded that the estimates, including the mean intersection probability estimated in the PVHA, "cluster at slightly greater than  $10^{-8}$  per year, providing confidence that the PVHA probability estimate is robust." SAR at 2.3.11-24. In addition, DOE evaluated the potential significance of aeromagnetic data gathered after the PVHA was completed for its potential significance to the hazard estimate. SAR at 2.3.11-25. The SAR identifies three separate sensitivity studies, completed following the PVHA, which show that effects of information developed following completion of the PVHA is insignificant. *Id.*

Most significantly, DOE's update to the PVHA (i.e., PVHA-U) was conducted using a panel of eight experts, whose evaluations included data that had become available since the conclusion of the PVHA, including high-resolution aeromagnetic data, drilling, geochemical, and geochronological analyses conducted specifically to support the PVHA-U. "Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada Rev. 01" (09/02/2008), (LSN# DEN001601965) (cited in Petition at 833). As summarized in DOE's letter to NRC dated October 17, 2008, "The differences between the PVHA-96 and PVHA-U distributions would not significantly affect the estimates of repository performance for either 10,000 years or 1,000,000 years, demonstrating that the PVHA-U results are confirmatory of the

PVHA-96 technical basis. As a result, the volcanic hazard results presented in the License Application (LA) are robust and suitable for evaluating the expected performance of the repository, and no change to the technical basis presented in the LA is necessary.” Letter from W. Boyle (DOE) to NRC, “Transmittal of Report: Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada.” October 17, 2008, Project No. WM-00011, Docket Number 63-001, with enclosures. BSC Correspondence Log # 1021084046, CCU.20081021.0009 LSN# DEN001606520.

Thus, Nevada is simply incorrect that DOE ignored post-1996 information and analyses. It fails to show that the original PVHA failed to capture any uncertainties that are relevant to the Application, and consequently it fails to raise a genuine dispute on a material issues.

Nevada also makes the self-evident point that elicitation can be influenced by the data provided to the experts (Petition at 904), but once again it fails to aver, much less demonstrate, any genuine dispute following from that proposition. DOE uniformly distributed literature and technical data sets to all the experts, and that data is described in the PVHA report. SAR at 5.4-5; PVHA Report at 2-13 and Appendix B. Nevada presents no evidence that DOE failed to distribute a suitably broad range of materials and data, and it certainly does not show that the elicitation as conducted produced an inaccurate result as a result of the data sample provided to the experts or otherwise fell short of the regulatory requirements.

In its closest approach to a substantive argument, Nevada recites the undisputed organizational affiliations and experience of the experts chosen, and its own version of the interactive deliberative process followed to develop consensus views as well as fully considered individual ones. Petition at 904-05. This reflects Nevada’s fundamental misreading of NUREG-1563. For example, Nevada mistakenly contends that NUREG-1563 requires eliciting expert

opinion before expert training, workshops, and field trips. Petition at 905. But DOE in fact followed the elicitation guidelines. Both NUREG-1563 and NUREG/CR-6372 make clear that elicitation training should occur in advance of the elicitations in order for the experts to take advantage of the information provided. NUREG-1563 at 17; NUREG/CR-6372 at 44-45. Likewise, both guidelines recommend that expert interactions such as workshops and field trips be conducted in advance of the final elicitation interviews in order for the experts to receive the information and feedback prior to the finalization of their assessments. NUREG-1563 at 27; NUREG/CR-6372 at 45-46. Thus, contrary to Nevada's unsupported accusation that DOE's process was "calculated to have the effect of revising and orchestrating the 'independent' thinking of the subject-matter experts" (Petition at 905), this process is specifically encouraged by the relevant guidelines.

Moreover, out of all this, Nevada comes up only with the unsupported concern that this process "creates the risk of introducing error into the LA and its analyses," which in turn, according to Nevada, "could lead to adverse health and safety consequences for workers and the public." Petition at 906. However, not a single independent basis is advanced in support of this concern, not a single concrete allegation is made about the supposed results of these alleged biases, and not a single expert is listed in Nevada's table of experts in support of it. Thus, this contention is legally insufficient. As discussed in the applicable Legal Standards section above (Section V.A.3), contentions, like this one, that allege errors, omissions, uncertainties or alternative approaches – without specifying the and making a prima facie demonstration of the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible.

Nevada has clearly stated its unhappiness with several aspects of DOE's expert elicitation process. However, it has neither made a prima facie case that DOE's process violated specific regulatory requirements, nor demonstrated that the alleged defects have produced (as distinguished from unsupported speculation that they might have tended to produce) distorted results. As the petitioner, Nevada has the burden of showing that its issues raise a genuine dispute worthy of litigating in this proceeding. An allegation that some aspect of the Application is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the Application is unacceptable in some material respect. *See Fla. Power & Light Co. (Turkey Point Plan, Unit Nos. 3 and 4)*, LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). Nevada has not met this burden, and the contention should be dismissed.

**168. NEV-SAFETY-168 - Retrieval Practicality**

The descriptions of plans provided in SAR Subsection 1.11 and similar subsections are not sufficiently detailed to demonstrate waste packages can be retrieved.

**RESPONSE**

In this contention, Nevada alleges that the description of DOE's retrieval plans in SAR Subsection 1.11 and similar subsections lacks sufficient detail, because it does not address certain events that may occur, or other information regarding the Transportation and Emplacement Vehicle (TEV) and drift inspection and maintenance. Nevada alleges, therefore, that DOE has not "demonstrate[d] waste packages can be retrieved." Petition at 908.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada does not demonstrate that DOE's alleged failure to include completed retrieval plans in an application for a construction authorization would in any way prevent the NRC from making the requisite findings under 10 C.F.R. § 63.31(a)(1)-(2). In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding,

Nevada identifies various NRC regulations and the NWSA, as these provisions relate to the subject of waste retrieval, including 10 CFR § 63.21(c)(7) and 10 CFR § 63.31(a)(3). *See* Petition at 908-09. Nevada then asserts that, “This contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of this proceeding.” *Id.* at 908-09.

10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding,” not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

As noted, this contention alleges non-compliance with various NRC regulations, Petition at 908-09; however, Nevada fails to demonstrate that any of the alleged deficiencies it identifies would preclude the NRC from finding that DOE has designed the facility in such a way as to allow for the retrieval of waste. Indeed, as shown in section f, below, in some cases the alleged deficiency is DOE’s alleged failure to consider certain events, when, in fact, DOE has considered the events and how to deal with them. In other cases, Nevada alleges that certain design details

are missing, but they are not. Finally, Nevada suggests that DOE has no plans for inspections and monitoring to support retrieval activities. This also is contradicted by the Application.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the Application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (by Doug F. Hambley and Allen Messenger) which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

As noted, Nevada argues that the description of DOE's retrieval plans are "not sufficiently detailed to demonstrate waste packages can be retrieved." Petition at 908. As support for this argument, Nevada identified three primary deficiencies: (1) that DOE does not describe how it will "overcome" certain events that may potentially impact retrieval operations; (2) that the TEV and "other equipment" are "incomplete concepts"; and (3) that plans to inspect drifts and maintenance plans, to address ground support failures and other conditions, are lacking. *Id.* at 909-10. Nevertheless, not one of these deficiencies is supported by any facts or

opinion, much less a demonstration that, even if true, any of them would prevent DOE from being able to retrieve waste from the repository.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention also fails to demonstrate the existence of a genuine issue of material fact. In the contention, Nevada implicitly admits that 10 C.F.R. § 63.21(c)(7) only requires that DOE submit a description of its retrieval plans and acknowledges that DOE provided a description in SAR Section 1.11. Nevertheless, Nevada challenges the sufficiency of the description and argues that, among other things, it does not include certain topics or demonstrate that DOE has “designed, prototyped, tested, or demonstrated in any practical manner [that] the equipment . . . [DOE] proposes to use . . . [can] retrieve waste packages.” Petition 908. The three primary deficiencies Nevada identifies to support this argument, however, fail to question the practicability or possibility of retrieval or to support its claimed noncompliance with 10 C.F.R. § 63.21(c)(7).

Nevada’s suggestion that DOE is required to “prototype” the equipment it proposes to use to retrieve waste packages has been considered and rejected by the NRC. In its comments on the final rulemaking for 10 C.F.R. Part 63, the NRC stated that “the Commission *does not* envision that DOE will need to build full-scale prototypes of its retrieval systems to demonstrate that its retrieval plans are practicable at the time of construction authorization.” 66 Fed. Reg. 55743, 55732 (Nov. 2, 2001) (emphasis added). Thus, the NRC already has stated its position on the absence of prototyped retrieval equipment, and as such, Nevada’s resurrection of that issue does not legitimately place the issue into any dispute. To the contrary, the following examples merely show the absence of any challenge to the content of the Application. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), CLI-01-24, 54 NRC 349,

358 (2001), *recons. denied*, CLI-02-1, 55 NRC 1 (2002) (demonstrating that a petitioner must “read the pertinent portions of the license application . . . state the applicant’s position and the petitioner’s opposing view,” and explain why it disagrees with the applicant).

Nevada first argues that there are a number of operational events identified in SAR subsection 1.11.1.2-2 “that may potentially impact retrieval operations” and that DOE provides “[n]o descriptions of plans to overcome these events.” Petition at 910. Nevada ignores, however, that DOE addresses these events in the next subsection. As stated in SAR subsection 1.11.1.2.3, at p. 1.11-7, “[p]otential solutions have been considered that might be implemented for the potential retrieval operational events listed in Section 1.11.1.2.2.” DOE then cites to a reference document, “Concepts for Waste Retrieval and Alternate Storage of Radioactive Waste” §§ 6.3, 6.4, at 15-17, 800-30R-HER0-01100-000-007, ACC: ENG.20080109.0010, LSN#: DEN001570516, which discusses conceptual approaches to recovery from the events identified by Nevada.<sup>95</sup> DOE states, and Nevada acknowledges that DOE states, that development of more detailed plans for waste package retrieval will be driven by the reason for retrieval. Petition at 909.

Nevada also argues that the TEV and “other equipment” that may be necessary for retrieval are “no more than idealized incomplete concepts.” Petition at 910. But this statement is easily refuted, again, by the Application itself. SAR subsection 1.3.3.5.1.1, alone, provides an extensive, specific, and detailed description of the TEV design. That description includes:

- Power supply;

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<sup>95</sup> Indeed, just a few paragraphs later, at SAR subsection 1.11.1.2.3 (p. 1.11-8), DOE references yet another document, “Strategies for Recovery After an Off-Normal Event to the Waste Package Transport and Emplacement Vehicle” §§ 3.2 through 3.5 (pp. 7-17), 800-30R-HE00-01800-000-000, ACC: ENG.20070531.0043, LSN#: DN20022399654, which provides an even more detailed description of the strategies for recovering from the events that are identified by DOE in the SAR and that Nevada expresses concern about in this contention.

- Pallet and lifting operational processes;
- Frame structure;
- Specific electronic control features designed to permit operation in high-radiation environments;
- Braking process and specific procedural controls to ensure proper braking system operation;
- Collision and speed control design features;
- Analysis of the potential for TEV tipover and derailment and a description of specific safety features designed to minimize the consequences of derailment;
- Seismic restraint features included in the TEV design;
- Analysis of the efficiency of the shielded enclosure with respect to personnel radiation protection and potential rockfall; and
- Analysis of required thermal performance characteristics.

Nevada attempts to bolster its argument about the sufficiency of TEV design details by referencing a technical report prepared by the Swedish Nuclear Fuel and Waste Management Company, which allegedly performed field testing on certain waste retrieval equipment.

Nevertheless, Nevada does not discuss the content of the report or the content of the Application, let alone use the report as a basis to challenge any specific content of the Application.<sup>96</sup>

Nevada’s final attempt to call into question the description of DOE’s retrieval plans is as flawed as the first two. This one relates to DOE’s “practically nonexistent drift inspection and maintenance plans to address ground support failure and associated rock fall and drift collapse.”

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<sup>96</sup> Although Nevada also challenges the sufficiency of design detail regarding “other equipment . . . which has yet even to be identified,” Petition at 910, Nevada specifies neither the information (or type of information) that is allegedly “missing,” nor the potential significance of such information.

Petition at 911. Here, Nevada fails to address the fact that the ground support for the emplacement drifts is designed to function without planned maintenance for the duration of the preclosure period. SAR section 1.3.4.4.2 (“Operational Processes”) (p. 1.3.4-15). Nevada also appears to assume that significant rockfall or drift collapse will occur in the subsurface facility, yet it does not claim that such events would meet the definition of an event sequence that would need to be considered in the SAR—nor does Nevada provide any basis for making such a claim.

It should also be noted that Nevada ignores SAR Subsection 1.7.5.6 (“Subsurface”), which states that DOE’s analysis determined that there are no Category 1 subsurface event sequences that lead to exposure of individuals to radiation, and demonstrates that the only Category 2 subsurface event sequence does not involve rockfall in emplacement drifts or drift collapse. *See* SAR at 1.7-49 (referencing Table 1.7-18). Accordingly, Nevada does not clearly establish the extent to which there is even a need for drift inspection or maintenance plans to address ground support failure.

Notwithstanding this, DOE commits to monitor selected emplacement drifts as part of its Performance Confirmation Program, which will be accomplished using instrumentation or remotely operated vehicles for visual inspections to detect rockfall. SAR Subsection 1.11.1.2.4.1 (“Subsurface Facility”) (p. 1.11-8). As DOE explains, “[t]hese monitoring and inspection activities [will] provide the necessary information for evaluating drift degradation effects, as well as any required maintenance and repair of the ground support components that may be needed to provide continued accessibility to the emplacement drifts for possible waste retrieval

operations.” *Id.*<sup>97</sup> Nevada does not dispute that DOE has made this commitment or that it is somehow impracticable.

Accordingly, Nevada has failed to demonstrate that any of the alleged deficiencies in DOE’s description of its retrieval represent a genuine dispute of material fact.

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<sup>97</sup> Apart from the Performance Confirmation Program, and although such events are not expected, DOE has developed strategies for recovery from rock-fall, ground support failure, and other off-normal events that could complicate operations, if such events were to occur. These strategies are described in, among other sources, the two reference documents previously cited. *See generally* Concepts for Waste Retrieval and Alternate Storage of Radioactive Waste,” 800-30R-HER0-01100-000-007, ACC: ENG.20080109.0010, LSN# : DEN001570516; Strategies for Recovery After an Off-Normal Event to the Waste Package Transport and Emplacement Vehicle,” 800-30R-HE00-01800-000-000, ACC: ENG.20070531.0043, LSN# : DN20022399654. Nevada also fails to address, let alone challenge, these strategies.

**169. NEV-SAFETY-169 - Deferred Retrieval Plans**

Legal issue: The LA cannot be granted because it includes only a conceptual discussion of retrieval plans and no actual retrieval plans are included or referenced.

**RESPONSE**

In this contention, Nevada alleges that the Application does not comply with 10 § 63.21(c)(7), because DOE has “deferred” preparing its retrieval plans; and that, as a result, the NRC cannot make the requisite “reasonable assurance” findings under 10 C.F.R. § 63.31(a).  
Petition at 912.

**a. Statement of Issue of Law or Fact to be Controverted**

In this contention, the controversy is purely legal and hinges entirely on the false premise that 10 C.F.R. § 63.21(c)(7) requires more than a description of DOE’s retrieval plans. As demonstrated below, in section f of this response, the language in 10 C.F.R. § 63.21(c)(7) is crystal clear: only a “description” of DOE’s plans is required at this time. Accordingly, this contention should be dismissed, because there is no controversy.

**b. Brief Explanation of Basis**

This contention must also be dismissed because it lacks any basis whatsoever. As demonstrated below, in section f of this answer, Nevada fails to identify any specific missing information that would render the description of its retrieval plans incomplete or would prevent the NRC from making the requisite “reasonable assurance” findings.

**c. Whether the Issue is Within the Scope of the Proceeding**

As demonstrated below, in Section f of this response, there is no dispute as to whether DOE has complied with 10 C.F.R. § 63.21(c)(7), which requires only that a description of DOE’s plans for retrieval be provided at this stage of the proceeding. Insofar as Nevada challenges the

sufficiency of providing a description in place of the plans themselves, Nevada challenges the NRC's regulations by advocating a stricter standard than the regulations require. 10 C.F.R. § 2.335(a); *see also Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant Units 3 and 4), LBP-01-6, 53 NRC 138, 159, *aff'd*, CLI-01-14, 54 NRC 3 (2001) (dismissing contention on the basis that petitioner sought "to impose requirements in addition to those set forth in the regulations").

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As demonstrated below, in Section f of this response, Nevada does not demonstrate that DOE's failure to include completed retrieval plans would in any way prevent the NRC from making the requisite reasonable assurance findings under 10 C.F.R. § 63.31(a). In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies regulations concerning waste retrieval, including 10 CFR § 63.21(c)(7) and 10 CFR § 63.31(a). *See* Petition at 912-13. Nevada concludes this general description of these sections of 10 C.F.R. Part 63 with the mere assertion that: "The issue must be addressed and resolved in order for the NRC to find, as required by 10 C.F.R. § 63.31(a)(1) and (2), that there is reasonable assurance of safety, and to find that the application complies with 10 C.F.R. § 63.21(c)(7), as required by 10 C.F.R. § 63.31(a)(3). The issue is therefore material." Petition at 912.

10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding," not merely a citation of relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. While the Advisory PAPO Board directed

the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied,” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that a petitioner must demonstrate that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

As noted above, Nevada asserts that this contention alleges non-compliance with 10 C.F.R. §§ 63.21(c)(7) and 63.31(a)(1)-(3). Petition at 912. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the Application; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. This falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

Nevada argues that the “scant sixteen pages” that comprise SAR section 1.11 “provide[] only limited information about retrieval concepts,” and DOE’s commitment to provide more “[s]pecific plans for retrieval . . . should the need for retrieval be identified” is inadequate and

“effectively eliminates the possibility that a there will be a full and fair consideration of retrieval issues on a timely basis.” Petition at 913. Neither of these assertions provides any support for this contention, however, because Nevada fails to identify any information about retrieval that must appear in the Application, but does not.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to demonstrate the existence of a genuine issue of material fact in the two following ways. First, Nevada fails to show that DOE is obligated to provide anything more than a description of its plans for retrieval. On this point, the regulations are, as noted earlier, crystal clear: DOE is required to submit a “description” at the time of license submittal; and that description need only contain all the information that was reasonably available *at the time of docketing*. See 10 C.F.R. § 63.21(c)(7) (requiring “[a] description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary”); 10 C.F.R. § 63.21(a) (requiring that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing”). DOE provided the requisite description of its retrieval plans in SAR section 1.11 in compliance with 10 C.F.R. § 63.21(c)(7).

Despite this, Nevada maintains that 10 C.F.R. § 63.21(c)(7) requires more than a description, because the “requirement that plans be described suggests that plans must exist or otherwise they could not be described.” Petition at 913. This ignores the accepted practice of describing plans that *will* be developed.<sup>98</sup> As further support for its theory, Nevada also cites to comments made by the NRC about giving DOE’s retrieval “plans and procedures . . . extensive, detailed review . . . as part of any construction authorization review.” *Id.* (citing 66 Fed. Reg.

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<sup>98</sup> Here, DOE commits to developing “[s]pecific plans for retrieval should the need for retrieval be identified.” SAR at 1.11-1 to -2.

55732, 55743 (Nov. 2, 2001)). This statement, however, merely reflects NRC staff's discretion in its Application review, not what DOE is required to include with its Application. In that regard, the NRC's regulations are the final word on the subject.<sup>99</sup>

Second, even if Nevada were correct in its assertion that finalized, specific retrieval plans are required at this stage, which is not the case, Nevada has not specifically identified any deficiencies in DOE's description of its plans, SAR 1.11, or any where else in the Application with respect to this topic. Interestingly, the NRC's cited comment above, when returned to its proper context, demonstrates that the NRC's concern about the subject of retrieval is not about DOE's retrieval plans per se, but rather whether the information provided in DOE's Application demonstrates that DOE can "design (and) build) the repository in such a way that the retrieval option is not rendered impractical or impossible." 66 Fed. Reg. 55732, 55743.

This is highlighted in 10 C.F.R. 63.111(e), which requires that the GROA "be designed to preserve the option of waste retrieval." DOE's compliance with this design criterion is what the NRC will consider when deciding whether the requisite determinations can be made under 63.31(a). The description of DOE's retrieval plans in SAR section 1.11 is one of many places in the SAR where the NRC will look to determine whether it has reasonable assurance that the option of retrieval has been preserved. Notwithstanding the significance of this design criterion, Nevada never cites to 10 C.F.R. 63.111(e), or points to any deficiency in the SAR that calls into question the design of the repository. Instead, without any support, it simply asserts that DOE's

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<sup>99</sup> Notably, the cited comment stops short of explaining what the NRC believes the level of detail in DOE's retrieval plans should be; nor does the cited comment define the term "plans." In effect, SAR section 1.11 and its associated reference documents constitute DOE's current retrieval "plans."

failure to provide completed retrieval plans prevents the NRC from finding the requisite “reasonable assurance” under 10 C.F.R. 63.31(a). Petition at 912.<sup>100</sup>

In sum, Nevada does not demonstrate that there is any dispute as to whether DOE has complied with 10 C.F.R. § 63.21(c)(7), because DOE invariably provided a description of its retrieval plans. Likewise, Nevada fails to offer any support for its belief that the NRC cannot make the requisite “reasonable assurance” findings under 10 C.F.R. § 63.33(a), because nothing in Nevada’s contention seriously questions whether the option of retrieval has been preserved in the design of the repository.

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<sup>100</sup> Nevada also asserts that the failure to provide a complete plan “effectively eliminates the possibility that there will be full and adequate consideration of retrieval issues before wastes are emplaced.” This statement not only lacks support, it also fails to recognize that, before DOE can receive and possess radioactive materials at the GROA, DOE must separately apply for a license. *See* 10 C.F.R. § 63.41.

**170. NEV-SAFETY-170 - Conservatism And The PMA**

The PMA in Subsection 2.4.2.3.2.3.2.4 of the SAR, and referred to in related subsections, is offered to validate or provide confidence in the TSPA, but it cannot be used for these purposes, or to demonstrate net conservatism or margins in the TSPA, because the PMA (LSN# DN20023695678) assumes that certain important parts of the TSPA are conservative when, in fact, these parts are not adequately supported, are biased in favor of compliance, or are simply wrong.

**RESPONSE**

This contention asserts that the Performance Margin Analysis (PMA) in “Subsection 2.4.2.3.2.3.2.4 of the SAR, and referred to in related subsections,” cannot be used to validate or provide confidence in the TSPA because the PMA erroneously assumes that certain important parts of the TSPA are conservative. Petition at 916.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada’s challenge to the PMA appears to be premised on the assumption that the PMA is a necessary element in the validation of the TSPA. However, as described in the SAR, the procedurally-defined validation level for the TSPA model requires at least two of the post-development model validation activities described in the TSPA model report. SAR 2.4.2.3.2 at

2.4-122, citing to “Total System Performance Assessment Model/Analysis for the License Application,” LSN# DEN001579005 at Section 7. The TSPA model validation analyses are summarized in SAR Table 2.4-8. In addition to the required validation activities, DOE conducted several other post-development activities to enhance confidence in the TSPA model, including the PMA. However, the additional activities were entirely optional, and not mandated by DOE’s procedures or NRC regulations. SAR 2.4.2.3.2.3.2.4 at 2.4-245.

Therefore, to the extent that Nevada’s contention is asserting that NRC regulations required DOE to conduct the PMA, this contention should be dismissed. It is well settled that, absent a waiver, “no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding.” 10 C.F.R § 2.335(a). This includes a contention that advocates stricter requirements than those imposed by the Commission’s regulations. *See Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-01-6, 53-NRC-138, 159, *aff’d*, CLI-01-17, 54-NRC-3 (2001).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the Petition identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this issue is therefore material.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material *only* if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. See 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 supra, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a "reasonable expectation": (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and

analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

In making its “reasonable expectation” determination, the NRC must evaluate DOE’s compliance with the applicable provisions of Part 63, including, among other things, whether DOE has described the proposed geologic repository as specified in § 63.21, and whether the site and design comply with the Part 63 performance objectives and requirements. Proposed safety contentions that fail to raise issues that are material to these findings are inadmissible. For example, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. As stated in Section V.A.3 above, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

Nevada asserts that DOE’s PMA violates the applicable regulations because the fundamental premise for the PMA, that certain assumptions in the TSPA are conservative, is flawed because these assumptions are unsupported, are biased in favor of compliance, or are simply wrong. Petition at 917. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically,

Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3, above, discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any supporting documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach one affidavit (Michael C. Thorne), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in this contention, the affidavit simply "adopts" the otherwise unsupported assertions in paragraph 5 of this contention. That approach falls far short of the requirement in 10 C.F.R. § 2.309(f)(1)(v) to provide conclusions supported by reasoned bases or explanation.

Nevada's attempt to provide support for its contention by listing twenty-five other Nevada contentions must necessarily fail. Contentions do not constitute factual information that can be used to provide the necessary support for yet additional contentions.

Therefore, the contention is not supported by adequate factual information or expert opinion under 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed above, DOE has already demonstrated that Nevada's claims are outside the scope of the proceeding, are not material and are not supported by adequate factual information or expert opinion. Accordingly, Nevada's claims also do not raise a genuine dispute of material fact or law. But the contention also contains other arguments which, as DOE demonstrates below, also do not raise a genuine dispute. In particular, Nevada asserts that the PMA cannot be used to validate or provide confidence in the TSPA because the PMA erroneously assumes that certain important parts of the TSPA are conservative. Petition at 916. For the reasons discussed below, these arguments do not raise a genuine dispute of material fact or law and must be dismissed.

First, in its assertion that the assumptions in the TSPA cannot be claimed to be conservative because the assumptions are unsupported, are biased in favor of compliance, or are simply wrong, Nevada fails to directly controvert DOE's documented position to the contrary. In this regard, the contention does not address any of the conservatisms in the TSPA, documented in "Total System Performance Assessment Model/Analysis for the License Application," LSN# DEN001579005, at Sections 6.3 to 6.6, nor does it even address the technical bases for the conservatisms as documented in the conclusions of the major subsections of SAR Section 2.3. Nevada's failure to controvert any of DOE's documented statements regarding the conservatism of TSPA necessarily means the contention does not raise a genuine issue of material fact. *See Tex. Utils. Electric Co. (Comanche Peak Steam Electric Station, Unit 2)*, LBP-92037, 36 NRC 370, 384 (1992).

Second, according to Nevada's "general proposition," it is not possible to select bounding or conservative representations of uncertainty if information is lacking or the degree of

complexity exceeds the ability of suitable methodologies to provide realistic representations of uncertainty. Petition at 917. This “general proposition,” which constitutes Nevada’s only basis for its assertion that the assumptions in the TSPA are not conservative, is unsupported, incorrect, and fails to directly controvert DOE’s position on the issue of conservatism in uncertainties. As discussed above in Section e, Nevada has failed to provide any facts or expert opinion in support of this statement. In addition, the logic of the “general proposition” is flawed because the methodologies for selecting a bounding or conservative representation of uncertainty are well-established and are commonly used in the nuclear industry. *See* NUREG/CR-6823, Appendix B. For the repository, DOE’s characterizations of uncertainty for the TSPA were guided by a set of guidelines. “Guidelines for Developing and Documenting Alternative Conceptual Models, Model Abstractions, and Parameter Uncertainty in the Total System Performance Assessment for the License Application” LSN# DN2002011095. Nevada has not directly controverted DOE’s position on its methodology for selecting conservative representations of uncertainty, and therefore the contention does not establish a genuine dispute of material fact. *See Tex. Utils. Electric Co. (Comanche Peak Steam Electric Station, Unit 2)*, LBP-92037, 36 NRC 370, 384 (1992).

Third, although this contention asserts that the PMA should not have been premised on the conservatism of certain assumptions in the TSPA, the contention does not allege that the PMA results would have been significantly different. As discussed in Section V.A.3, above, contentions that allege errors, omissions, uncertainties or alternative approaches, without specifying the ramifications or results of such alleged deficiencies, fail to raise a genuine dispute of material fact.

Other than asserting that DOE's PMA was improperly based on assumptions in the TSPA that are not conservative, Nevada fails to provide anything substantive that challenges the validity of the PMA or, by extension, the TSPA. Contentions like this one that allege errors, omissions, uncertainties or alternative approaches – without specifying the ramifications or results of such alleged deficiencies – fail to raise a genuine dispute of material fact and are, therefore, inadmissible. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521 (1990). Furthermore, as stated above in Section d, because 10 C.F.R. Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses and to report those doses as mean doses, contentions failing to allege an increase in the mean dose above the regulatory limit are inadmissible.

Finally, paragraph 6 of the contention, in addition to not having been “adopted” by any of Nevada's experts, makes no attempt whatsoever to demonstrate a genuine dispute on a material fact or law. That paragraph simply repeats, for the fourth time on only three and one half pages, the mantra of this contention, that “the fundamental premise for the PMA, that certain assumptions in the TSPA are conservative, is flawed because these assumptions are unsupported, are biased in favor of compliance, or are simply wrong.” Petition at 918.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(vi) and should be rejected.

**171. NEV-SAFETY-171 - PMA And QA**

Legal issue: The PMA in Subsection 2.4.2.3.2.3.2.4 of the SAR, and referred to in related SAR subsections, is offered to validate or provide confidence in the TSPA and to demonstrate net conservatisms or margins in the TSPA, but it cannot lawfully be used for these purposes because it relies on data and models that are not qualified pursuant to DOE's quality assurance program.

**RESPONSE**

This contention challenges the use of the performance management analysis (PMA), which is included in the SAR to provide further confidence in the TSPA and to assess the conservatisms in the TSPA, because the PMA uses data and models not qualified under DOE's quality assurance (QA) program.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations in 10 C.F.R. Part 63, subpart

E and the requirement from 10 C.F.R. §63.31(a)(3)(ii) that the site and design must comply with Subpart E, and then states that “[t]he issue is therefore material.” *See* Petition at 919-20.

Nevada also states that it challenges compliance with various sections in 10 C.F.R. Part 63, Subpart G and states that 10 C.F.R. § 63.31(a)(3)(iii) requires a finding of compliance with Subpart G. *Id.* at 920. Nevada fails to specify how the PMA does not comply with subparts E or G or how the PMA causes the Application to fail to comply with subparts E or G.

10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

Nevada's assertion that the PMA relies on data and models not qualified under DOE's QA program fails both to identify a specific violation of Subpart E and fails to identify a connection with the determinations of safety, common defense and security, and environmental values that the Commission must make. *See* 10 C.F.R. § 63.31.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Nevada's challenge to the use of the PMA on the grounds that it uses data and models that are not qualified under DOE's QA program does not raise a genuine dispute on a material issue of law or fact because there is no regulatory requirement that explicitly or implicitly subjects the PMA to DOE's QA program.

First, the PMA is one of the post-development validation activities used to enhance confidence in the TSPA, but is not one of the two post-development model validation activities required by the project's modeling procedures. *See* SAR at 2.4-245. The PMA provides additional confidence in the TSPA by examining the effects of conservatisms on the outputs from the TSPA. The purposes of this exercise were to confirm that that the conservatisms remain conservative when propagated through the TSPA, to quantify the extent to which the conservatisms overestimate the projected annual dose, and to assess that the conservatisms did not introduce any risk dilution in the TSPA results. *Id.* The PMA achieved these goals by performing a separate set of TSPA calculations in parallel to those in the TSPA, but removing some of the conservatisms that exist in the TSPA. *Id.* at 2.4-245 to -246.

The Quality Assurance Requirements and Description (QARD) identifies the TSPA and qualification of its *inputs* within the category of "activities related to" systems, structures and components (SSCs) important to safety and to barriers important to waste isolation, and are therefore subject to the QA program. Quality Assurance Requirements and Description, rev. 20,

§ 2.2.2, (Oct. 1, 2008). The PMA, however, is a tool for understanding and evaluating the *outputs* of TSPA, not its *inputs*, and thereby is not subject to the QA program under § 2.2.2 of the QARD. Also, because the PMA is related to the TSPA, and is not the TSPA itself or other study of the SSCs important to safety or barriers important to waste isolation, it does not fall within the category of activities “related” to such SSCs or barriers. Nevada’s statement that “[s]ince the PMA is offered as a part of DOE’s compliance case, it is subject to quality assurance requirements” is made without legal citation because there is no such legal standard.

Second, the documents governing DOE’s QA program do not specifically include the PMA.<sup>101</sup> The QA program must apply to SSCs important to safety, to barriers important to waste isolation and to related activities. 10 C.F.R. § 63.142(a). As discussed above, the TSPA and qualification of its inputs are “activities related to” SSCs important to safety and to barriers important to waste isolation, and are thereby subject to the QA program. QARD, § 2.2.2 at 30. Neither the regulations nor the QARD, however, include the PMA in the “related activities” category that is subject to the QA program. *See* 10 C.F.R. § 63.142(a); QARD § 2.2.2 at 30. As such, Nevada fails to raise a genuine dispute on a material issue of fact or law because there is no explicit requirement that subjects the PMA to the QA program.

Finally, as discussed above, Nevada does not explain how the PMA violates requirements of 10 C.F.R. Part 63 subpart E, and thereby fails to raise a genuine dispute of a material issue of law or fact in that regard as well. The contention should be dismissed for failure to raise a genuine dispute on a material issue of law or fact.

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101 Although not required to be subject to DOE’s QA program, the PMA exceeded regulatory requirements by following the DOE’s QA program for model development, as implemented in the procedure, Sandia National Laboratories, SCI-PRO-006, Models rev. 14 (Effective date Oct. 1, 2008) (LSN# DEN001603409), with the exception of a subset of the data that needs to be treated as not qualified in accordance with the QARD, and an excel spreadsheet that contained a simple macro that also needs to be treated as not qualified in accordance with the QARD.



**172. NEV-SAFETY-172 - Inspection And Verification Of TAD**

SAR Subsections 5.0, 5.1, 1.5, 1.5.1, 1.2.1, and similar subsections, and DOE'S QARD (incorporated by reference in the License Application in Chapter 5) Sections 7.1, 7.2, and similar subsections, demonstrate that DOE is required to, but does not intend to, require reasonable assurance with respect to the contents and the proper packaging of those contents by nuclear utilities providing waste to DOE for the proposed repository in transportation, aging, and disposal (TAD) canisters; such quality assurance failure with respect to the important-to-safety (ITS) TAD renders it unusable for emplacement and storage of waste in the proposed Yucca Mountain repository.

**RESPONSE**

This contention alleges that in SAR §§ 5.0, 5.1, 1.5.1, 1.2.1, and similar subsections, and in DOE's QARD, DOE is required to, but does not intend to, require reasonable assurance with respect to the contents and the proper packaging of those contents by nuclear utilities providing waste to the repository in transportation, aging and disposal canisters (TADs). The contention also alleges that DOE's proposed approach to accepting the TADs from utilities is a quality assurance (QA) failure that renders TADs unusable for emplacement and storage of waste in the repository.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding for several reasons, not the least of which is because the contention could only fall within the scope of DOE's application for a license to receive and possess licensed materials, *not* construction authorization. The contention alleges that DOE's proposed approach to accepting TADs from utilities is a QA failure, or somehow a violation of the applicable QA regulations, but ignores the fact that the NRC already has deemed activities related to operations (i.e., activities that will occur after DOE receives its license to receive and possess licensed materials) as beyond what DOE's QA program must encompass at this time. Simply put, DOE will not perform any licensed activities involving TADs until after a construction authorization is granted and DOE receives its license to receive and possess SNF.

In response to questions regarding "which elements of DOE's QA program should be in place at the time of license application submittal," the NRC stated that:

The DOE quality assurance program and associated quality assurance program controls and implementing procedures regarding activities performed must be in place before activities begin. These activities include site characterization; acquisition, control, and analysis of samples and data; tests and experiments; scientific studies; facility and equipment design and construction; and performance confirmation.

U.S. Nuclear Regulatory Commission, Yucca Mountain Review Plan, NUREG-1804, Rev. 2, Final Report 68 Fed. Reg. 45,086, 45,103 (July 31, 2003) (quotations omitted). It is clear from this statement that the NRC does not expect to receive from DOE, at this time, detailed QA program information on activities related to the receipt and possession of TADs. Nor does Nevada cite any legal authority that, if applicable, would broaden the scope of what the NRC

declared the QA program must cover for the purposes of this proceeding.<sup>102</sup> Thus, Nevada fails to establish that DOE's QA program, as it would apply to receiving TADs, is within the scope of this proceeding.

The contention also is outside the scope of this proceeding because it seeks to introduce issues that relate to activities performed by utilities, including the preparation of TADs for shipment to the Yucca Mountain repository. Such activities are not governed by any aspect of 10 C.F.R. Part 63, but rather 10 C.F.R. Parts 50 ("Domestic Licensing of Production and Utilization Facilities"), Part 70 ("Domestic Licensing of Special Nuclear Material"), and Part 71 ("Packaging and Transportation of Radioactive Material"). 10 C.F.R. Part 63 does not govern the procedures and controls to be used at nuclear reactor sites for the loading of TADs for shipment to the repository (or for any other related activities).<sup>103</sup>

Many of the arguments that Nevada makes in this contention also relate to the Standard Contract and, for this additional reason, the contention must be dismissed as outside the scope of this proceeding. Specifically, Nevada challenges whether the Standard Contract even applies to TADs, because the contract predates DOE's decision to use them. Petition at 929. Nevada also takes issue with the scope of the activities to be performed by DOE under the contract, because, according to Nevada, it leaves much of the work related to the packaging of TADs up to the utilities. *Id.* at 928. Along these same lines, Nevada implicitly challenges the adequacy of the

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<sup>102</sup> Notably, the portion of the Yucca Mountain Review Plan, NUREG-1804, that covers the subject of QA does not yet include guidance on activities during the operations phase. *See* U.S. Nuclear Regulatory Commission, Yucca Mountain Review Plan, Rev. 2, NUREG-1804 § 2.5.1.3 at 2.5-4 (July, 2003); 68 Fed. Reg. 45,086, 45,103 (July 31, 2003) ("The Yucca Mountain Review Plan will be modified, at the appropriate time, to include facility operation, permanent closure, and decontamination and dismantling of surface facilities.").

<sup>103</sup> The NRC's view regarding its licensing authority under 10 C.F.R. Part 63 is best summarized in the Proposed Rule for 10 C.F.R. Part 63, where the NRC stated that its authority is "limited to the licensing of *DOE* to receive and possess source, special nuclear, and byproduct material at a geological repository operations area [(GROA)] sited, constructed, or operated *at Yucca Mountain, Nevada.*" Proposed Rule, Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 64 Fed Reg. 8,640, 8,655 (Feb. 22, 1999)(emphasis added).

contract on the basis that it does not explicitly impose QA-related requirements on utilities. *Id.* at 929-30.

Nevertheless, a challenge to the Standard Contract among parties under the NWPA is outside the scope of this proceeding. Section 302 of the NWPA makes it clear that the acceptance of SNF by DOE for disposal at the Yucca Mountain repository is governed by the contract between DOE and the generator of the SNF, and that *DOE* is responsible for establishing the terms and conditions of that contract.<sup>104</sup> As a result, Nevada may not challenge the NWPA or the Standard Contract in this proceeding; and this contention, which is an attempt to do so, must be dismissed.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material in this proceeding, because it alleges an absence of QA requirements over activities – *operations* – that will not take place until after DOE receives its license to receive and possess licensed materials. In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada references the requirement that the Application describe the QA program (10 C.F.R. §63.21(c)(20)), the consideration that the NRC must give to DOE’s compliance with subpart G (10 C.F.R. § 63.31(a)(3)(iii)), and the requirement that DOE implement a QA program in compliance with 10 C.F.R. § 63.142 (10 C.F.R. § 63.143). Petition at 924.

Nevada then takes a leap of logic and states that the contention raises a material issue because it questions “whether DOE’s plan to receive TAD canisters already packed with waste at

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<sup>104</sup> Section 302 also makes the Standard Contract a condition for the issuance or renewal by the NRC of a license for a commercial power plant. Neither section 302, nor any other statutory provision, grants the NRC authority to approve the terms and conditions of the contract or to regulate how the contract is implemented. Any questions concerning the implementation of a contract under section 302 must be resolved by DOE and the contract holder or by an appropriate court.

the site of the utility delivering it, without ensuring that the TADs have been prepared and loaded in compliance with an adequate and compliant QA program, constitutes a failure on the part of DOE to itself comply with the requisites of Sections 63.142 and 63.143.” Petition at 924-25. Nevada fails to explain, however, how the applicability of the QA program to the contents and packaging of TADs is material to the findings that the NRC must make in connection with its determinations regarding construction authorization (i.e., how the issues presented in this contention, if admitted, would make a difference in the outcome of this construction authorization proceeding). *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 333-34 (1999).<sup>105</sup>

Nevada cannot make the above showing because, at this time, the NRC is being asked to only make findings with respect to the construction of the repository. Nevada does not cite any legal authority requiring that the SAR or QARD submitted as part of the Application for construction authorization include the QA program to confirm that utilities are appropriately packing TADs because there is no such legal authority. Moreover, the applicable regulations explicitly contemplate that DOE will change its QA program following the submittal of the Application. *See generally* 10 C.F.R. § 63.144. SAR § 5.1 and the QARD, which is incorporated by reference and, therefore, also part of the Application, reflect this same concept. *See* SAR § 5.1 at 5.1-2 (“The QARD will be revised at appropriate times to address future activities related to facility operations, permanent closure of the repository, and decommissioning and dismantlement of the surface facilities.”); QARD at 19 (“This QARD will

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<sup>105</sup> Notably, Nevada fails to cite a regulation or statute that requires DOE to apply its QA program to the utilities who will prepare TADs, or that requires DOE to obtain the referenced “reasonable assurances” in any other way. Nor is there any regulatory requirement for DOE to inspect or verify the contents of the TADs. It should also be noted that DOE has no regulatory authority at commercial nuclear reactor sites.

be revised prior to the receipt of a license to receive and possess HLW/SNF to address activities associated with facility operation.”).

Notwithstanding this specific DOE commitment, Nevada claims a deficiency in the Application exists and cites to 10 C.F.R. § 63.31(a)(3) as support for the proposition that the QA program is somehow a failure because it lacks details about activities (i.e., the receipt and possession of TADs) that DOE cannot yet perform. Nevada’s arguments are misplaced. The plain language of the regulation demonstrates that DOE’s compliance with Subpart G (including 10 C.F.R. § 63.142) is one of several issues for the Commission to “consider” in making its safety determinations. *Nothing* in either 10 C.F.R. § 63.31(a)(3) or 10 C.F.R. § 63.142 requires that DOE’s QA program cover activities beyond those activities for which authorization is sought. In sum, any other interpretation flies in the face of the NRC’s acceptance criteria and the multi-phased nature of the licensing process described by the NRC in the Statements of Consideration for 10 C.F.R. Part 63:

[P]art 63 provides for a multi-staged licensing process that affords the Commission the flexibility to make decisions in a logical time sequence that accounts for DOE collecting and analyzing additional information over the construction and operational phases of the repository. The multi-staged approach comprises four major decisions by the Commission: (1) Construction authorization; (2) license to receive and emplace waste; (3) license amendment for permanent closure; (4) termination of license. The time required to complete the stages of this process . . . is extensive and will allow for generation of additional information. Clearly, the knowledge available at the time of construction authorization will be less than at the subsequent stages.

Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55738 (Nov. 2, 2001).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. In contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v)(1), the contention contains only unsupported assertions of counsel and lacks any reference to any expert opinion. That approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. Nevada fails to provide any evidence that the assurances it claims are lacking could have any impact on the determinations that the NRC must make with respect to either the preclosure or postclosure period of the repository. Nevada also does not provide any evidence that the QA programs of the utilities or other types of assurances discussed below are in any way inadequate with respect to issues related to the contents and packaging of the TADs. Indeed, even if everything stated in this contention were accepted as true, it would still fail to draw any connection to safety, because none is articulated, let alone demonstrated with facts or expert opinion.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For reasons discussed above, this contention also fails to raise a genuine dispute on a material issue of law or fact because there is no legal requirement that the Application identify the elements of the QA program as it will apply to operations. The applicable regulations and guidance explicitly contemplate that DOE will amend its QARD to address operations sometime after receipt of construction authorization; and DOE has not yet asked the NRC to consider the appropriateness of the QA program for operations and the activities that will follow. Nor should

Nevada be allowed to somehow force that consideration upon the NRC Staff before DOE has requested NRC's approval for a license to receive and possess.

In any event, even if Nevada were able to demonstrate that DOE's QA program—as it applies to operations—was somehow at issue here, it is beyond dispute that DOE *does* have the “reasonable assurances” referenced by Nevada. In this regard, Nevada fails to address a number of such assurances that will exist (if they do not already). Indeed, as discussed below, rather than accepting waste “on the honor system” or taking a “leap of faith,” as Nevada alleges, (Petition at 927-28) DOE's acceptance of SNF will be based on a number of assurances that utilities will, among other things, properly package TADs.

First, treatment of TAD contents, TAD licensing, and packaging are activities covered by a multitude of NRC regulations (10 C.F.R. Parts 50, 70 or 71) and performed pursuant to NRC-approved QA programs. These QA programs cover such activities as the loading of the TADs and maintenance of related records. These QA programs also are comparable to DOE's QA program under 10 C.F.R. Part 63; and DOE reasonably relies on TAD activities being conducted properly by the utilities based on the results of NRC inspections, and QA program reviews of utility site activities. SAR, § 1.5.1 at 1.5.1-5.

Second, additional assurances that utilities will properly package TADs are provided by DOE's ability and future commitment to review the utilities' quality-affecting work-related documentation. DOE has committed to amend the SAR and QARD to memorialize its commitment to perform this activity. *See* Letter to Brian J. Benney from Jeffrey R. Williams, “Yucca Mountain – Request for Additional Information Re: License Application (Safety Analysis Report – Section 5.1) Quality Assurance” (Dec. 10, 2008) (LSN# DEN001606742 at 2 and Enclosure 06 (Response to RAI Vol. 4, Chapter 2-5-1, 1st set – Number 9)). Reviews that

DOE will perform and the circumstances under which such reviews will be performed will be identified in procedures to be developed in connection with DOE's request to receive and possess licensed materials. *Id.* DOE also has reserved to itself under the Standard Contract the ability to observe the preparatory activities of the utilities as they ready their waste for shipment offsite. *See* SAR, §1.5.1 at 1.5.1-5.

Third, the utilities are obligated to provide DOE with descriptions of the waste in the containers (SAR, § 1.5.1 at 1.5.1-5), along with a certification that states that “the above-named materials are properly described, classified, packaged, marked and labeled and are in proper condition for transfer.”<sup>106</sup> Thus, clearly, Nevada's statements that DOE has not addressed the issue of the certification to be completed by the utilities, Petition at 929, is wrong and does not raise a genuine issue of fact.

Fourth, DOE also has the ability to reject any TADs that do not meet waste acceptance requirements. Under the Standard Contract, DOE and the utilities have agreed that “DOE shall accept . . . *only* such SNF and/or HLW which meets the General Specifications for such fuel and waste.” *Id.* at Art VI.A.1 (emphasis added). Further, DOE accepts SNF and HLW for disposal only “when DOE has verified the SNF and/or HLW description, determined the material is properly loaded, packaged, marked, labeled and ready for transportation. *Id.* at Art. VI.B.2. DOE has reserved to itself the right “in its sole discretion to refuse to accept such SNF and/or HLW until the SNF and/or HLW have been properly described.” *Id.* at Art. VI.B.3; *see also* Office of Civilian Radioactive Waste Management, “Civilian Radioactive Waste Management

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<sup>106</sup> *See* 10 C.F.R. § 961.11, Art. VI.B.2. Nevada's statements that DOE somehow has “failed, despite proposing to give ‘incentives,’ to secure an agreement with nuclear power plant operators,” Petition at 924, also is wrong because participation in the Standard Contract by the utilities is required if the utilities wish DOE to accept their SNF. DOE does not just “assume” that information regarding the waste will be supplied with the records for each proposed shipment of waste—such information is required and DOE can reject the proposed shipment if such information is not provided. 10 C.F.R. § 961.11, Art. VI.B.3.

System Waste Acceptance Requirements Document” Rev 5 (May 31, 2007) (LSN# DN2002409775 at 13) (indicating that commercial SNF “shall meet the requirements specified in 10 C.F.R. Part 961” if it is to be accepted for disposal).

Notwithstanding all of the above assurances (or perhaps because of them), Nevada tries to liken DOE’s acceptance of TADs packaged by utilities to a procurement activity. *See* Petition at 925-26. Nevada, however, fails to offer any legal theory as to how these QARD provisions would apply to the SNF-generating utilities (including, but not limited to, how activities covered by the Standard Contract could possibly fall within the scope of this proceeding). Nevada also fails to demonstrate how treating its contractors, suppliers and procurement relationships different from utilities would result in a violation of a specific NRC regulation. Indeed, Nevada mischaracterizes receiving SNF and HLW from utilities, which would occur after the issuance of authorizations to construct and operate the GROA, as a procurement activity in support of the licensing and construction of the GROA. In short, the logic of Nevada’s position does not withstand critical analysis and this contention should be dismissed.<sup>107</sup>

As a final point, the QARD provides that “[a]dditional QA-related requirements governing the interface between commercial nuclear utilities and the OCRWM will be addressed in greater detail in future QARD revisions when OCRWM deems such an action necessary.” QARD at 137 (“Appendix C – Waste Custodians”). Consequently, there is no genuine dispute with regard to DOE’s acceptance of TADs from utilities because, beyond the fact that the issue is

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<sup>107</sup> The sections of the regulations cited in the contention that require application of DOE’s QA program to “procurement” refer only to materials that are “purchased” by DOE. DOE is not purchasing waste. In fact, under the terms of the Standard Contract, the utilities are the “Purchasers,” and are referred to as such, because they are purchasing SNF management. *See, e.g.*, 10 C.F.R. § 63.142(e) (“requirements necessary to assure adequate quality are suitably included or referenced in the documents for procurement of material, equipment, and services, whether purchased by the licensee or applicant”); 10 C.F.R. § 63.142(h) (“DOE shall establish measures to assure that purchased material, equipment, and services, which are purchased directly or through contractors and subcontractors, conform to the procurement documents.”).

outside the scope this proceeding, DOE already has laid the groundwork for, and committed to, further reasonable assurances to address these operational issues before DOE is granted a license to receive SNF and HLW. Litigating related issues at this stage would, at best, be premature.

**173. NEV-SAFETY-173 - Emplacement Drift Monitoring**

SAR Subsection 1.3.4.8.2.4 and similar subsections, which discuss monitoring processes for waste emplacement and the preclosure period in general, fail to include sufficient detail to determine whether these monitoring efforts will fulfill the requirements that the LA places on them, and as a result, the LA assumptions related to waste package emplacement and the effectiveness of the engineered barrier system are unfounded.

**RESPONSE**

This contention asserts that certain assumptions in the LA regarding waste packages and engineered barriers cannot be made because the LA contains insufficient information about the systems for monitoring conditions in the emplacement drifts during the preclosure period.

**a. Statement of Issue of Law or Fact to be Controverted**

This contention does not provide a specific statement of the issue of law or fact to be raised, because the contention neither specifies the monitoring processes it challenges nor the specific requirements that such processes would allegedly not meet.

Paragraphs 1 and 5 of the contention mention SAR Subsection 1.3.4.8.2.4, and paragraph 5 also mentions SAR Subsection 1.3.5.2, but Petitioner also purports to challenge other “similar subsections,” which Petitioner identifies simply as those subsections that “discuss monitoring processes for waste emplacement and the preclosure period in general.” Petition at 933. This description is unduly broad, since monitoring during the preclosure period is discussed in *many* subsections of the LA. In fact, numerous types of preclosure monitoring are mentioned in the LA, including, but not limited to: Precipitation (SAR at 4-15); seepage (SAR at 4-16); Saturated Zone Monitoring (SAR at 4-20); Thermally Accelerated Drift Near-Field Monitoring (SAR at 4-25); Dust Buildup (SAR at 4-26); Thermally Accelerated Drift In-Drift Environment Monitoring

(SAR at 4-28); Seismicity (SAR at 4-30); Construction Effects (SAR at 4-31); Waste Package Monitoring (SAR at 4-36).

There is also a wide variety of monitoring processes that specifically relate to waste emplacement. For example, Subsection 1.3.1.2.1.6, “Monitoring Activities” (at 1.3.1-10), alone, mentions monitoring of: radon; radiation; dust; airflow velocity; barometric pressure; air temperature; humidity; airborne particulates; carbon monoxide; airborne radioactive materials; emplacement access doors; ventilation fans; ground support; invert structures; rails; isolation barriers; and many other such activities. Consequently, this contention does not alert DOE to which portions of the LA are at issue. Nor does it identify the specific monitoring process descriptions that it seeks to challenge.

This contention also fails to specify the “LA assumptions related to waste package emplacement and the effectiveness of the engineered barrier system” that Petitioner seeks to challenge. Petition at 933. Petitioner asserts in paragraph 2 of the contention that waste packages and other engineered barriers will be “installed within specified tolerances and in conformance with other engineering requirements” and “the ventilation system will maintain the temperature at a level that will facilitate installation of the drip shields or retrieval of the waste packages,” but does not identify the tolerances or requirements or identify temperature requirements for these activities. *Id.*

Similarly, in paragraph 5 of the contention, Petitioner refers to transport and emplacement vehicle (TEV) cameras for remote monitoring of the placement of waste packages, and airflow volumes and temperatures in the emplacement drifts, airflow regulator damper positions, and “other features of the ventilation,” but does not identify any of the LA

assumptions that allegedly depend on or even relate to such features. *Id.* at 934. As a result, the contention does not alert DOE to the LA assumptions that it seeks to challenge.

Not only does this contention fail to give DOE sufficient notice of the issues of law or fact Petitioner seeks to dispute, but it also does not comply with the direction of the June 20, 2008, Case Management Order for this proceeding that contentions be “narrow, single-issue contentions” that are “sufficiently specific as to define the relevant issues for eventual rulings on the merits, and not require” extensive narrowing or clarification by the parties or boards. *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 6) (June 20, 2008). For these reasons, this contention should be dismissed.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As discussed in e. and f. below, Nevada has failed to demonstrate that this contention raises a material issue.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

This contention also should be dismissed because it is not supported by any facts or expert opinion. To the contrary, the “facts” cited by Petitioner fail to provide any basis for

concluding that the monitoring systems cited in this contention are material to any determination that the NRC must make. Petitioner's comments on the level of detail in the LA, therefore, do not provide any basis for concluding that more detailed information is required, and do not show that such information is material. Indeed, this contention does not reference any expert opinion or documentation other than the LA. Instead, this contention appears to consist entirely of arguments of counsel and illustrates a fundamental misunderstanding of the significance of the above-referenced monitoring systems.

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards because, as noted, it presents only unsupported arguments of counsel. It should also be noted that, although not referenced in the body of this contention, attachments to two of the affidavits included with the Petition (by Doug F. Hambley and Steven A. Frishman) reference this contention, albeit broadly. Nevertheless, these references do not somehow save this contention from being dismissed for failure to provide an adequate statement of alleged facts or expert opinion. As discussed in Section V.A.3 above, the affidavit(s) fall far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in section V.A.3 above, contentions that allege errors, omissions, uncertainties or alternative approaches -- without specifying the ramifications or results of such alleged deficiencies -- fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. This contention suffers from this deficiency. Paragraph 4 of the contention discusses various regulations and then asserts that “[t]his contention alleges non-compliance with

these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” Petition at 934. But this assertion is not borne out by the actual contention or any of the statements made in connection with it. Indeed, the contention makes no attempt to show that, if true, the alleged missing information would prevent the NRC from making any material finding, or that the proposed repository would not meet any regulatory requirements. Instead, Petitioner merely alleges that “the LA assumptions related to waste package emplacement and the effectiveness of the engineered barrier system are unfounded.” *Id.* at 933. The contention does not, however, identify any specific assumptions that are alleged to be unfounded, explain how the effect of the alleged monitoring concerns on such assumptions would affect the safety of the repository, or how the NRC’s ability to make a required finding could be affected.

In Paragraph 2 of the contention, Petitioner argues that:

[t]he LA assumes that the waste packages and other engineered barriers are installed within specified tolerances and in conformance with other engineering requirements and that the ventilation system will maintain the temperature at a level that will facilitate installation of the drip shields or retrieval of the waste packages. However, the lack of information on the systems for monitoring the conditions in the emplacement drifts during the preclosure period means that there is no assurance that these assumptions can be achieved.

Petition at 933. This stops short of challenging any specific assumptions, explaining how the information in the LA regarding “the systems for monitoring the conditions in the emplacement drifts during the preclosure period” is insufficient, or indicating how the implied potential monitoring deficiencies could affect safety or prevent the NRC from being able to make the requisite safety determinations under 10 C.F.R. § 63.31(a).

Likewise, in paragraph 5 of the contention, the Petitioner references the discussion of cameras to be mounted on the TEV for monitoring waste package emplacement in SAR

Subsection 1.3.4.8.2.4, and states “no further details on the cameras or their locations on the TEV are provided.” *Id.* at 934. Petitioner does not, however, explain why any further detail should be required, or how such additional details might affect the validity of any assumptions relied upon in the LA—nor could it. Detailed information about the TEV cameras is not material to any finding the NRC must make because these cameras are *not* important to safety (non-ITS; *see* SAR Table 1.9-7 at 1.9-108, TEV safety functions do not use camera) or important to waste isolation (non-ITWI; *See* SAR Table 1.9-9 at 1.9-124, waste package emplacement (05-01) and spacing (05-02) not ITWI), and it will be readily apparent to operators if changes are needed for the camera to fulfill its design function.

The only other monitoring system mentioned in the contention concerns the ventilation system. In paragraph 2 of the contention, Petitioner asserts that the LA assumes that the ventilation system “will maintain the temperature at a level that will facilitate installation of the drip shields or retrieval of the waste packages.” Petition at 933. In paragraph 5 of the contention, Petitioner asserts that although the LA states that “instrumentation will be provided for remotely monitoring airflow volumes and temperatures in the emplacement drifts, airflow regulator damper positions, and other features of the ventilation system . . . no details are provided on the instruments . . . [and] there is no mention of monitoring of radiation levels, which could signal whether a waste package breach had occurred.” *Id.* at 934-35. But neither of these statements explains why any further detail should be required about the airflow and temperature monitoring, or how such additional details might affect the validity of any assumptions relied upon in the LA. Petitioner also ignores the extensive discussion of radiation monitoring in other subsections of the LA.

The LA discussion of the classification of ventilation systems in SAR Subsection 1.3.5.3 at 1.3.5-19 states that “[t]he subsurface ventilation system is neither ITS nor ITWI because the system does not prevent or mitigate an event sequence in the preclosure period and does not contribute to a significant barrier function in the postclosure period.” Significantly, Petitioner does not challenge these classifications either. Nor does Petitioner show that additional information about the associated monitoring equipment is material to any finding that must be made for construction authorization.

Subsection 1.9.1.4 “Means to Monitor and Control Dispersal of Radioactive Contamination,” states at page 1.9-10, that “continuous air monitors are located throughout the subsurface waste emplacement area, including the access main and alcoves.” The LA further describes radiation monitoring in various other places, including Subsection 1.4.2.2 “Radiation/Radiological Monitoring,” which includes the statement that these monitoring systems are classified as non-ITS at 1.4.2-7. Again, Nevada does not challenge these classifications.

The unchallenged non-ITS and non-ITWI classifications of the functions associated with the only monitoring systems mentioned in this contention are a clear indication that the details of these monitoring systems are not material to any finding that must be made in this proceeding. As the petitioner, Nevada has the burden of showing that the issues it seeks to raise are material to the findings that the NRC must make in this proceeding. An allegation that some aspect of the LA is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the LA is unacceptable in some material respect. *See Fla. Power & Light Co.* (Turkey Point Plant, Unit Nos. 3 and 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990). Petitioner has not met this burden. Neither has Nevada identified any evidence that

would support this contention. Consequently, Nevada has failed to demonstrate that there is a genuine dispute on a material issue of law or fact.

**174. NEV-SAFETY-174 - Controls And Restrictions**

SAR Subsection 1.6.3.4.1 and related subsections, which screen-out aircraft crashes at the Yucca Mountain repository, fail to provide any documentary evidence of any procedural controls for monitoring flight activity over the proposed flight restricted airspace with the United States military, and if no such controls exist then the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.

**RESPONSE**

This contention alleges that the SAR fails to “provide any documentary evidence of any procedural controls for monitoring flight activity over the proposed flight restricted airspace with the United States military.” Petition at 937. The contention further asserts that, in the absence of such controls, “the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.” *Id.*

For the reasons discussed below, contrary to 10 C.F.R. § 2.309(f)(1)(v) that requires adequate factual support or expert opinion in order for a contention to be admitted, this contention fails to explain how the alleged facts and documents upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. In addition, the contention also must be rejected because it fails to state a legitimate issue of law or fact, lacks adequate basis, and fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. §§ 2.309(f)(1)(i), (ii), and (vi). As here, when a contention does not directly controvert a position taken by the applicant in the license application, it is subject to dismissal.

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, Nevada has failed to state a legitimate issue of law or fact to be controverted in this proceeding. For instance, Nevada provides absolutely *no* legal or regulatory basis for its assertion that DOE must fully develop and/or implement air-traffic restrictions now, as part of the construction authorization process—and years before DOE is separately authorized under 10 C.F.R. § 63.41 to receive and possess licensed nuclear material at the repository.

**b. Brief Explanation of Basis**

As explained below, the proffered contention lacks adequate supporting basis in law or fact. In this regard, DOE has provided the information that is required by NRC regulations in its Application. It is Nevada—not DOE—that has failed to meet *its* burden by presenting sufficient legal and factual bases for its allegation that “SAR Subsection 1.6.3.4.1 is both materially incomplete and inaccurate.” Petition at 939. This basis for rejection is more fully discussed below.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As fully explained below, Nevada’s contention fails to establish a genuine dispute on a material issue of fact or law. At its core, this contention seeks to challenge, albeit unsuccessfully, DOE's ability to implement the flight-restricted airspace and operational controls credited in the aircraft hazard analysis and identified in the SAR. In short, nowhere in its contention does Nevada directly and credibly challenge DOE’s authority or ability to implement

the aircraft-related PSCs listed in SAR Section 5.8.3. Thus, the contention fails to raise a material issue.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

This contention fails to meet the requirements of 10 C.F.R. § 2.309(f)(1)(v) because it lacks both a legal and factual foundation. The linchpin of Nevada’s argument is that “DOE cannot take credit for as yet unidentified procedural controls to control or monitor aircraft activity over the proposed flight restricted airspace.” Petition at 938. Nevada further asserts that “DOE has the burden not only to identify the controls with sufficient specificity, but more importantly to prove the controls are currently in effect and operating, or will be put in place and how they will operate.” *Id.* In this regard, Nevada also contends that “DOE’s commitment to implement procedural controls” is not sufficient. *Id.*

The foregoing arguments fail to pass muster under the Commission’s strict contention admissibility standards and thus do not support the admission of this contention. Nevada provides absolutely *no* legal or regulatory basis for its assertion that DOE must implement air-traffic restrictions now, as part of the construction authorization process—and years before DOE is separately authorized under 10 C.F.R. § 63.41 to receive and possess licensed nuclear material at the repository. Nor does Nevada provide any legal or factual support for its suggestion that DOE will be unable to implement these flight restrictions in the future. As shown in section f. below, DOE has clear authority to implement the flight-restricted airspace and operational controls credited in the SAR when they are needed to support repository operations.

Tellingly, Nevada’s arguments (as set forth under paragraph 5 of its contention) completely lack supporting citations to controlling statutes or regulations, or even citations to relevant NRC guidance (*e.g.*, the YMRP). Moreover, in addition to disregarding key portions of

the SAR (as discussed further below), Nevada's arguments defy logic and common sense. It would serve no purpose to institute air-traffic restrictions when the need for such restrictions does not currently exist and will not exist until the repository is actually built and DOE is subsequently authorized to receive and possess SNF and HLW. Indeed, as discussed below, the SAR explicitly recognizes and addresses this fact. The SAR also reflects DOE's authority to implement the applicable restrictions when they are actually needed to support repository operations.

By way of background, the aircraft hazard frequency analysis discussed in the SAR and supporting documentation credits a flight-restricted airspace and operational constraints over the repository, as follows:

- Flights by fixed-wing aircraft in the Nevada Test Site or Nevada Test and Training Range airspace within 4.9 nautical mi (5.6 statute mi) of the North Portal and below 14,000 ft mean sea level are prohibited.
- 1,000 overflights of this flight-restricted airspace per year are permitted above 14,000 ft mean sea level for fixed-wing aircraft.
- Maneuvering over the flight-restricted airspace is prohibited; flight is straight and level.
- Carrying ordnance over the flight-restricted airspace is prohibited.
- Electronic jamming activity over the flight-restricted airspace is prohibited.
- Helicopter flights within 0.5 mi of the surface facilities and areas that handle SNF and high-level radioactive waste are prohibited. The helipad associated with the repository is located at least 0.5 mi from the surface facilities that handle SNF and high-level radioactive waste.

SAR at 1.6-22. SAR Section 1.6.3.4.1 further indicates that these restrictions will not be needed for years to come. Reflecting both this fact and the need for DOE to retain flexibility to address any potential future modifications or additions to flight activities within the special-use airspace over the repository, SAR Section 1.6.3.4.1 states:

It should be noted, however, that because air traffic restrictions for the repository would not be required for a number of years, DOE would take into consideration any modifications or additions to flight activities within the special-use airspace over the repository during the construction period. If necessary to support repository operations, DOE would seek a special-use airspace designation from the Federal Aviation Administration. In addition, airspace restrictions could include agreements with the U.S. Air Force and other users to manage traffic in the vicinity of the repository. The accident analysis conducted assumed that such flight restrictions would occur.

*Id.*

Importantly, DOE has incorporated the flight restrictions identified above into specific Preclosure Procedural Safety Controls (PSCs), which are included in Table 1.9-10 of the SAR (*see* PSC-15 to PSC-18 at 1.9-144 to -145). The SAR states that the PSCs presented in Table 1.9-10 will “be implemented in facility operations to prevent and mitigate event sequences,” and that these PSCs will impose “interface controls on activities outside of the GROA that could potentially lead to an event sequence.” SAR at 1.9-2.

SAR Section 5.8.3 describes the implementation of the PSCs (*i.e.*, flight restrictions) enumerated above. Section 5.8.3 states, in part, as follows:

Prior to receipt of a license to receive and possess SNF and HLW, and in accordance with 10 CFR 63.121(c), controls will be implemented to ensure that the requirements of 10 CFR 63.111(a) and (b) are met. The site boundary, as shown in Figure 5.8-2, will be considered as the boundary of the preclosure controlled area under the definition of 10 CFR 20.1003. Such land use controls

will include ensuring that U.S. Air Force flight activities in the proximity of the GROA remain within the repository performance analysis considerations of existing and projected U.S. Air Force flight activity (SAR Section 1.6.3.4.1).

SAR at 5.8-7.

Thus, DOE has committed in the Application to implement appropriate PSCs. It is well-established that a docketed commitment can satisfy a licensee's regulatory obligation. *AmerGen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), LBP-06-7, 63 NRC 188, 207 (2006) (accepting licensee commitment as satisfying regulatory obligation).

Significantly, as noted above, the flight restrictions for the airspace over the repository are not actually required until the nuclear waste forms are located at the repository, an activity that will require a separate licensing action (and an associated hearing opportunity) pursuant to 10 C.F.R. § 63.41.

Nevada offers no alleged facts, documents, or credible expert opinion to demonstrate that DOE has not complied with applicable NRC regulations. It relies instead on bare assertions that have no basis in law or fact and which ignore critical discussion in the SAR. As noted above, the flight restrictions set forth in the SAR will be implemented as PSCs, in accordance with 10 C.F.R. §§ 63.111(a)-(b) and 63.121. Neither of those regulations requires, or even suggests, that DOE must “prove [that] the [relevant] controls are currently in effect and operating,” as Nevada incorrectly claims. Petition at 938. In particular, Section 63.121(c) states that, in establishing appropriate controls outside the geologic repository operations area, “DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at Sec. 63.111(a) and (b) are met,” and that such “[c]ontrol includes the *authority* to exclude members of the public, *if necessary*.” 10 C.F.R. § 63.121(c) (emphasis added). Nowhere does Section 63.121(c)—or any other Part 63 regulation—state that DOE must prove “that such controls exist” (Petition at 938)

or even develop complete and final procedures, now, as part of its construction authorization request.

NRC regulations require only that DOE “identify” and “describe” those controls that are necessary to ensure compliance with applicable Part 63 requirements, and which may be implemented by DOE pursuant to its applicable authorities. For example, 10 C.F.R. § 63.21(c), which prescribes the contents of the SAR, requires, among other things, “[a] *description* of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site and adjacent areas.” 10 C.F.R. 63.21(c)(24) (emphasis added). The YMRP, which guides the NRC Staff in its review of the Application, directs the Staff to assess whether “any additional controls” are “acceptable and sufficient.” YMRP § 2.5.8.3 at 2.5-100. In the same vein, the YMRP directs the Staff to evaluate whether DOE has “identified” any “existing or proposed permissible rights or encumbrances that exist and may be continued, or that *should be established* outside the geologic repository operations area,” and whether DOE has assessed the nature of any activities that may permissibly occur under those rights. *Id.* (emphasis added) By claiming that DOE must implement flight control restrictions now, Nevada alleges noncompliance with a requirement that simply does not exist and thus, is not material to the findings to be made by the NRC Staff. The contention, therefore, fails to establish a concrete and genuine dispute suitable for litigation.

As shown above, DOE has provided the information that is required by NRC regulations in its Application. It is Nevada—not DOE—that has failed to meet *its* burden by presenting sufficient legal and factual bases for its allegation that “SAR Section 1.6.3.4.1 is both materially incomplete and inaccurate.” Petition at 939. Nevada does not challenge—with the requisite specificity and basis—the adequacy of DOE’s proposed flight restrictions. At most, Nevada

vaguely (and erroneously) claims that “DOE fails to describe in any detail the nature of the procedural controls.” *Id.* at 938. Nevada ignores relevant portions of the SAR. The SAR sections discussed above are quite explicit with respect to the aircraft-related PSCs that DOE has committed to implement.

Indeed, this contention is like numerous other Nevada contentions, in that it presents only unsupported allegations by counsel. Notably, the contention fails even to mention the Affidavit of Hugh Horstman (Attachment 12 to Petition), in which Mr. Horstman purports to “adopt as [his] own opinions” the statements contained within Paragraph 5 of the contention. That affidavit, in any case, is grossly insufficient to support the contention. As discussed in Section V.A.3 above, an expert’s attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—including its proffered expert—to set forth “the necessary technical analysis to show why the proffered bases support its contention.” *Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 180 (1998) (*citing Georgia Inst. of Tech.* (Georgia Tech Research Reactor), LBP-95-6, 41 NRC 281, 305 (1995)). No such analysis is presented here by Nevada in its contention or by Nevada's proffered expert in his Affidavit.

In summary, Nevada plainly has failed to meet its burden under Section 2.309(f)(1)(v). While the ultimate burden of persuasion is on the license applicant with respect to an *admitted* contention, “the proponent of the [proposed] contention has the initial burden of coming forward with factual issues, not merely conclusory statements and vague allegations” of the type made here by Nevada. *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit No. 3), CLI-01-3, 53 NRC 22, 27 (2001). Accordingly, the contention must be rejected as lacking adequate factual and legal support.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention also fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(vi). At its core, this contention (as well as subsequent Nevada contentions) seeks to challenge, albeit unsuccessfully, DOE's ability to implement the flight-restricted airspace and operational controls credited in the aircraft hazard analysis and identified in the SAR. In short, nowhere in its contention does Nevada directly and credibly challenge DOE's authority or ability to implement the aircraft-related PSCs listed in SAR Section 5.8.3.

In fact, the SAR amply demonstrates DOE's authority to implement the additional flight restrictions discussed therein. SAR Section 1.1.1.3.2.1 describes the NTS airspace. *See* SAR at 1.1-13 to -14. The NTS airspace is protected by restricted areas R-4808N and R-4808S, known jointly as R-4808. Restricted areas are a type of special-use airspace that separate or confine air activities that are considered dangerous or unsafe to aircraft not involved in the activity. Federal Aviation Administration (FAA) regulations prohibit flights by nonparticipating military, civilian or commercial aircraft in this special-use airspace without the controlling authority's authorization. If the area is not designated for joint use (nonjoint use), then nonparticipating aircraft are normally not permitted at any time. The repository surface facility is located in restricted area R-4808N, which is designated as nonjoint use by the FAA. DOE is the controlling authority for the airspace. SAR at 1.1-14. As the controlling authority, DOE allows military aircraft to transit R-4808N. DOE has existing avoidance areas (further flight-restricted areas) over the Device Assembly Facility and over BREN (Bare Reactor Experiment-Nevada) Tower, as well as several other areas within R-4808N. *Id.*

As discussed above, additional flight restrictions have been identified in SAR Sections 1.6.3.4.1 and 5.8.3 for the airspace above the repository surface facilities. As the controlling authority for that airspace, DOE has full authority to implement the additional restrictions when needed. Although these flight restrictions for the airspace are not needed until nuclear waste forms are actually located at the repository, DOE nonetheless has taken steps to facilitate implementation of the additional flight restrictions identified in the SAR. Specifically, interactions with the U.S. Air Force Warfare Center at Nellis Air Force Base, Nevada, have resulted in a revision to Air Force Instruction (AFI) 13-212, Volume 1, Addendum A. AFI 13-212, Vol. 1, IC2, “Summary of Changes – Interim Change to AFI 13-212” (Dec. 17, 2008) (LSN# DEN001606834) at 5. This revision includes the additional restrictions, with a future implementation date, for the airspace above the repository surface facilities consistent with the restrictions outlined in SAR Section 1.6.3.4.1. Currently, these future restrictions serve only as a reference for future use and planning purposes, given that DOE is not yet receiving SNF and HLW at the repository. When repository operations commence under an NRC-approved license, DOE (currently through the National Nuclear Security Administration Nevada Site Office) will implement the applicable flight restrictions. These restrictions will be implemented in the same manner as the current avoidance areas in R-4808N. Specifically, DOE will *require* the Air Force to revise the formal Air Force Instructions to include the restrictions. *Id.*

If necessary to support repository operations, DOE also can seek an additional special-use airspace designation from the FAA for the southwest portion of the 4.9 nautical mile radius airspace that currently is not special-use airspace. SAR at 1.6-22. The FAA publishes annually, as Order JO7400.8, a listing of all regulatory and non-regulatory special use airspace areas, as well as issued but not yet implemented amendments to those areas established by the FAA. *See*

14 C.F.R. Part 73. The Order states that its audience is Airspace and Aeronautical Operations, Air Traffic Controllers, and interested aviation parties. *Id.* The FAA also identifies special-use air space on charts, and the restriction is for all altitudes and for continuous duration. *Id.* The FAA would include the designation of any new special use airspace in its Orders and charts. Therefore, as with R-4808N, any new special-use air space would be identified for pilots as a nonjoint-use restricted airspace.

For the foregoing reasons, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected. Contrary to Nevada's suggestion, DOE has identified in sufficient detail the applicable "procedural controls" and has clear authority to implement those controls when they are needed. Petition at 938. The contention thus fails to establish a "genuine dispute of fact or law meriting an evidentiary hearing." *Northeast Nuclear Energy Co.*, CLI-01-3, 53 NRC 22 at 24.

For all of the reasons set forth above, the contention must be rejected in its entirety.

**175. NEV-SAFETY-175 - Controls On Pilot Relief**

SAR Subsection 1.6.3.4.1 and related subsections, which screens-out aircraft crashes at the Yucca Mountain repository, fails to provide any documentary evidence of any procedural controls for restricting pilots from using a pilot relief "piddle pack" when operating aircraft over the proposed flight restricted airspace, and if none exists then the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.

**RESPONSE**

This contention alleges that SAR Section 1.6.3.4.1 does not provide “documentary evidence of any procedural controls for restricting pilots from using a pilot relief ‘piddle pack’ when operating aircraft over the proposed flight restricted airspace.” Petition at 940. The contention further asserts that “DOE cannot take credit for as yet unidentified procedural controls to control or monitor aircraft activity over the proposed flight restricted airspace.” *Id.* at 942.

For the reasons discussed below, contrary to 10 C.F.R. § 2.309(f)(1)(v) that requires adequate factual support or expert opinion in order for a contention to be admitted, this contention fails to explain how the alleged facts and documents upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. In addition, the contention also must be rejected because it fails to state a legitimate issue of law or fact, lacks adequate basis, and fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(i), (ii), (iv), and (vi). As here, when a contention does not directly controvert a position taken by the applicant in the license application, it is subject to dismissal.

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, Nevada has failed to state a legitimate issue of law or fact to be controverted in this proceeding. It simply repeats its generic argument (as set forth in NEV-SAFETY-174) that “DOE cannot take credit for as yet unidentified procedural controls to control or monitor aircraft activity over the proposed flight restricted airspace.” Petition at 942. Here again, Nevada provides no legal or regulatory basis for its assertion that DOE must implement air-traffic restrictions now—as part of its construction authorization request—and years before DOE is separately authorized to receive and possess licensed nuclear material at the repository.

**b. Brief Explanation of Basis**

As explained below, the proffered contention lacks adequate supporting bases in law or fact. In this regard, Nevada offers no alleged facts, documents, or credible expert opinion to demonstrate that DOE has not complied with applicable NRC regulations. It relies instead on bare assertions that have no basis in law or fact and which ignore critical discussion in the SAR.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For purposes of demonstrating that this contention is material to the findings NRC must make to license Yucca Mountain, Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.111, and 63.112. Petition at 940-41. In direct contradiction to the June 20, 2008, Case Management Order, however, Nevada fails to cite the “*principal* statutory or regulatory requirement or requirements” on which it relies (emphasis added). The mere recitation of regulatory provisions

does not satisfy Nevada's burden of demonstrating the issue raised in this contention is material to the findings that the NRC must make in this proceeding.

In addition, Nevada states that, in the alleged absence of "documentary evidence of any procedural controls for restricting pilots from using a pilot relief 'piddle pack' when operating aircraft over the proposed flight restricted airspace," DOE must evaluate the crash of a military aircraft at the repository "in terms of doses to the public and workers." Petition at 940. As demonstrated below, however, Nevada fails to provide any analysis to show the result that would be obtained if its position were correct and DOE's were wrong. Nevada, in other words, makes no attempt to explain *how* DOE's assumptions regarding the use of "piddle packs" by pilots would *materially* affect the results or outcome of DOE's frequency analysis of aircraft hazards.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards because, as discussed in that Section, it presents only unsupported arguments of counsel, and the associated expert affidavit falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Notably, the contention fails even to mention Horstman Affidavit, Attach. 12, in which Mr. Horstman purports to "adopt as [his] own opinions" the statements contained within Paragraph 5 of the contention. His Affidavit, in any case, is grossly insufficient to support the contention. An expert's attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—including its proffered expert—to set forth "the necessary technical analysis to show why the proffered bases support its contention." *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech.*, LBP-95-

6, 41 NRC at 305). No such analysis is presented here. In addition, as discussed below, the sole document upon which Nevada relies as extrinsic factual support does not support its contention. These fatal deficiencies render the contention inadmissible.

Although this contention focuses on piddle pack use by military pilots, Nevada repeats its generic argument (as set forth in NEV-SAFETY-174) that “DOE cannot take credit for as yet unidentified procedural controls to control or monitor aircraft activity over the proposed flight restricted airspace.” Petition at 942. Here again, Nevada provides no legal or regulatory basis for its assertion that DOE must implement air-traffic restrictions now—as part of its construction authorization request—and years before DOE is separately authorized to receive and possess licensed nuclear material at the repository. Nor does it support its suggestion that DOE will be unable to implement the restrictions where they are actually needed to support repository operations.

By way of background, the aircraft hazard frequency analysis discussed in the SAR and supporting documentation credits a flight-restricted airspace and operational constraints over the repository, as follows:

- Flights by fixed-wing aircraft in the Nevada Test Site or Nevada Test and Training Range airspace within 4.9 nautical mi (5.6 statute mi) of the North Portal and below 14,000 ft mean sea level are prohibited.
- 1,000 overflights of this flight-restricted airspace per year are permitted above 14,000 ft mean sea level for fixed-wing aircraft.
- Maneuvering over the flight-restricted airspace is prohibited; flight is straight and level.
- Carrying ordnance over the flight-restricted airspace is prohibited.
- Electronic jamming activity over the flight-restricted airspace is prohibited.

- Helicopter flights within 0.5 mi of the surface facilities and areas that handle SNF and high-level radioactive waste are prohibited. The helipad associated with the repository is located at least 0.5 mi from the surface facilities that handle SNF and high-level radioactive waste.

SAR at 1.6-22. SAR Section 1.6.3.4.1 further indicates that these restrictions will not be needed for years to come. Reflecting both this fact and the need for DOE to retain flexibility to address any potential future modifications or additions to flight activities within the special-use airspace over the repository, SAR Section 1.6.3.4.1 states:

It should be noted, however, that because air traffic restrictions for the repository would not be required for a number of years, DOE would take into consideration any modifications or additions to flight activities within the special-use airspace over the repository during the construction period. If necessary to support repository operations, DOE would seek a special-use airspace designation from the Federal Aviation Administration. In addition, airspace restrictions could include agreements with the U.S. Air Force and other users to manage traffic in the vicinity of the repository. The accident analysis conducted assumed that such flight restrictions would occur.

*Id.*

Importantly, DOE has incorporated the flight restrictions identified above into specific Preclosure Procedural Safety Controls (“PSCs”), which are included in Table 1.9-10 of the SAR (*see* PSC-15 to PSC-18, SAR at 1.9-144 to -145 (Table 1.9-10)). The SAR states that the PSCs presented in Table 1.9-10 will “be implemented in facility operations to prevent and mitigate event sequences,” and that these PSCs will impose “interface controls on activities outside of the GROA that could potentially lead to an event sequence.” SAR at 1.9-2.

SAR Section 5.8.3 describes the implementation of the PSCs (*i.e.*, flight restrictions) enumerated above. Section 5.8.3 states, in part, as follows:

Prior to receipt of a license to receive and possess SNF and HLW, and in accordance with 10 CFR 63.121(c), controls will be implemented to ensure that the requirements of 10 CFR 63.111(a) and (b) are met. The site boundary, as shown in Figure 5.8-2, will be considered as the boundary of the preclosure controlled area under the definition of 10 CFR 20.1003. Such land use controls will include ensuring that U.S. Air Force flight activities in the proximity of the GROA remain within the repository performance analysis considerations of existing and projected U.S. Air Force flight activity (Section 1.6.3.4.1).

SAR at 5.8-7.

Thus, DOE has committed in the Application to implement appropriate PSCs. It is well-established that a docketed commitment can satisfy a licensee's regulatory obligation. *AmerGen Energy Co., LLC* (License Renewal for Oyster Creek Nuclear Generating Station), LBP-06-7, 63 NRC 188, 207 (2006) (accepting licensee commitment as satisfying regulatory obligation).

Significantly, as noted above, the flight restrictions for the airspace over the repository are not actually required until the nuclear waste forms are located at the repository, an activity that will require a separate licensing action (and an associated hearing opportunity) pursuant to 10 C.F.R. § 63.41.

Nevada offers no alleged facts, documents, or credible expert opinion to demonstrate that DOE has not complied with applicable NRC regulations. It relies instead on bare assertions that have no basis in law or fact and which ignore critical discussion in the SAR. As noted above, the flight restrictions set forth in the SAR will be implemented as PSCs, in accordance with 10 C.F.R. §§ 63.111(a)-(b) and 63.121. Neither of those regulations requires, or even suggests, that DOE must "prove [that] the [relevant] controls are currently in effect and operating," as Nevada incorrectly claims. Petition at 942. In particular, Section 63.121(c) states that, in establishing appropriate controls outside the geologic repository operations area, "DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b)

are met,” and that such “[c]ontrol includes the *authority* to exclude members of the public, *if necessary*.” 10 C.F.R. § 63.121(c) (emphasis added). Nowhere does Section 63.121(c)—or any other Part 63 regulation—state that DOE must prove “that such controls exist” (Petition at 942) or even develop complete and final procedures, now, as part of its construction authorization request.

NRC regulations require only that DOE “identify” and “describe” those controls that are necessary to ensure compliance with applicable Part 63 requirements, and which may be implemented by DOE pursuant to its applicable authorities. For example, 10 C.F.R. § 63.21(c), which prescribes the contents of the SAR, requires, among other things, “[a] *description* of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site and adjacent areas.” 10 C.F.R. 63.21(c)(24) (emphasis added). The YMRP, which guides the NRC Staff in its review of the Application, directs the Staff to assess whether “any additional controls” are “acceptable and sufficient.” YMRP § 2.5.8.3, at 2.5-100. In the same vein, the YMRP directs the Staff to evaluate whether DOE has “identified” any “existing or proposed permissible rights or encumbrances that exist and may be continued, or that *should be established* outside the geologic repository operations area,” and whether DOE has assessed the nature of any activities that may permissibly occur under those rights. *Id* (emphasis added). By claiming that DOE must implement flight control restrictions now, Nevada alleges noncompliance with a requirement that simply does not exist and thus, is not material to the findings to be made by the NRC Staff. The contention, therefore, fails to establish a concrete and genuine dispute suitable for litigation.

As shown above, DOE has provided the information that is required by NRC regulations in its Application. It is Nevada—not DOE—that has failed to meet *its* burden by presenting

sufficient legal and factual bases for its allegation that “SAR Section 1.6.3.4.1 is both materially incomplete and inaccurate.” Petition at 942. Nevada does not challenge—with the requisite specificity and basis—the adequacy of DOE’s proposed flight restrictions. At most, Nevada vaguely (and erroneously) claims that “DOE fails to describe in any detail the nature of the procedural controls.” *Id.* Nevada ignores relevant portions of the SAR. The SAR sections discussed above are quite explicit with respect to the aircraft-related PSCs that DOE has committed to implement.

Aside from the grossly deficient Affidavit mentioned above, the only other factual support proffered by Nevada is a document entitled “U.S. Air Force Multi-Command Instruction 11-F-16 Volume 3, Virtual Pilot Operational Procedures – F16,” dated March 10, 2007 (LSN# NEV000005429). Petition at 941 - 42. Nevada, however, cites no specific sections or pages of the document, nor does it provide any meaningful explanation of the document’s significance. With regard to this document, Nevada states only that “[t]he rules that govern pilot activity while flying are not controlled by DOE, but by the military services.” *Id.* at 941. For the reasons set forth above, that argument clearly lacks merit. Furthermore, the Air Force instruction cited by Nevada applies to “virtual” flight training conducted in simulators. It does not address actual flying operations. Finally, the cited document contains no discussion of piddle pack use, the specific subject of Nevada’s proposed contention.

As discussed in the applicable Legal Standards section above, it is imperative that petitioners identify the specific portions of the documents upon which they rely and explain their significance to the contention. Nevada has not done so here. Its vague reference to the cited document is insufficient. As discussed in Section f. below, Nevada’s allegations concerning DOE’s alleged inability to “impose such rules on the military services” (Petition at 942)

regarding the use of piddle packs do not, in any event, establish a genuine *material* dispute worthy of a hearing.

In summary, Nevada plainly has failed to meet its burden under Section 2.309(f)(1)(v). While the ultimate burden of persuasion is on the license applicant with respect to an *admitted* contention, “the proponent of the [proposed] contention has the initial burden of coming forward with factual issues, not merely conclusory statements and vague allegations” of the type made here by Nevada. *Northeast Nuclear Energy Co. (Millstone Nuclear Power Station, Unit 3)*, CLI-01-03, 53 NRC 22, 27 (2001). Accordingly, the contention must be rejected as lacking adequate factual and legal support.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention also fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(vi). At its core, this contention (as well as subsequent Nevada contentions) seeks to challenge, albeit unsuccessfully, DOE's ability to implement the flight-restricted airspace and operational controls credited in the aircraft hazard analysis and identified in the SAR. In short, nowhere in its contention does Nevada directly and credibly challenge DOE's authority or ability to implement the aircraft-related PSCs listed in SAR Section 5.8.3.

In fact, the SAR amply demonstrates DOE's authority to implement the additional flight restrictions discussed therein. SAR Section 1.1.1.3.2.1 describes the NTS airspace. *See* SAR at 1.1-13 to 1.1-14. The NTS airspace is protected by restricted areas R-4808N and R-4808S, known jointly as R-4808. Restricted areas are a type of special-use airspace that separate or confine air activities that are considered dangerous or unsafe to aircraft not involved in the activity. Federal Aviation Administration (“FAA”) regulations prohibit flights by

nonparticipating military, civilian or commercial aircraft in this special-use airspace without the controlling authority's authorization. If the area is not designated for joint use (nonjoint use), then nonparticipating aircraft are normally not permitted at any time. The repository surface facility is located in restricted area R-4808N, which is designated as nonjoint use by the FAA. DOE is the controlling authority for the airspace. SAR at 1.1-14. As the controlling authority, DOE allows military aircraft to transit R-4808N. DOE has existing avoidance areas (further flight-restricted areas) over the Device Assembly Facility and over BREN (Bare Reactor Experiment-Nevada) Tower, as well as several other areas within R-4808N. *Id.*

As discussed above, additional flight restrictions have been identified in SAR Sections 1.6.3.4.1 and 5.8.3 for the airspace above the repository surface facilities. As the controlling authority for that airspace, DOE has full authority to implement the additional restrictions when needed. Although these flight restrictions for the airspace are not needed until nuclear waste forms are actually located at the repository, DOE nonetheless has taken steps to facilitate implementation of the additional flight restrictions identified in the SAR. Specifically, interactions with the U.S. Air Force Warfare Center at Nellis Air Force Base, Nevada, have resulted in a revision to Air Force Instruction (AFI) 13-212, Volume 1, Addendum A. AFI 13-212, Vol. 1, IC2, "Summary of Changes – Interim Change to AFI 13-212" (Dec. 17, 2008) (LSN# DEN001606834) at 5. This revision includes the additional restrictions, with a future implementation date, for the airspace above the repository surface facilities consistent with the restrictions outlined in SAR Section 1.6.3.4.1. Currently, these future restrictions serve only as a reference for future use and planning purposes, given that DOE is not yet receiving SNF and HLW at the repository. When repository operations commence under an NRC-approved license, DOE (currently through the National Nuclear Security Administration Nevada Site Office) will

implement the applicable flight restrictions. These restrictions will be implemented in the same manner as the current avoidance areas in R-4808N. Specifically, DOE will *require* the Air Force to revise the formal Air Force Instructions to include the restrictions. *Id.*

Additionally, as discussed in the applicable Legal Standards section above, contentions that allege errors, omissions, uncertainties or alternative approaches—without specifying the ramifications or results of such alleged deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. The contention also suffers from this deficiency. Specifically, Nevada states that, in the alleged absence of “documentary evidence of any procedural controls for restricting pilots from using a pilot relief ‘piddle pack’ when operating aircraft over the proposed flight restricted airspace,” DOE must evaluate the crash of a military aircraft at the repository “in terms of doses to the public and workers.” Petition at 940. Nevada fails to provide, however, any analysis to show the result that would be obtained if its position were correct and DOE’s were wrong. Nevada, in other words, makes no attempt to explain *how* DOE’s assumptions regarding the use of “piddle packs” by pilots would *materially* affect the results or outcome of DOE’s frequency analysis of aircraft hazards.

Nevada’s contention completely ignores relevant discussion and analysis contained in DOE’s *Frequency Analysis of Aircraft Hazards for License Application*, Las Vegas, NV, Bechtel SAIC Company (2007) (LSN# DN2002488951 and DEN001564755), referenced in the SAR and herein as BSC 2007c. As Nevada acknowledges, the use of a piddle pack is a special activity for personal comfort for pilot urination, which includes loosening or removal of seat restraints. As indicated in Attachment III of BSC 2007c, two mishaps were attributed to the use of a piddle pack; one in 1990 and one in 1992. BSC 2007c, Attachment III at III-4 (Item No. 10), III-9 (Item No. 59). Both mishaps involved the removal of the lap belt that restrains the pilot in the

seat. *Id.* The act of removing the lap belt and preparing the cockpit for the use of the piddle pack is a special activity not consistent with straight and level flight, which is required by PSC-16 (SAR at 1.9-144 Table 1.19 -10). Thus, the initiating event does not apply to overflight of the flight-restricted airspace because straight and level flight is required of overflights. For this reason, DOE has concluded that a separate restriction on the use of piddle packs is not necessary because such a requirement is already embedded in the requirement for straight and level flight.

Even if piddle pack use were permitted (which it is not), the sensitivity analysis performed in Attachment 6 of BSC 2007c shows that the overall frequency of aircraft crashes is insensitive to the categorization of initiating events of military crashes. BSC 2007c, Attachment VI at VI-8 to VI-9. This fact indicates that, even if piddle-pack use were consistent with straight and level flight, it would not be necessary to impose restrictions on the use of piddle packs. Nevada thus has ignored the content of key supporting documentation that is explicitly referenced in the Application, something it cannot do and expect that its proposed contention will not suffer the consequences. Indeed, Nevada's own contention indicates that it has reviewed at least some portion of DOE's aircraft hazard frequency analysis. *See* Petition at 941 (citing BSC 2007c).

For the foregoing reasons, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi). By failing to controvert portions of the Application directly relevant to its contention, Nevada has failed to establish a genuine dispute of fact or law meriting an evidentiary hearing.

For all of the reasons discussed above, this contention should be rejected in its entirety.

**176. NEV-SAFETY-176 - Controls On Pilot Maneuvering**

SAR Subsection 1.6.3.4.1 and related subsections, which screen-out aircraft crashes at the Yucca Mountain repository, fail to provide any documentary evidence of any procedural controls for restricting pilots from maneuvering their aircraft when operating over the proposed flight restricted airspace, and if none exists then the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.

**RESPONSE**

This contention alleges that SAR Section 1.6.3.4.1 does not provide “documentary evidence of any procedural controls for restricting pilots from maneuvering their aircraft when operating over the proposed flight restricted airspace.” Petition at 943. The contention further asserts that, in the absence of such controls, “the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.” *Id.*

For the reasons discussed below, contrary to 10 C.F.R. § 2.309(f)(1)(v) that requires adequate factual support or expert opinion in order for a contention to be admitted, this contention fails to explain how the alleged facts and documents upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. In addition, the contention also must be rejected because it fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(i), (ii), and (vi). As here, when a contention does not directly controvert a position taken by the applicant in the license application, it is subject to dismissal.

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, Nevada has failed to state a legitimate issue of law or fact to be controverted in this proceeding. For instance, Nevada provides no legal or regulatory basis for

its assertion that DOE must implement air-traffic restrictions now—as part of its construction authorization request—and years before DOE is separately authorized to receive and possess licensed nuclear material at the repository.

**b. Brief Explanation of Basis**

As explained below, the proffered contention lacks adequate supporting bases in law or fact. In this regard, it is Nevada—not DOE—that has failed to meet *its* burden by presenting sufficient legal and factual bases for its allegation that “SAR Section 1.6.3.4.1 is both materially incomplete and inaccurate.” Petition at 946. Nevada does not challenge—with the requisite specificity and basis—the adequacy of DOE’s proposed flight restrictions. At most, Nevada vaguely (and erroneously) claims that “DOE fails to describe in any detail the nature of the procedural controls.” *Id.* at 945. Nevada ignores relevant portions of the SAR and fails to state how the SAR is materially incomplete or inaccurate.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As fully explained below, Nevada’s contention fails to establish a genuine dispute on a material issue of fact or law. In this regard, even though Nevada cites three documents as extrinsic support for its contention, none of those documents controverts the Application and gives rise to a material issue in this proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards because, as discussed below and in that Section, it presents only unsupported arguments of counsel, and the associated expert affidavit falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Notably, the contention fails even to mention the Horstman Affidavit, Attach. 12, in which Mr. Horstman purports to “adopt as [his] own opinions” the statements contained within paragraph 5 of the contention. This Affidavit, in any case, is grossly insufficient to support the contention. An expert’s attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—including its proffered expert—to set forth “the necessary technical analysis to show why the proffered bases support its contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech.*, LBP-95-6, 41 NRC at 305). No such analysis is presented here. In addition, as discussed in Section f. of this response below, the three documents upon which Nevada relies as extrinsic factual support do not controvert the Application and thus do not support its contention. These fatal deficiencies render the contention inadmissible.

Although this contention focuses on aircraft maneuvering by military pilots, Nevada repeats its general argument (as set forth in NEV-SAFETY-174) that “DOE cannot take credit for as yet unidentified procedural controls,” this time as they pertain to “aircraft maneuvering over Yucca Mountain.” Petition at 946. In particular, this contention further asserts that “DOE has the burden of proving that there is an agreement with the U.S. military to prohibit certain operational activities of military aircraft flying anywhere near the Yucca Mountain repository.”

*Id.* at 945. The contention also states that DOE cannot “presume” that it will obtain the agreement of third parties, viz., the U.S. Air Force, to comply with such procedural controls or to modify military operations manuals to include such restrictions. *Id.* at 946. Here again, however, Nevada provides no legal or regulatory basis for its assertion that DOE must *implement* air-traffic restrictions now—as part of its construction authorization request—and years before DOE is separately authorized to receive and possess licensed nuclear material at the repository. Nor does it support its claim that DOE lacks the authority to implement those restrictions when they are needed to support repository operations.

As explained previously, the aircraft hazard frequency analysis discussed in the SAR and supporting documentation credits a flight-restricted airspace and operational constraints (which include a prohibition on maneuvering) over the repository as follows:

- Flights by fixed-wing aircraft in the Nevada Test Site or Nevada Test and Training Range airspace within 4.9 nautical mi (5.6 statute mi) of the North Portal and below 14,000 ft mean sea level are prohibited.
- 1,000 overflights of this flight-restricted airspace per year are permitted above 14,000 ft mean sea level for fixed-wing aircraft.
- Maneuvering over the flight-restricted airspace is prohibited; flight is straight and level.
- Carrying ordnance over the flight-restricted airspace is prohibited.
- Electronic jamming activity over the flight-restricted airspace is prohibited.
- Helicopter flights within 0.5 mi of the surface facilities and areas that handle SNF and high-level radioactive waste are prohibited. The helipad associated with the repository is located at least 0.5 mi from the surface facilities that handle SNF and high-level radioactive waste.

SAR at 1.6-22. SAR Section 1.6.3.4.1 further indicates that these restrictions will not be needed for years to come. Reflecting both this fact and the need for DOE to retain flexibility to address any potential future modifications or additions to flight activities within the special-use airspace over the repository, SAR Section 1.6.3.4.1 states:

It should be noted, however, that because air traffic restrictions for the repository would not be required for a number of years, DOE would take into consideration any modifications or additions to flight activities within the special-use airspace over the repository during the construction period. If necessary to support repository operations, DOE would seek a special-use airspace designation from the Federal Aviation Administration. In addition, airspace restrictions could include agreements with the U.S. Air Force and other users to manage traffic in the vicinity of the repository. The accident analysis conducted assumed that such flight restrictions would occur.

*Id.*

Importantly, DOE has incorporated the flight restrictions identified above into specific Preclosure Procedural Safety Controls (“PSCs”), which are included in Table 1.9-10 of the SAR (*see* PSC-15 to PSC-18, SAR at 1.9-144 to -145 (Table 1.9 -10)). The SAR states that the PSCs presented in Table 1.9-10 will “be implemented in facility operations to prevent and mitigate event sequences,” and that these PSCs will impose “interface controls on activities outside of the GROA that could potentially lead to an event sequence.” SAR at 1.9-2.

SAR Section 5.8.3 describes the implementation of the PSCs (*i.e.*, flight restrictions) enumerated above. Section 5.8.3 states, in part, as follows:

Prior to receipt of a license to receive and possess SNF and HLW, and in accordance with 10 CFR 63.121(c), controls will be implemented to ensure that the requirements of 10 CFR 63.111(a) and (b) are met. The site boundary, as shown in Figure 5.8-2, will be considered as the boundary of the preclosure controlled area under the definition of 10 CFR 20.1003. Such land use controls

will include ensuring that U.S. Air Force flight activities in the proximity of the GROA remain within the repository performance analysis considerations of existing and projected U.S. Air Force flight activity (Section 1.6.3.4.1).

SAR at 5.8-7.

Thus, DOE has committed in the Application to implement appropriate PSCs. It is well-established that a docketed commitment can satisfy a licensee's regulatory obligation. *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), LBP-06-7, 63 NRC 188, 207 (2006) (accepting licensee commitment as satisfying regulatory obligation). Significantly, as noted above, the flight restrictions for the airspace over the repository are not actually required until the nuclear waste forms are located at the repository, an activity that will require a separate licensing action (and an associated hearing opportunity) pursuant to 10 C.F.R. § 63.41.

Nevada offers no alleged facts, documents, or credible expert opinion to demonstrate that DOE has not complied with applicable NRC regulations. It relies instead on bare assertions that have no basis in law or fact and which ignore critical discussion in the SAR. As noted above, the flight restrictions set forth in the SAR will be implemented as PSCs, in accordance with 10 C.F.R. §§ 63.111(a)-(b) and 63.121. Neither of those regulations requires, or even suggests, that DOE must “prove that the [relevant] controls are currently in effect and operating,” as Nevada incorrectly claims. Petition at 946. In particular, Section 63.121(c) states that, in establishing appropriate controls outside the geologic repository operations area, “DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met,” and that such “[c]ontrol includes the *authority* to exclude members of the public, *if necessary*.” 10 C.F.R. § 63.121(c) (emphasis added). Nowhere does Section 63.121(c)—or any other Part 63 regulation—state that DOE must prove that such controls exist or even develop complete and final procedures, now, as part of its construction authorization request.

NRC regulations require only that DOE “identify” and “describe” those controls that are necessary to ensure compliance with applicable Part 63 requirements, and which may be implemented by DOE pursuant to its applicable authorities. For example, 10 C.F.R. § 63.21(c), which prescribes the contents of the SAR, requires, among other things, “[a] *description* of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site and adjacent areas.” 10 C.F.R. 63.21(c)(24) (emphasis added). The YMRP, which guides the NRC Staff in its review of the Application, directs the Staff to assess whether “any additional controls” are “acceptable and sufficient.” YMRP § 2.5.8.3, at 2.5-100. In the same vein, the YMRP directs the Staff to evaluate whether DOE has “identified” any “existing or proposed permissible rights or encumbrances that exist and may be continued, or that *should be established* outside the geologic repository operations area,” and whether DOE has assessed the nature of any activities that may permissibly occur under those rights. *Id.* (emphasis added). By claiming that DOE must implement flight control restrictions now, Nevada alleges noncompliance with a requirement that simply does not exist and thus, is not material to the findings to be made by the NRC Staff. The contention, therefore, fails to establish a concrete and genuine dispute suitable for litigation.

As shown above, DOE has provided the information that is required by NRC regulations in its Application. It is Nevada—not DOE—that has failed to meet *its* burden by presenting sufficient legal and factual bases for its allegation that “SAR Section 1.6.3.4.1 is both materially incomplete and inaccurate.” Petition at 946. Nevada does not challenge—with the requisite specificity and basis—the adequacy of DOE’s proposed flight restrictions. At most, Nevada vaguely (and erroneously) claims that “DOE fails to describe in any detail the nature of the procedural controls.” Petition at 945. Nevada ignores relevant portions of the SAR. The SAR

sections discussed above are quite explicit with respect to the aircraft-related PSCs that DOE has committed to implement.

In summary, Nevada plainly has failed to meet its burden under Section 2.309(f)(1)(v). While the ultimate burden of persuasion is on the license applicant with respect to an *admitted* contention, “the proponent of the [proposed] contention has the initial burden of coming forward with factual issues, not merely conclusory statements and vague allegations” of the type made here by Nevada. *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit 3), CLI-01-03, 53 NRC 22, 27 (2001). Accordingly, the contention must be rejected as lacking adequate factual and legal support.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. Nevada’s contention also suffers from this deficiency. Specifically, the contention mistakenly suggests that DOE lacks the authority to implement the specific flight-restricted airspace and operational controls that are credited in SAR Section 1.6.3.4.1 (page 1.6-22) and SAR Section 5.8.3 (page 5.8-7) for the airspace above the repository surface facilities, insofar as it asserts that the U.S. Air Force may “decline” to abide by those controls. *See* Petition at 945-46.

DOE has clear authority to implement these additional flight restrictions. SAR Section 1.1.1.3.2.1 describes the Nevada Test Site airspace. *See* SAR at 1.1-13 to 1.1-14. The Nevada Test Site airspace is protected by restricted areas R-4808N and R-4808S, known jointly as R-4808. Restricted areas are a type of special-use airspace that separate or confine air activities that are considered dangerous or unsafe to aircraft not involved in the activity. FAA regulations

prohibit flights by nonparticipating military, civilian or commercial aircraft in this special-use airspace without the controlling authority's authorization. If the area is not designated for joint use (nonjoint use), then nonparticipating aircraft are normally not permitted at any time. R-4808N is designated as nonjoint use by the FAA, and DOE is the controlling authority for the airspace.

As discussed in SAR Section 1.1.1.3.2.1, the repository surface facility is located in restricted area R-4808N. SAR at 1.1-14. DOE, as the controlling authority, allows military aircraft to transit R-4808N. DOE has existing avoidance areas (further flight-restricted areas) over the Device Assembly Facility and over BREN (Bare Reactor Experiment-Nevada) Tower, as well as several other areas within R-4808N. *Id.* The additional flight-restrictions identified in SAR Sections 1.6.3.4.1 and 5.8.3 are for the airspace above the repository surface facilities. As discussed above, the flight restrictions for the airspace are not needed until nuclear waste forms are actually located at the repository.

DOE nonetheless has taken steps to facilitate implementation of the additional flight-restrictions identified in the SAR. Specifically, interactions with the U.S. Air Force Warfare Center at Nellis Air Force Base, Nevada, have resulted in a revision to Air Force Instruction (AFI) 13-212, Volume 1, Addendum A. AFI 13-212, Vol. 1, IC2, "Summary of Changes – Interim Change to AFI 13-212" (Dec. 17, 2008) (LSN# DEN001606834) at 5. This revision includes the additional restrictions, with a future implementation date, for the airspace above the repository surface facilities, consistent with the restrictions outlined in SAR Sections 1.6.3.4.1 and 5.8.3. Currently, these future restrictions serve only as a reference for future use and planning purposes. When repository operations commence under an NRC-approved license, DOE (currently through the National Nuclear Security Administration Nevada Site Office) will

implement the applicable flight restrictions. These restrictions will be implemented in the same manner as the current avoidance areas in R-4808N. Specifically, DOE will require the Air Force to revise the formal Air Force Instructions to include the restrictions.

Nevada has not presented any factual information or expert opinion that directly controverts the Application or information presented above and, consequently, its contention is inadmissible. As noted above, the Horstman Affidavit lacks the requisite “reasoned basis or explanation.” Furthermore, while Nevada cites three documents as extrinsic support for its contention, none of those documents controverts the Application and gives rise to a material dispute.

The first document cited by Nevada is a September 11, 2003, letter from U.S. Air Force officials to U.S. Representative Duncan Hunter, then-Chairman of the House Committee on Armed Services. Petition at 945 (citing Letter from J. Jumper, U.S. Air Force Chief of Staff, and J. Roche, Secretary of the Air Force to Hon. Duncan Hunter, Chairman, Committee on Armed Services, U.S. House of Representatives (Sept. 11, 2003), LSN# DN2001403483 at 1). This letter addresses two issues related to the Nevada Test and Training Range (“NTTR”). The first issue relates to the Air Force’s previously-stated concern that DOE might seek to transport repository-bound nuclear materials through sensitive areas of the NTTR. As such, it has no relevance to DOE’s aircraft hazard analysis, the subject of Nevada’s contention.

The second issue mentioned in the September 2003 letter involves the Air Force’s concern, as expressed in 2003, that “overflight restrictions on aircraft operating in NTTR-associated airspace will negatively impact [its] readiness activities.” LSN# DN2001403483 at 1. Nevada fails, however, to explain how the 2003 Air Force letter directly controverts the Application, particularly with respect to DOE’s authority to implement the flight-restricted

airspace and operational constraints that are credited in the SAR. Indeed, it is clear that Nevada has not carefully reviewed the SAR and its supporting documentation, which describe in detail existing operations on the NTTR and their locations relative to the repository surface facility.

SAR Section 1.1.1.3.2.2 explains that the NTTR airspace consists of the Reveille and Desert Military operations and restricted areas R-4806, R-4807, and R-4809. SAR at 1.1-14. The closest border of the Reveille military operations area is about 71 miles from the North Portal at Yucca Mountain. *Id.* The restricted areas of the NTTR are divided into the North Range and the South Range. *Id.* at 1.1-15. These two ranges are separated by the Nevada Test Site. *Id.* Within the NTTR airspace, restricted areas R-4806, R-4807, and R-4809 are joint use; within the Nevada Test Site airspace, R-4808S is joint use and R-4808N is nonjoint use. *Id.* The additional flight-restrictions identified in SAR Sections 1.6.3.4.1 and 5.8.3 are for the airspace above the repository surface facilities. Those facilities are to be located in restricted area R-4808N, a nonjoint use area for which DOE is the controlling authority. Thus, contrary to Nevada's suggestion, the Air Force cannot "decline" to abide by the additional flight restrictions identified and credited by DOE in the SAR upon their implementation.

The second document cited by Nevada in support of its contention is a September 20, 1995, letter from the Air Force to U.S. Representative Don Young, then-Chairman of the House Committee in Resources. Petition at 945 (citing Letter from Sheila Widnall, Secretary of the Air Force to Hon. Don Young, Chairman, Committee in Resources, U.S. House of Representatives (Sept. 20, 1995), LSN# DEN000357493 at 1). That letter, written in response to then-proposed legislation (H.R. 1020), expresses the Air Force's concern, at the time, that overflight restrictions implemented to support repository operations might adversely affect military operations at the Nellis range complex, including the Nellis Air Force Base. Nevada does not explain—and the

Board is left to guess—how this 1995 document is germane to the information presented in DOE’s June 2008 Application.

Based on this 13-year-old letter, Nevada concludes, quite categorically, that “there is no likelihood that the U.S. military would agree to a prohibition on carrying live ordnance or using electronic jamming when operating in the airspace above the Yucca Mountain repository.” Petition at 945. Nevada does not elaborate on the basis for this conclusion, which is patently incorrect. With respect to restricted area R-4808N, overflight with live or hung ordnance already is prohibited (except for critical in-flight emergencies). SAR at 1.1-14. Additionally, as noted above, interactions between the Air Force and DOE to date have resulted in a revision to AFI 13-212, Volume 1, Addendum A, which includes additional flight restrictions consistent with those identified in SAR Section 1.6.3.4.1 (p. 1.6-22).

Finally, in asserting that maneuvering of military aircraft is “governed by military operations manuals, not airspace considerations,” Nevada again cites a March 2006 Air Force document. Petition at 946 (citing “U.S. Air Force Multi-Command Instruction 11-F-16 Volume 3, Virtual Pilot Operational Procedures – F-16” (Mar. 16, 2006), LSN# NEV000005429). That document, however, is essentially a procedural checklist for pilots, and certainly does not speak to DOE’s authority to implement—in DOE-controlled airspace above the repository surface facilities— flight restrictions that require straight and level flight (and thus prohibit maneuvering). Furthermore, as discussed above, relevant revisions already have been made to the *applicable* Air Force document, AFI 13-212, Volume 1, Addendum A.

For the foregoing reasons, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi). By failing to controvert the LA through adequate factual support or expert opinion, Nevada has not

established a “genuine dispute of fact or law meriting an evidentiary hearing.” *Northeast Nuclear Energy Co.* CLI-01-03, 53 NRC at 24.

For all of the reasons set forth above, the contention should be dismissed in its entirety.

**177. NEV-SAFETY-177 - Controls On Helicopters**

SAR Subsection 1.6.3.4.1 and related subsections, which screen-out aircraft crashes at the Yucca Mountain repository, fail to provide any documentary evidence of any procedural controls for prohibiting helicopter flights within 0.5 miles of the surface facilities that handle spent nuclear fuel and high level radioactive waste, and if none exist then the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.

**RESPONSE**

This contention alleges that SAR Section 1.6.3.4.1 and “related subsections” do not “provide any documentary evidence of any procedural controls for prohibiting helicopter flights within 0.5 miles of the surface facilities that handle spent nuclear fuel and high level radioactive waste.” Petition at 948. The contention further asserts that, in the absence of such controls, “the crash of military aircraft at the repository should have been evaluated in terms of doses to the public and workers.” *Id.*

Although this contention pertains to controls on helicopter flights as opposed to pilot maneuvering, the supporting bases for this contention are nearly identical—and not materially distinguishable—from the bases proffered in support of the previous contention (NEV-SAFETY-176). Accordingly, this contention is inadmissible for the same reasons. Contrary to 10 C.F.R. § 2.309(f)(1)(v), this contention fails to explain how the alleged facts and documents upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. Contrary to 10 C.F.R. § 2.309(f)(1)(i), (ii), and (vi), this contention fails to state a legitimate issue of law or fact, lacks adequate basis, and fails to establish a genuine dispute with DOE on a material issue of law or fact. The contention does not directly controvert a position taken by DOE in the Application and, therefore, should be dismissed.

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, Nevada has failed to state a legitimate issue of law or fact to be controverted in this proceeding. For instance, Nevada provides no legal or regulatory basis for its assertion that DOE must implement the specified prohibition on helicopter flights within one-half mile of the relevant surface facilities *before* DOE is even licensed to receive and possess SNF and HLW at those facilities. As shown below, DOE has met its present regulatory obligation by making an appropriate commitment in its Application for a construction authorization request to implement the specified helicopter flight restriction.

**b. Brief Explanation of Basis**

As explained below, the proffered contention lacks adequate supporting bases in law or fact. In this regard, Nevada provides no credible legal or factual bases for its claim that there is “no likelihood” (Petition at 950) that the U.S. military would agree to the flight restrictions specified by DOE in its Application. Indeed, the information presented by DOE below demonstrates otherwise.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above.

This contention fails to meet those standards because, as discussed in that Section, it presents only unsupported arguments of counsel, and the associated expert affidavit falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Notably, the contention fails even to mention the Horstman Affidavit, Attach. 12, in which Mr. Horstman purports to “adopt as [his] own opinions” the statements contained within Paragraph 5 of the contention. This Affidavit, in any case, is grossly insufficient to support the contention. An expert’s attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—including its proffered expert—to set forth “the necessary technical analysis to show why the proffered bases support its contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech.*, LBP-95-6, 41 NRC at 305). No such analysis is presented here. In addition, as discussed in Section f. of this response below, the three documents upon which Nevada relies as extrinsic factual support do not controvert the Application and thus do not support its contention. These fatal deficiencies render the contention inadmissible.

As in NEV-SAFETY-176, Nevada asserts that “DOE has the burden of proving that there is an agreement with the U.S. military to prohibit certain operational activities of military aircraft flying anywhere near the Yucca Mountain repository.” Petition at 950. This argument fails to support the admission of the contention for the reasons set forth above in DOE’s responses to Nevada’s previous aircraft hazard contentions. In short, Nevada provides no legal or regulatory basis for its assertion that DOE must *implement* flight restrictions, or enter into formal agreements with the U.S. Air Force or other federal entities, now, in order to obtain an NRC construction authorization. Moreover, as shown in section f. below, DOE has clear authority to

require implementation of the flight restrictions when they are needed to support repository operations.

As explained previously, the aircraft hazard frequency analysis discussed in the SAR and supporting documentation credits a flight-restricted airspace and operational constraints (which include a helicopter flight-related prohibition) over the repository as follows:

- Flights by fixed-wing aircraft in the Nevada Test Site or Nevada Test and Training Range airspace within 4.9 nautical mi (5.6 statute mi) of the North Portal and below 14,000 ft mean sea level are prohibited.
- 1,000 overflights of this flight-restricted airspace per year are permitted above 14,000 ft mean sea level for fixed-wing aircraft.
- Maneuvering over the flight-restricted airspace is prohibited; flight is straight and level.
- Carrying ordnance over the flight-restricted airspace is prohibited.
- Electronic jamming activity over the flight-restricted airspace is prohibited.
- Helicopter flights within 0.5 mi of the surface facilities and areas that handle SNF and high-level radioactive waste are prohibited. The helipad associated with the repository is located at least 0.5 mi from the surface facilities that handle SNF and high-level radioactive waste.

SAR at 1.6-22. SAR Section 1.6.3.4.1 further indicates that these restrictions will not be needed for years to come. Reflecting both this fact and the need for DOE to retain flexibility to address any potential future modifications or additions to flight activities within the special-use airspace over the repository, SAR Section 1.6.3.4.1 states:

It should be noted, however, that because air traffic restrictions for the repository would not be required for a number of years, DOE would take into consideration any modifications or additions to

flight activities within the special-use airspace over the repository during the construction period. If necessary to support repository operations, DOE would seek a special-use airspace designation from the Federal Aviation Administration. In addition, airspace restrictions could include agreements with the U.S. Air Force and other users to manage traffic in the vicinity of the repository. The accident analysis conducted assumed that such flight restrictions would occur.

*Id.*

Importantly, DOE has incorporated the flight restrictions identified above into specific Preclosure Procedural Safety Controls (“PSCs”), which are included in Table 1.9-10 of the SAR (see PSC-15 to PSC-18 on SAR at 1.9-144 to 1.9-145). The SAR states that the PSCs presented in Table 1.9-10 will “be implemented in facility operations to prevent and mitigate event sequences,” and that these PSCs will impose “interface controls on activities outside of the GROA that could potentially lead to an event sequence.” SAR at 1.9-2. The helicopter flight restrictions are established at 0.5 miles from surface facilities that process, stage, or age nuclear waste. Design criteria have been established, as identified in the Nuclear Safety Design Bases in SAR Section 1.9 (pp. 1.9-39, 1.9-51, 1.9-84, 1.9-96, and 1.9-100), for the helipad to be located at least 0.5 miles from the relevant surface facilities. This is indicated on the site plans in SAR Figures 1.2.1-1 and 1.2.1-2 (pp. 1.2.1-33 and 1.2.1-35). In addition, flight operating procedures will include the 0.5-mile restriction and the required flight paths to the heliport that support the 0.5-mile stand-off criteria, as required specifically by PSC-18 in SAR Table 1.9-10.

SAR Section 5.8.3 describes the implementation of the PSCs (i.e., flight restrictions) enumerated above. Section 5.8.3 states, in part, as follows:

Prior to receipt of a license to receive and possess SNF and HLW, and in accordance with 10 CFR 63.121(c), controls will be implemented to ensure that the requirements of 10 CFR 63.111(a) and (b) are met. The site boundary, as shown in Figure 5.8-2, will

be considered as the boundary of the preclosure controlled area under the definition of 10 CFR 20.1003. Such land use controls will include ensuring that U.S. Air Force flight activities in the proximity of the GROA remain within the repository performance analysis considerations of existing and projected U.S. Air Force flight activity (Section 1.6.3.4.1).

SAR at 5.8-7.

Thus, DOE has committed in the Application to implement appropriate PSCs. It is well-established that a docketed commitment can satisfy a licensee's regulatory obligation. *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), LBP-06-7, 63 NRC 188, 207 (2006) (accepting licensee commitment as satisfying regulatory obligation). Significantly, as noted above, the flight restrictions for the airspace over the repository are not actually required until the nuclear waste forms are located at the repository, an activity that will require a separate licensing action (and an associated hearing opportunity) pursuant to 10 C.F.R. § 63.41.

Nevada offers no alleged facts, documents, or credible expert opinion to demonstrate that DOE has not complied with applicable NRC regulations. It relies instead on bare assertions that have no basis in law or fact and which ignore critical discussion in the SAR. As noted above, the flight restrictions set forth in the SAR will be implemented as PSCs, in accordance with 10 C.F.R. §§ 63.111(a)-(b) and 63.121. Neither of those regulations requires, or even suggests, that DOE must "prov[e] that such controls are in place," as Nevada incorrectly claims. Petition at 948. In particular, Section 63.121(c) states that, in establishing appropriate controls outside the geologic repository operations area, "DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met," and that such "[c]ontrol includes the *authority* to exclude members of the public, *if necessary*." 10 C.F.R. § 63.121(c) (emphasis added). Nowhere does Section 63.121(c)—or any other Part 63 regulation—state that

DOE must prove that such controls exist or even develop complete and final procedures, now, as part of its construction authorization request.

NRC regulations require only that DOE “identify” and “describe” those controls that are necessary to ensure compliance with applicable Part 63 requirements, and which may be implemented by DOE pursuant to its applicable authorities. For example, 10 C.F.R. § 63.21(c), which prescribes the contents of the SAR, requires, among other things, “[a] *description* of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site and adjacent areas.” 10 C.F.R. 63.21(c)(24) (emphasis added). The YMRP, which guides the NRC Staff in its review of the Application, directs the Staff to assess whether “any additional controls” are “acceptable and sufficient.” YMRP § 2.5.8.3, at 2.5-100. In the same vein, the YMRP directs the Staff to evaluate whether DOE has “identified” any “existing or proposed permissible rights or encumbrances that exist and may be continued, or that *should be established* outside the geologic repository operations area,” and whether DOE has assessed the nature of any activities that may permissibly occur under those rights. *Id.* (emphasis added). By claiming that DOE must implement flight control restrictions now, Nevada alleges noncompliance with a requirement that simply does not exist and thus, is not material to the findings to be made by the NRC Staff. The contention, therefore, fails to establish a concrete and genuine dispute suitable for litigation.

As shown above, DOE has provided the information that is required by NRC regulations in its Application. It is Nevada—not DOE—that has failed to meet *its* burden by presenting sufficient legal and factual bases for its allegation that “SAR Section 1.6.3.4.1 is both materially incomplete and inaccurate.” Petition at 951. Nevada does not challenge—with the requisite specificity and basis—the rationale for, or adequacy of, DOE’s proposed helicopter flight

restrictions, particularly as they are applied by DOE in its aircraft hazard frequency analysis. *See, e.g.*, Section 3.3.3 (“Helicopter Flights Prohibited within One-Half Mile of the Relevant Surface Facilities”) *Frequency Analysis of Aircraft Hazards for License Application*, Las Vegas, NV, Bechtel SAIC Company (2007) (LSN# DN2002488951 at 45), identified in the SAR and herein as BSC 2007c. At most, Nevada erroneously asserts that “one of the key premises for DOE screening-out military aircraft crashes from consideration at the Yucca Mountain repository is in error.” Petition at 950. Nevada ignores relevant portions of the SAR. The SAR sections discussed above and BSC 2007c are quite explicit with respect to the aircraft-related flight-restrictions that DOE has committed to implement as Preclosure Procedural Safety Controls.

In summary, Nevada plainly has failed to meet its burden under Section 2.309(f)(1)(v). While the ultimate burden of persuasion is on the license applicant with respect to an *admitted* contention, “the proponent of the [proposed] contention has the initial burden of coming forward with factual issues, not merely conclusory statements and vague allegations” of the type made here by Nevada. *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit 3), CLI-01-03, 53 NRC 22, 27 (2001). Accordingly, the contention must be rejected as lacking adequate factual and legal support.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards section above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. This contention, like its immediate predecessor, also suffers from this deficiency. Specifically, the contention mistakenly suggests that DOE lacks the authority to implement the specific flight-restricted airspace and operational controls

that are credited in SAR Section 1.6.3.4.1 (page 1.6-22) and SAR Section 5.8.3 (page 5.8-7) for the airspace above the repository surface facilities, insofar as it asserts that there is "no likelihood that the U.S. military would agree to such proposed flight restrictions at the Yucca Mountain repository. *See* Petition at 950. In this instance, those restrictions pertain to helicopters.

DOE has clear authority to implement these additional flight restrictions. SAR Section 1.1.1.3.2.1 describes the Nevada Test Site airspace. *See* SAR at 1.1-13 to 1.1-14. The Nevada Test Site airspace is protected by restricted areas R-4808N and R-4808S, known jointly as R-4808. Restricted areas are a type of special-use airspace that separate or confine air activities that are considered dangerous or unsafe to aircraft not involved in the activity. FAA regulations prohibit flights by nonparticipating military, civilian or commercial aircraft in this special-use airspace without the controlling authority's authorization. If the area is not designated for joint use (nonjoint use), then non-participating aircraft are normally not permitted at any time. R-4808N is designated as nonjoint use by the FAA, and DOE is the controlling authority for the airspace.

As discussed in SAR Section 1.1.1.3.2.1, the repository surface facility is located in restricted area R-4808N. SAR at 1.1-14. DOE, as the controlling authority, allows military aircraft to transit R-4808N. DOE has existing avoidance areas (further flight-restricted areas) over the Device Assembly Facility and over BREN (Bare Reactor Experiment-Nevada) Tower, as well as several other areas within R-4808N. *Id.* The additional flight-restrictions identified in SAR Sections 1.6.3.4.1 and 5.8.3 are for the airspace above the repository surface facilities. As discussed above, the flight restrictions for the airspace are not needed until nuclear waste forms are actually located at the repository.

DOE nonetheless has taken steps to facilitate implementation of the additional flight-restrictions identified in the SAR. Specifically, interactions with the U.S. Air Force Warfare Center at Nellis Air Force Base, Nevada, have resulted in a revision to Air Force Instruction (AFI) 13-212, Volume 1, Addendum A. AFI 13-212, Vol. 1, IC2, “Summary of Changes – Interim Change to AFI 13-212” (Dec. 17, 2008) (LSN# DEN001606834) at 5. This revision includes the additional restrictions, with a future implementation date, for the airspace above the repository surface facilities, consistent with the restrictions outlined in SAR Sections 1.6.3.4.1 and 5.8.3. Currently, these future restrictions serve only as a reference for future use and planning purposes. When repository operations commence under an NRC-approved license, DOE (currently through the National Nuclear Security Administration Nevada Site Office) will implement the applicable flight restrictions. These restrictions will be implemented in the same manner as the current avoidance areas in R-4808N. Specifically, DOE will require the Air Force to revise the formal Air Force Instructions to include the restrictions.

Nevada has not presented any factual information or expert opinion that directly controverts the Application or information presented above and, consequently, its contention is inadmissible. As noted above, the Horstman Affidavit lacks the requisite “reasoned basis or explanation.” Furthermore, while Nevada cites two documents as extrinsic support for its contention, neither of which controverts the Application and gives rise to a material dispute. In brief, neither document establishes or even suggests that DOE lacks the necessary authority to implement the flight-restricted airspace and operational constraints identified in SAR Sections 1.6.3.4.1 and 5.8.3, including the prohibition on helicopter flights within 0.5 miles of the surface facilities that will handle spent nuclear fuel and high level radioactive waste. Nevada, for that

matter, fails to explain how the two documents (which it also cites in support of NEV-SAFETY-176) are even potentially relevant to helicopter flights within 0.5 miles of the surface facilities.

The first document cited by Nevada is a September 11, 2003, letter from U.S. Air Force officials to U.S. Representative Duncan Hunter, then-Chairman of the House Committee on Armed Services. Petition at 950 (citing Letter from John Jumper, USAF Chief of Staff, and James Roche, Secretary of the Air Force to Hon. Duncan Hunter, Chairman, Committee on Armed Services, U.S. House of Representatives (Sept. 11, 2003), LSN# DN2001403483 at 1). This letter addresses two issues related to the Nevada Test and Training Range (“NTTR”). The first issue relates to the Air Force’s previously-stated concern that DOE might seek to transport repository-bound nuclear materials through sensitive areas of the NTTR. As such, it has no relevance to DOE’s aircraft hazard analysis, the subject of Nevada’s contention.

The second issue mentioned in the September 2003 letter involves the Air Force’s concern, as expressed in 2003, that “overflight restrictions on aircraft operating in NTTR-associated airspace will negatively impact [its] readiness activities.” LSN# DN2001403483 at 1. Nevada fails, however, to explain how the 2003 Air Force letter directly controverts the Application, particularly with respect to DOE’s authority to implement the flight-restricted airspace and operational constraints that are credited in the SAR. Indeed, it is clear that Nevada has not carefully reviewed the SAR and its supporting documentation, which describe in detail existing operations on the NTTR and their locations relative to the repository surface facility.

SAR Section 1.1.1.3.2.2 explains that the NTTR airspace consists of the Reveille and Desert Military operations and restricted areas R-4806, R-4807, and R-4809. SAR at 1.1-14. The closest border of the Reveille military operations area is about 71 miles from the North Portal at Yucca Mountain. *Id.* The restricted areas of the NTTR are divided into the North

Range and the South Range. *Id.* at 1.1-15. These two ranges are separated by the Nevada Test Site. *Id.* Within the NTTR airspace, restricted areas R-4806, R-4807, and R-4809 are joint use; within the Nevada Test Site airspace, R-4808S is joint use and R-4808N is nonjoint use. *Id.* The additional flight restrictions identified in SAR Sections 1.6.3.4.1 and 5.8.3 are for the airspace above the repository surface facilities. Those facilities are to be located in restricted area R-4808N, a nonjoint use area for which DOE is the controlling authority. Thus, contrary to Nevada’s suggestion, the Air Force cannot “decline” to abide by the additional flight restrictions identified and credited by DOE in the SAR upon their implementation.

The second document cited by Nevada in support of its contention is a September 20, 1995, letter from Sheila Widnall, Air Force to U.S. Representative Don Young, then-Chairman of the House Committee in Resources. Petition at 950 (citing Letter from Sheila Widnall, Secretary of the Air Force to Hon. Don Young, Chairman, Committee in Resources, U.S. House of Representatives (Sept. 20, 1995)), LSN# DEN000357493 at 1). That letter, written in response to then-proposed legislation (H.R. 1020), expresses the Air Force’s concern, at the time, that overflight restrictions implemented to support repository operations might adversely affect military operations at the Nellis range complex, including the Nellis Air Force Base. Nevada does not explain—and the Board is left to guess—how this 1995 document is germane to the information presented in DOE’s June 2008 Application, particularly as it pertains to the prohibition on helicopter flights.

Based on this 13-year-old letter, Nevada concludes, quite categorically, that “there is no likelihood that the U.S. military would agree to such proposed flight restrictions at the Yucca Mountain repository.” Petition at 950. Nevada does not elaborate on the basis for this conclusion, which is patently incorrect. With respect to restricted area R-4808N, overflight with

live or hung ordnance already is prohibited (except for critical in-flight emergencies). SAR at 1.1-14. Additionally, as noted above, interactions between the Air Force and DOE to date have resulted in a revision to AFI 13-212, Volume 1, Addendum A, which includes additional flight restrictions consistent with those identified in SAR Section 1.6.3.4.1 (p. 1.6-22).

For the foregoing reasons, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi). By failing to controvert Application through adequate factual support or expert opinion, Nevada has not established a “genuine dispute of fact or law meriting an evidentiary hearing.” *Northeast Nuclear Energy Co.*, CLI-01-03, 53 NRC at 24. The contention accordingly should be dismissed.

**178. NEV-SAFETY-178 - Basis For Aircraft Exclusions**

SAR Subsection 1.6.3.4.1 and related subsections erroneously screen-out aircraft crashes at the Yucca Mountain repository because they inappropriately exclude numerous relevant aircraft crashes from consideration when performing aircraft crash frequency calculations.

**RESPONSE**

This contention alleges that SAR Subsection 1.6.3.4.1 and “related subsections” erroneously screen-out aircraft crashes at the Yucca Mountain repository because they “inappropriately exclude numerous relevant aircraft crashes” from consideration when performing aircraft crash frequency calculations. Petition at 952. The contention claims that, as a result, “the crash factor as determined by DOE substantially underestimates the aircraft crash frequency.” *Id.* at 954.

For the reasons discussed below, contrary to 10 C.F.R. § 2.309(f)(1)(v) that requires adequate factual support or expert opinion in order for a contention to be admitted, this contention fails to explain how the alleged facts and documents upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. In addition, the contention also must be rejected because it fails to state a legitimate issue of law or fact, lacks adequate legal or factual basis, and fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(i), (ii) and (vi). As here, when a contention does not directly controvert a position taken by the applicant in the license application, it is subject to dismissal.

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, DOE has not "inappropriately exclude[d]" relevant aircraft crash events or data from its Application so as to render it "materially incomplete and

inaccurate." Petition at 952, 954. Thus, Petitioner has failed to state a legitimate issue of law or fact to be controverted in this proceeding.

**b. Brief Explanation of Basis**

As fully explained below, this contention lacks adequate factual or legal basis. Contrary to Nevada's assertion, none of the relevant crash information was excluded from consideration in DOE's aircraft hazard frequency analysis. All available information from the comprehensive list of aircraft crash events is presented in supporting documentation explicitly referenced in the LA and available in the LSN, and has been considered by DOE in its analyses. In addition, Nevada makes no attempt to explain how the *alleged* exclusion of aircraft crash events purportedly results in a "substantia[l] underestim[at]ion" of the aircraft crash frequency. Petition at 954. Thus, the contention does not demonstrate "that there has been sufficient foundation assigned for it to warrant further exploration." *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC at 428.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For purposes of demonstrating that this contention is material to the findings NRC must make to license Yucca Mountain, Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.111, and 63.112. Petition at 952-53. In direct contradiction to the June 20, 2008, Case Management Order, however, Nevada fails to cite the "*principal* statutory or regulatory requirement or requirements" on which it relies (emphasis added). The mere recitation of regulatory provisions

does not satisfy Nevada’s burden of demonstrating the issue raised in this contention is material to the findings that the NRC must make in this proceeding.

In addition, as fully explained below, Nevada makes no effort whatsoever to explain how the unavailability of certain information for a particular crash event, as reflected in Table III-I of the *Frequency Analysis of Aircraft Hazards for License Application Las Vegas, NV*, Bechtel SAIC Company, (2007) (LSN# DN2002488951 at III-3 and DEN001564755), identified in SAR Section 1.6.5 and referred to herein as BSC 2007c, allegedly results in a “substantial underestimation” of the aircraft crash frequency. As discussed in the applicable Legal Standards Section V.A.3 above, contentions that allege errors, omission, uncertainties or alternative approaches—without indicating the specific ramifications or result of such deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards because, as discussed in that Section, it presents only unsupported arguments of counsel, and the associated expert affidavit falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Notably, the contention fails even to mention the Hortsman Affidavit, Attach. 12, in which Mr. Horstman purports to “adopt as [his] own opinions” the statements contained within Paragraph 5 of the contention. This Affidavit, in any case, is grossly insufficient to support the contention. An expert’s attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—including its proffered expert—to set forth “the necessary technical analysis to show why the proffered bases support its

contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech.*, LBP-95-6, 41 NRC at 305). No such analysis is presented here.

Indeed, Nevada’s concise statement of alleged “facts or expert opinion” under paragraph 5 of its contention is a series of vague and unsupported allegations. Petition at 953. Nevada merely asserts, without any particularized references to the Application or associated documentation, that “numerous aircraft crashes” in the “underlying database” are missing “valuable information” concerning “aircraft altitude, speed, flight path angle, and glide distance.” Petition at 953. Nevada further alleges that, by ignoring this “missing” information, DOE has not performed a “conservative” analysis and therefore “substantially underestimates the aircraft crash frequency.” *Id.* at 953-54.

Such unduly vague assertions do not meet the Commission’s strict contention admissibility requirements. Despite the gravity of these allegations, Nevada fails to provide a single, concrete example of the alleged “missing” information. Indeed, the Board is left to guess from which “underlying database” the information is missing, given Nevada’s complete omission of any supporting references to the Application or the analyses cited therein. In short, NEV-SAFETY-178 lacks “a reasoned basis or explanation” and, therefore, “deprives the Board of the ability to make the necessary, reflective assessment” of the alleged deficiencies in the Application. *Private Fuel Storage*, LBP-98-7, 47 NRC at 181.

Although Nevada discusses a DOE guidance document on page 953 of its Petition, that discussion does nothing to bolster the admissibility of its contention. Specifically, Nevada cites “DOE Standard Accident Analysis for Aircraft Crash into Hazardous Facilities,” DOE-STD-3014-96 (Oct. 1, 1996) (LSN# DN2002431791) at 5. Nevada asserts that this DOE document

adopts the use of the so-called “ACRAM” model, and that “NRC applicants, including DOE, are required to consider all aircraft activity in or near any nuclear facility.” Petition at 953.

As an initial matter, the referenced DOE document is a guidance document. As such, while it may assist in complying with applicable requirements, it does not have the force of legally binding regulations. *See, e.g., Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 264 (2001) (citations omitted). In any case, this standard was referenced and used in the identification and analysis of aircraft hazards. Specifically, the *Identification of Aircraft Hazards*, Las Vegas, NV, Bechtel SAIC Company (2007) LSN# DN2002406192, cited in the SAR and herein as BSC 2007b, states in Section 1 that the scope of the report “includes the evaluation of military, private, and commercial use of airspace in the 100-mile regional setting of the repository at Yucca Mountain.” BSC 2007b at 1. Thus, by evaluating aircraft activity within 100 miles of the repository, DOE, in fact, met the ACRAM standard of “including all aircraft activity that could imply a risk.” DOE-STD-3014-96 also was used in establishing the criteria for evaluating the air activity. BSC 2007b at 24, 30. The screening criteria established in BSC 2007b (page 24) for evaluating the distance from an airport is greater than the distance used in DOE-STD-3014-96 and thus “provides an additional conservative margin.” BSC 2007b at 24. Finally, DOE-STD-3014-96 also is used in BSC 2007c. *See* BSC 2007c at 29, 45, 63, and 68. These facts wholly undercut Nevada’s allegation that “DOE failed to fulfill its obligation to use the relevant data and instead screened out many accidents from consideration during their analysis.” Petition at 954.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address

an issue that the Application does address, is defective. Nevada's contention also suffers from this deficiency. Nevada completely ignores the relevant portions of the Application and fails to explain how the alleged defects in the Application have caused DOE to "substantially underestimate" the aircraft crash frequency. Petition at 954. In short, this contention is inadmissible because "the Petitioner's assertion that the application[] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[]." *Dominion Nuclear Conn., Inc.*, LBP-04-15, 60 NRC at 95 (2004) *aff'd*, CLI-04-6, 60 NRC 631 (2004).

As reflected in Table III-1 of BSC 2007c, DOE compiled a comprehensive list of 282 U.S. Air Force aircraft crash events. As discussed in BSC 2007c, these events include aircraft crashes that occurred between May 1990 and December 2006, and which involved F-16, F-15, F-22 and A-10 aircraft. BSC 2007c at 66; Attachment III at III-1. DOE compiled the list from safety reports, accident investigation reports, and executive summaries gathered through multiple visits to the Air Force Safety Center located at Kirkland Air Force Base in Albuquerque, New Mexico. *Id.* DOE also obtained data from publicly available reports posted on the U.S. Air Force Accident Investigation Board and the NRC's ADAMS websites. *Id.*

Contrary to Nevada's assertion, none of the relevant crash information was excluded from consideration in DOE's aircraft hazard frequency analysis. All available information from the comprehensive list of 282 aircraft crash events is presented in Table III-1 of BSC 2007c and has been considered by DOE in its analyses. BSC 2007c, Table III-1 at III-3 to -38. Table III-1 includes the following types or categories of information: (1) the source document for the event; (2) description of the initiating event, such as engine failure or midair collision; (3) type of aircraft involved; (4) aircraft serial number; (5) date of the event; (6) ejection altitude; (7) distance traveled from actual or inferred ejection point to the crash site; (8) method used to

estimate the ejection to crash distance; (9) comments that provide additional relevant information; (10) glide ratio; and (11) initiating event type. *Id.*

Given the manifold sources from which the information in Table III was obtained, certain types of information (e.g., distance to crash, glide ratio) were not available for particular events. In other words, the individual sources that DOE used to develop Table III-1 did not contain equal levels of information. Accordingly, for some of the crash events in Table III-1, all the entries contain a value, whereas for other events, the values of some entries are designated as “Unknown.” In particular, it is not possible to calculate a glide ratio if either the distance to crash or the ejection altitude is unavailable from the source document. Thus, contrary to Nevada’s misleading claim, DOE did not “exclude” or “screen-out” relevant information. Petition at 952.

Moreover, Nevada makes no effort whatsoever to explain how the unavailability of certain information for a particular crash event, as reflected in Table III, allegedly results in a “substantia[l] underestim[ation]” of the aircraft crash frequency. Petition at 954. As discussed in the applicable Legal Standards Section V.A.3 above, contentions that allege errors, omission, uncertainties or alternative approaches—without indicating the specific ramifications or result of such deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. Nevada’s contention falls squarely into this category of inadmissible contentions.

As Nevada fails to explain, in BSC 2007c, the information in Table III-1 is used for several purposes, including:

- The evaluation of distances to crash after ejection. Specifically, this information is used in Section 4.3.3 of BSC 2007c in the form of a cumulative distribution function, which,

in turn, is used to calculate the frequency of aircraft crash into relevant facilities, for flights outside the flight-restricted airspace.

- The evaluation of annual crash frequency density for crashes that occurred in the Nevada Test and Training Range and adjacent military operations areas. This information is used to calculate the frequency of aircraft crash into relevant facilities for flights outside of the flight-restricted airspace. The relevant crash events are extracted from Table III-1 and presented in Table 8 of BSC 2007c.
- The evaluation of glide ratios after ejection. As indicated in Footnote “e” of Table III-1, the glide ratio is the dimensionless ratio of the distance to crash after ejection over the ejection altitude. Glide ratios are used in Section 4.3.2 to calculate the frequency of aircraft crash into relevant facilities for overflights of the flight-restricted airspace.

Based on the information presented in Table III-1 of BSC 2007c, DOE was able to calculate a distance to crash for 155 of the identified events. Using this information, DOE developed a cumulative distribution function, as presented in Figure 5 of BSC 2007c. BSC 2007c at 59. Based on the available data, DOE then calculated the glide ratio, which requires both knowledge of the ejection altitude and distance to crash, for 88 events.

As reflected in Section 4.3.2 of BSC 2007c, DOE used the glide ratios to calculate the frequency of aircraft crashes into relevant facilities for overflights of the flight-restricted airspace. As indicated in the SAR (Sections 1.6.3.4.1 and 5.8.3) and BSC 2007C, Section 7, such overflights are required to be straight and level (*i.e.*, maneuvering is prohibited). Of the 88 events for which DOE was able to calculate glide ratios, 58 events were determined to be compatible with such overflight restrictions. Therefore, the frequency of aircraft crash into relevant facilities described in Section 4.3.2 is based on these 58 applicable events.

In performing the sensitivity study described in BSC 2007c, Attachment VI (specifically, the Section entitled “Categorizing Events”), DOE included all 88 events for which glide ratios were calculated. BSC 2007c, Attach. VI at VI-9. Significantly, the sensitivity study concludes that the frequency of aircraft crash is insensitive to the categorization of military crashes, even when using all events with known glide ratios. *Id.* Therefore, the frequency of aircraft crash is not affected by the unavailability of information in Table III. Nevada fails even to reference these calculations, and certainly presents no information—quantitative or qualitative—to controvert the associated results and conclusions.

For the foregoing reasons, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi). Nevada has not directly controverted *any* portion of the Application, as it must do to gain admission of the contention. As shown above, there is no basis for Nevada’s conclusory allegations that DOE has “excluded numerous crashes on subjective grounds,” “failed to fulfill its obligation to use the relevant data,” or “underestimate[d] the aircraft crash frequency.” Petition at 953-54. Nor is SAR Subsection 1.6.3.4.1 “materially incomplete and inaccurate.” Petition at 954. Accordingly, the contention should be dismissed.

For all of the reasons discussed above, this contention must be dismissed in its entirety.

**179. NEV-SAFETY-179 - Controls On Aircraft Operations (Mid-Air)**

SAR Subsection 1.6.3.4.1 and related subsections erroneously screen out aircraft crashes at the Yucca Mountain repository using an analysis that is based on the claim that all mid-air collisions and controlled flight into terrain occur during maneuvering, which is not supported by any documentary evidence. Since DOE further claims that maneuvering is prohibited in the airspace over the proposed flight restricted area, these types of accidents have been improperly excluded from the crash frequency analysis.

**RESPONSE**

This contention alleges that DOE “erroneously screen[s] out aircraft crashes at the Yucca Mountain repository using an analysis that is based on the claim that all mid-air collisions and controlled flight into terrain occur during maneuvering, which is not supported by any documentary evidence.” Petition at 955. In support of this contention, Nevada advances three primary arguments. Specifically, it alleges that DOE: (1) falsely assumes that the flight-restricted area is a non-maneuvering area; (2) does not specify the flights parameters that characterize maneuvering; and (3) ignores midair collisions that did not involve “high-performance maneuvering.” *Id.* at 956-57.

For the reasons discussed below, Nevada’s first two arguments fail to meet the requirements of 10 C.F.R. § 2.309(f)(1)(v) and (vi) and thus do not support admission of the contention. In this regard, the contention fails to explain how the alleged facts upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. Furthermore, the contention ignores, and thus does not directly controvert, information presented in the Application. Finally, while Nevada references specific sources in support of its third argument, the information contained in those documents was explicitly

considered by DOE in its Application and does not establish a genuine dispute with DOE on a material issue of law or fact. Accordingly, the contention must be dismissed.

**a. Statement of Issue of Law or Fact to be Controverted**

Because, as explained below, Nevada has ignored the content of the application and misinterpreted the underlying regulatory requirements in Part 63, it has failed to state a legitimate issue of law or fact to be controverted in this proceeding.

**b. Brief Explanation of Basis**

As fully discussed below, Nevada has proffered no legal or factual support for its assertion that “DOE assumes that the flight restricted airspace is a non-maneuvering area, which is false.” Petition at 957. This assertion simply is another iteration of Nevada’s argument in NEV-SAFETY-174 (and subsequent contentions) that DOE “fails to provide documentary evidence of any procedural controls for monitoring flight activity over the proposed flight-restricted airspace with the United States military.” *Id.* at 937. This argument must be rejected for the same reasons detailed in DOE’s response to NEV-SAFETY-174, *supra*. Similarly, as fully discussed below, Nevada presents no factual support for its claim that DOE does not specify “the flights parameters that characterize maneuvering.” Petition at 957.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As discussed below, Nevada does not accurately describe the information contained in the six references it cites in support of this contention, and therefore, does not directly controvert DOE’s classification of three events as Type 0 events that are not applicable to overflight

(straight and level flight) of the flight-restricted airspace. Even *assuming* DOE’s classification of the three events were incorrect, Nevada does not explain how the alleged errors would materially affect the results of DOE’s aircraft hazard frequency analysis.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards with respect to the first two arguments or bases identified above. First, Nevada has proffered no legal or factual support for its assertion that “DOE assumes that the flight restricted airspace is a non-maneuvering area, which is false.” Petition at 957. This assertion simply is another iteration of Nevada’s argument in NEV-SAFETY-174 (and subsequent contentions) that DOE “fails to provide documentary evidence of any procedural controls for monitoring flight activity over the proposed flight-restricted airspace with the United States military.” *Id.* at 937. This argument must be rejected for the same reasons detailed in DOE’s response to NEV-SAFETY-174, *supra*.

Specifically, DOE has identified additional flight restrictions in SAR Sections 1.6.3.4.1 and 5.8.3 for the airspace above the repository surface facilities. DOE’s aircraft hazard frequency analysis credits these flight-restricted airspace and operational constraints over the repository. *See Frequency Analysis of Aircraft Hazards for License Application* (2007) (LSN# DN2002488951 and #DEN001564755), Section 7 at 75-76 (identified in SAR Section 1.6 and herein as BSC 2007c). Those restrictions include, among others, the following: “Maneuvering over the flight-restricted airspace is prohibited; flight is straight and level.” SAR at 1.6-22, 5.8-7. DOE has incorporated these flight restrictions into specific Preclosure Procedural Safety Controls (“PSCs”), which are included in Table 1.9-10 of the SAR (see PSC-15 to PSC-18 on

SAR at 1.9-144 to 1.9-145). The requirement for straight and level flight is specifically contained in PSC-16. *Id.* 1.9-144. The SAR states that the PSCs presented in Table 1.9-10 will “be implemented in facility operations to prevent and mitigate event sequences,” and that these PSCs will impose “interface controls on activities outside of the GROA that could potentially lead to an event sequence.” *Id.* at 1.9-2.

DOE is the “controlling authority” for the airspace above the repository surface facilities and, as such, has full authority to implement the additional restrictions when needed. SAR Section 1.1.1.3.2.1 describes the NTS airspace. *See* SAR at 1.1-13 to 1.1-14. The NTS airspace is protected by restricted areas R-4808N and R-4808S, known jointly as R-4808. Restricted areas are a type of special-use airspace that separate or confine air activities that are considered dangerous or unsafe to aircraft not involved in the activity. Federal Aviation Administration (“FAA”) regulations prohibit flights by nonparticipating military, civilian or commercial aircraft in this special-use airspace without the controlling authority’s authorization. If the area is not designated for joint use (nonjoint use), then nonparticipating aircraft are normally not permitted at any time. The repository surface facility is located in restricted area R-4808N, which is designated as nonjoint use by the FAA. DOE is the controlling authority for the airspace. SAR at 1.1-14. As the controlling authority, DOE allows military aircraft to transit R-4808N. DOE has existing avoidance areas (further flight-restricted areas) over the Device Assembly Facility and over BREN (Bare Reactor Experiment-Nevada) Tower, as well as several other areas within R-4808N. *Id.*

Although the specified additional flight restrictions for the airspace are not needed until nuclear waste forms are actually located at the repository, DOE, pursuant to its authority, nonetheless has taken steps to facilitate implementation of the additional flight-restrictions

identified in the SAR. Specifically, interactions with the U.S. Air Force Warfare Center at Nellis Air Force Base, Nevada, have resulted in a revision to Air Force Instruction (AFI) 13-212, Volume 1, Addendum A. AFI 13-212, Vol. 1, IC2, “Summary of Changes – Interim Change to AFI 13-212” (Dec. 17, 2008) (LSN# DEN001606834) at 5. This revision includes the additional restrictions, with a future implementation date, for the airspace above the repository surface facilities consistent with the restrictions outlined in SAR Section 1.6.3.4.1. Currently, these future restrictions serve only as a reference for future use and planning purposes, given that DOE is not yet receiving SNF and HLW at the repository. When repository operations commence under an NRC-approved license, DOE (currently through the National Nuclear Security Administration Nevada Site Office) will implement the applicable flight restrictions. These restrictions will be implemented in the same manner as the current avoidance areas in R-4808N. Specifically, DOE will *require* the Air Force to revise the formal Air Force Instructions to include the restrictions. *Id.* Thus, Nevada presents no legal or factual support for its assertion that DOE “falsely” assumes that “the flight restricted airspace is a non-maneuvering area.” Petition at 957.

Second, Nevada presents no factual support for its claim that DOE does not specify “the flight parameters that characterize maneuvering.” *Id.* Nevada points to no relevant portion of the Application or supporting documentation that is purportedly deficient in this respect. Nor does it supply its own “definition of maneuvering.” *Id.* Nevada’s allegation, in fact, reflects a failure to read and address the information presented in the Application.

Section 3.2.17 of DOE’s *Frequency Analysis of Aircraft Hazards for License Application* (BSC 2007c, as cited above) specifically discusses the criteria that DOE used to sort and evaluate the military aircraft crash data it collected for the period May 1990 to December 2006. BSC

2007c at 41-43. As explained therein, DOE assigned an initiating-event type code (Type 0 and Type 1) to each aircraft crash. *Id.* at 41. Type 0 events are *not* applicable to overflight (i.e., straight and level or cruising-type flight) of the flight-restricted airspace. *Id.* Type 1 events *are* applicable to overflight of the flight-restricted airspace. *Id.* As Section 3.2.17 makes clear, Type 0 events include, among others, midair collisions (because “midair collision is much more likely during simulated combat maneuvers”), take-off mishaps, landing mishaps, abandoned aircraft during maneuvering, loss of control during testing or maneuvering, and spatial disorientation during maneuvering. *Id.* at 42. Type 1 events, in contrast, are consistent with cruise-type flight, and include, for example, simple engine failure or airframe failure, or events that may lead to immediate ejection. *Id.* at 43. Nevada totally ignores DOE’s explicit discussion of these criteria in BSC 2007c.

The Commission’s rules require “a clear statement as to the basis for the contention and the submission of . . . supporting information and references to specific documents and sources that establish the validity of the contention.” *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-06-24, 64 NRC 111, 118-19 (2006) (emphasis added; citations omitted). The two Nevada arguments discussed above fall far short of meeting this requirement, as they reference neither the Application nor extrinsic sources of information. Accordingly, insofar as it relies on these arguments, the contention does not meet 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective under 10 C.F.R. § 2.309(f)(1)(vi). Thus, because Nevada’s first two arguments fail to make particularized references to the Application

and supporting DOE aircraft hazard frequency analysis, or any other supporting information, they also fail to meet this criterion.

With respect to the third argument discussed above (i.e., that DOE overlooks midair collisions that did not involve maneuvering), Nevada provides specific references to six documents in the LSN. See Petition at 956-57 (citing LSN#'s DEN001605889, NEV000005461, DEN001605244, NEV000005482, DEN001605232 and NEV000005483). Collectively, these documents relate to three separate midair collision events, which occurred on June 23, 1993; September 16, 1997; and October 22, 1998, respectively. As explained below, however, none of the cited documents establishes a genuine dispute with DOE on a material issue of fact or law.

As indicated above, DOE collected data on documented historical aircraft crash events involving military aircraft for the 16.5-year period from May 1990 to December 2006. Each of the 282 events is listed in Table III-1 of Attachment III to BSC 2007c (pp. III-3 to III-37). Table III-1 includes the three specific events identified above and discussed in the six documents cited by Nevada in its contention. These three events are listed in Table III-1 as event numbers 77, 156, and 175/176, respectively. See BSC 2007c, Attachment III at III-12, -21, and -23. As indicated in Table III-1, based on its review of the relevant source documents (e.g., safety and accident investigation reports), DOE classified each of these three events as Type 0 events, with the first two events involving midair collisions and the third event involving a take-off mishap.

Nevada's contention, including the six documents referenced therein, in no way establishes a genuine material dispute with DOE. First, Nevada ignores the fact that DOE's Application (as supported by BSC 2007c) explicitly addresses the three events cited by Nevada as midair collisions purportedly not involving maneuvering but "typical," "routine," or "normal" flight. Petition at 955-56. Second, Nevada does not accurately describe the information

contained in the six references and, therefore, does not directly controvert DOE's classification of three events as Type 0 events that are not applicable to overflight (straight and level flight) of the flight-restricted airspace. Finally, even *assuming* DOE's classification of the three events were incorrect, Nevada does not explain how the alleged errors would materially affect the results of DOE's aircraft hazard frequency analysis.

Nevada's claim that the cited incidents involved "one aircraft simply [running] over another flight member during a routine in-flight visual rejoin when both aircraft were in normal flight" is misleading and not supported by the referenced documents. Petition at 956. With respect to the June 23, 1993 mishap event, the documents cited by Nevada indicate that the midair collision occurred during basic fighting maneuvers. One of the documents states that "[t]he purpose of the flight was to conduct a Basic Fighter Maneuver (BFM) training mission," and that BFM's "consist of training which stresses *maneuvering* one airplane against another emphasizing employment necessary to kill the adversary." AFR 110-14 USAF Aircraft Accident Investigation (Sept. 1, 1993), LSN# NEV000005482 at 2 (emphasis added). Thus, consistent with DOE's conclusion in Table III-1 of BSC 2007c, this event is not consistent with straight and level flight.

With respect to the September 16, 1997, mishap event, the documents cited by Nevada unequivocally indicate that the midair collision occurred during a "recurrency and requalification program" training mission. AFI 51-503 Accident Investigation Board (Nov. 11, 1997), LSN# NEV000005461 at 1-2. Specifically, the collision occurred while two F-16 aircraft were climbing from 7,000 feet above mean sea level (ft MSL) to 14,000 ft MSL during a night-vision goggle climb to cruise elevation. *Id.* at 2-3. Thus, consistent with DOE's conclusion in Table III-1 of BSC 2007c, this event also is not consistent with straight and level flight.

Finally, with respect to the October 22, 1998, mishap event, the documents cited by Nevada clearly indicate that the midair collision occurred during an Air Combat Tactics-1 training sortie. According to the documents cited by Nevada, the collision between two F-16C aircraft occurred only two minutes after take-off while the planes were still climbing. *See* Aircraft Accident Investigation Report F-16C6, Serial Number 88-0414 (Dec. 12, 1998) LSN# NEV000005483 at 1-3. Thus, consistent with DOE's conclusion in Table III-1 of BSC 2007c, this event also is not consistent with straight and level flight.

In summary, as explained in Legal Standards Section V.A.3 above, any supporting material provided by a petitioner is subject to Board scrutiny both for what it does and does not show. Nevada's imprecise reading of the very documents it offers as support for its contention simply cannot be the basis for a litigable contention. Furthermore, as also discussed in Section V.A.3 above, contentions that allege errors, omission, uncertainties or alternative approaches—without indicating the specific ramifications or result of such deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. Nevada's contention fails in this respect too.

For all of the reasons discussed above, this contention must be dismissed in its entirety.

**180. NEV-SAFETY-180 - Crash Frequency Of Fixed-Wing Aircraft**

SAR Subsection 1.6.3.4 and similar subsections, which state that aircraft impact was screened out as an external initiating event, refer to inappropriate calculations as a basis for the screening, making the associated screening decision unjustified.

**RESPONSE**

This contention alleges that SAR Subsection 1.6.3.4 and “similar subsections” refer to “inappropriate calculations” as a basis for the screening out aircraft impacts as an external initiating event, thereby making the associated screening decision “unjustified.” Petition at 958. In equally vague fashion, the contention further asserts that the methodology used by DOE to characterize the frequency of impacts of fixed-wing aircraft on the repository is “inadequately described, has not been demonstrated to be mathematically correct, and uses an unnecessary and unjustified approximation in the calculations.” *Id.*

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, Nevada has not explained with any specificity the particular safety or legal reasons requiring rejection of the Application. Its specific grievances are unclear and certainly not substantiated. Thus, Nevada has failed to state a legitimate issue of law or fact to be controverted in this proceeding.

**b. Brief Explanation of Basis**

As fully explained below, this contention lacks adequate factual or legal basis. Contrary to Nevada’s assertion, the computational approach Nevada seeks to challenge is not “obscure” or “unjustified.” The analysis supporting DOE’s Application discusses in detail the methodology used to calculate the annual frequency of crashes into the relevant surface facilities when the initiating event leading to the crash occurs during an overflight of the flight-restricted airspace.

Thus, the contention fails to demonstrate “that there has been sufficient foundation assigned for it to warrant further exploration.” *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC at 428.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. *See* Petition at 958-59. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) for the most part, the contention does not reference, *with the requisite specificity*, any documents other

than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not clearly reference any credible expert opinion. Nevada's Petition does attach two affidavits (by Michael C. Thorne and Hugh Horstman, Attachments 3 and 12, respectively), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in paragraphs 5 and 6 of this contention, the affidavits simply "adopt" the otherwise unsupported assertions made in paragraph 5 and 6 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Finally, while the contention refers to a "full analysis" prepared by Mr. Thorne, it fails to describe the nature of that analysis or explain its relevance and significance to the claims made in the contention.

Nevada's contention purports to challenge "aspects of the computational approach" (Petition at 959) set forth in DOE's *Frequency Analysis of Aircraft Hazards for License Application* (2007) (LSN# DN2002488951 and #DEN001564755), identified in SAR Section 1.6 and referred to herein as BSC 2007c. Specifically, the contention claims that the description of the methodology contained in Subsection 4.3.2 ("Allowing for Overflights of the Flight-Restricted Airspace by Fixed-Wing Aircraft") of BSC 2007c "is extremely obscure and has not been justified mathematically." Petition at 960. The contention further asserts that DOE's methodology "involves an approximation of the calculations" as illustrated in Figure 4 on page 55 of BSC 2007c, "which has not been demonstrated to be accurate." *Id.*

This contention, without question, is deficient for want of adequate factual support or expert opinion. The assertions made in the contention are exceedingly vague and do not satisfy Nevada's obligation to "explain, with specificity, particular safety or legal reasons requiring rejection of the contested [application]." *Dominion Nuclear Conn., Inc.*, CLI-01-24, 54 NRC at

359-60. Nevada states that the methodology described in Section 4.3.2 of BSC 2007c is “incomplete and inadequate,” because it allegedly lacks “an appropriate basis for the calculations of frequencies of crashes of fixed-wing aircraft.” Petition at 960. It also claims that “a comprehensive analysis of the problem” would eliminate the need for the purported “approximation” contained in Figure 4 of BSC 2007c. *Id.* Nowhere in its contention, however, does Nevada even begin to explain how or why the methodology in question is “incomplete” or “inadequate.” *Id.* Nor does it furnish the suggested “comprehensive analysis.” *Id.* Thus, the contention rests solely on conclusory assertions which, as explained in Section V.A.3 above, cannot provide the basis for the admission of a contention.

In this respect, neither the “expert” affidavits nor the supposed “full analysis” prepared by Mr. Thorne serve to remedy this defect in Nevada’s contention. The contention fails even to mention the Affidavits of Mr. Horstman and Mr. Thorne, in which those individuals merely “adopt as [their] own opinions” the statements contained in Paragraphs 5 and 6 of the contention. Those Affidavits thus are grossly insufficient to support the contention and does not pass muster under 10 C.F.R. § 2.309(f)(1)(v).

With respect to Mr. Thorne’s “analysis,” the contention states only that it considers “an appropriate probability density function for glide ratios.” Petition at 960. Nothing more is said of that analysis or the “supplementary information” supposedly provided by Mr. Thorne. Nevada fails to explain why *any* aspect of DOE’s analysis—including its treatment of glide ratios—is “incomplete” or “inadequate.” *Id.* Such general allegations, even if “adopted” or otherwise endorsed by an alleged expert, are insufficient, particularly where, as here, there is no accompanying “reasoned basis or explanation.” *USEC, Inc., CLI-06-10, 63 NRC at 472.* Indeed, the other litigants—and this Board—can only surmise what Nevada’s *specific* grievances

*might* be relative to DOE's analysis. As noted above, the Board may not accept uncritically the assertion that a document or expert opinion supplies the basis for a contention, or makes factual or technical inferences on behalf of a petitioner. This is precisely what Nevada asks the Board to do here, to the detriment of its proposed contention.

Furthermore, review of the documents prepared by Mr. Thorne and cited in the contention confirms that they lend no support to the contention. Indeed, the documents appear to be more in the vein of an academic exercise than a cogent evaluation of the adequacy of the methodology described and applied in Section 4.3.2 of BSC 2007c. In fact, Mr. Thorne's papers make few and only oblique references to DOE's aircraft hazard frequency analysis (BSC 2007c). His statements, moreover, are entirely inconclusive, if not inscrutable. For example, in Part 1 of his analysis, Mr. Thorne opines that "what DOE has done . . . leads to a very crude approach that *may* not even be internally incorrect." LSN# NEV000005506 at 1 (emphasis added). Similarly, Mr. Thorne concludes the final part of his analysis by suggesting that DOE's analysis is "biased because mishaps with small glide angles are preferentially excluded," and that "I think that we will need to look at these other mishaps to see whether we can estimate the glide ratios from collateral data." LSN# NEV000005509 at 2.

Significantly, Mr. Thorne never clearly or conclusively states in his analysis—which apparently was never completed or is still a work in progress—that any aspect of DOE's analysis is inadequate or incomplete. Nonetheless, this is the conclusion that he purportedly "adopts" in his cursory affidavit. Moreover, Mr. Thorne never opines that DOE has failed to meet applicable NRC requirements, and thereby fails to support Nevada's claim that this contention raises a genuine dispute on a material issue of law or fact.

Finally, it is unclear from the information presented whether Mr. Thorne is sufficiently qualified as an expert to challenge DOE's aircraft hazard analysis. The burden of demonstrating that a witness is qualified to be an expert falls on the party offering the witness. *Duke Energy Corp.* (Catawba Nuclear Station, Units 1 and 2), CLI-04-21, 60 NRC 21, 27-28 (2004). Experts must be qualified in the field in which they seek to provide expert testimony. *Duke Power Co.* (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-669, 15 NRC 453, 475 (1982). Nevada has not discharged its burden. The fact that Nevada has proffered Mr. Thorne as a putative expert for literally dozens of contentions—spanning a very broad array of technical subjects—strongly suggests that Mr. Thorne, whatever his level of erudition and experience, is straying far beyond the proper bounds of his professional expertise.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. Nevada's contention also suffers from this deficiency. The contention does not identify any concrete and specific disputes with the Application, and explain the supporting reasons for those disputes, such that this Board could possibly conclude that an inquiry in depth is warranted.

As a threshold matter, Nevada's contention contains significant factual errors and misstatements relative to the Application. First, Subsection 4.3.2 is contained on pages 52 through 56 of BSC 2007c, not on pages 52 through 59, as Nevada incorrectly states. The bottom of page 56 and pages 57 through 59 contain Subsection 4.3.3, "Flights Beyond the Radius of the Flight-Restricted Airspace," which concerns an entirely different analysis than the one ostensibly challenged by Nevada in this contention.

Second, Figure 4 on page 55 of BSC 2007c is not an “approximation” of the calculations. Rather, Figure 4 depicts an overhead view of the flight-restricted airspace 5.6-mile radius (equivalent to a 4.9-nautical mile radius), and the 1.0-mile radius of the inner circle that encompasses the surface facilities where HLW could be located. Figure 4 is an illustration that depicts the 10 discrete and equal line segments of a flight path through the center of the flight-restricted airspace. Although this flight path can originate from any direction, Figure 4 reflects DOE’s assumption that it goes through the center of the airspace, to ensure a conservative approach that focuses on the longest trip that an aircraft could make in traversing the flight-restricted airspace. Thus, DOE determined the fraction of aircraft overflights that pose a threat to the facilities by determining the fraction of aircraft that have a glide ratio large enough for the aircraft to reach the 1.0 mi radius inner circle where surface facilities are located but less than the glide ratio required to carry the aircraft past the facilities or beyond the 1.0 mi radius circle.

Third, contrary to Nevada claim, the “computational approach” applied in Section 4.3.2 of BSC 2007c is not an “extremely obscure” and “unjustified” theoretical mathematical formulation. Petition at 960. Subsection 4.3.2 describes in detail the methodology used by DOE to calculate the annual frequency of crashes into the relevant surface facilities when the initiating event leading to a crash occurs during an overflight of the flight-restricted airspace. As discussed therein, it utilizes actual aircraft crash data compiled from FAA and U.S. Air Force sources.

Finally, contrary to Nevada's unfounded claim, the analysis in Section 4.3.2 is not unjustified. Section 4.3.2 includes the specific inputs and assumptions used by DOE, the sources of those inputs and assumptions, and the actual calculations performed by DOE using that information. DOE does not duplicate the Section 4.3.2 calculations here, through which it

determined that 10.5% of the flights that suffer crash-initiating events during overflight of the flight-restricted airspace at 14,000 ft MSL could pose a risk to repository surface facilities. BSC 2007c at 56. It suffices to say that Nevada, as demonstrated above, has not directly controverted any specific aspect of that analysis or demonstrated a material deficiency in the analysis. As discussed in the applicable Legal Standards Section V.A.3 above, contentions that allege errors, omission, uncertainties or alternative approaches—without indicating the specific ramifications or result of such deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible. Here, Nevada only makes unsupported assertions that DOE’s calculations are inadequate or incomplete. Although it purports to present an alternative “analysis” by Mr. Thorne, the nature, relevance, and significance of that analysis are not explained in the contention, contrary to the requirements of both Section 2.309(f)(1)(v) and (vi).

For all of the reasons discussed above, this contention must be dismissed in its entirety.

**181. NEV-SAFETY-181 - Basis For Crash Density Calculations**

SAR Subsection 1.6.3.4.1 and related subsections incorrectly assumes that the crash initiation density of military aircraft outside the proposed flight restricted airspace is independent of the number of sorties flown each year and will not change if the number of sorties increases, and therefore incorrectly calculates the crash initiation frequency resulting in an understatement of risk of a military aircraft crash at the repository and an inappropriate screening of aircraft crashes from consideration.

**RESPONSE**

This contention alleges that SAR Subsection 1.6.3.4.1 and related subsections “incorrectly assumes [sic] that the crash initiation density of military aircraft outside the proposed flight restricted airspace is independent of the number of sorties flown each year and will not change if the number of sorties increases, and therefore incorrectly calculates the crash initiation frequency.” Petition at 962. The result, Nevada argues, is “an understatement of risk of a military aircraft crash at the repository and an inappropriate screening of aircraft crashes from consideration.” *Id.*

For the reasons discussed below, contrary to 10 C.F.R. § 2.309(f)(1)(v) that requires adequate factual support or expert opinion in order for a contention to be admitted, this contention fails to explain how the alleged facts upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. In addition, the contention also must be rejected because it fails to state a legitimate issue of law or fact, lacks adequate legal or factual basis, and fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(i), (ii), (iv), and (vi). As here,

when a contention does not directly controvert a position taken by the applicant in the license application, it is subject to dismissal.

**a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, DOE has not made incorrect assumptions regarding crash frequency density so as to render the Application “materially incomplete and inaccurate.” Petition at 964. Thus, Petitioner has failed to state a legitimate issue of law or fact to be controverted in this proceeding.

**b. Brief Explanation of Basis**

As fully explained below, this contention lacks adequate factual or legal basis. Contrary to Nevada’s assertion, DOE does not assume in its analysis that the crash frequency density outside the flight-restricted airspace is independent of the annual number of sorties flown. The crash-frequency density used in DOE’s analysis reflects the historical number of crashes that have occurred in the recent past over a large regional setting near the repository site, including any dependence on number of sorties flown. Thus, the contention does not demonstrate “that there has been sufficient foundation assigned for it to warrant further exploration.” *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC at 428.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For purposes of demonstrating that this contention is material to the findings NRC must make to license Yucca Mountain, Nevada generically claims noncompliance with a litany of regulatory provisions in 10 C.F.R. Part 63, including §§ 63.31, 63.21, 63.102, 63.111, and

63.112. Petition at 962-63. In direct contradiction to the June 20, 2008, Case Management Order, however, Nevada fails to cite the “*principal* statutory or regulatory requirement or requirements” on which it relies (emphasis added). The mere recitation of regulatory provisions does not satisfy Nevada’s burden of demonstrating the issue raised in this contention is material to the findings that the NRC must make in this proceeding.

In essence, as demonstrated below, Nevada asks the Board to accept as true or self-evident *its* own assumption that “[t]he calculated crash density is directly proportional to the number of flights in the airspace in question.” Petition at 964. But Nevada does not explain exactly where in its analysis DOE has made an incorrect assumption, why that assumption is incorrect, and how it materially affects the outcome of DOE’s analysis.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards because, as discussed in that Section, it presents only unsupported arguments of counsel, and the associated expert affidavit falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Notably, the contention fails even to mention the Horstman Affidavit, Attach. 12, in which Mr. Horstman purports to “adopt as [his] own opinions” the statements contained within Paragraph 5 of the contention. This Affidavit, in any case, is grossly insufficient to support the contention. An expert’s attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—including its proffered expert—to set forth “the necessary technical analysis to show why the proffered bases support its

contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech.*, LBP-95-6, 41 NRC at 305). No such analysis is presented here.

Indeed, Nevada’s “concise statement of facts and expert opinions” is as vague and unsupported as it is concise. Nevada argues that DOE assumes, without any justification, that “the crash density outside the proposed flight-restricted airspace is independent of the number of sorties flown annually.” Petition at 964. Nevada’s argument is based solely on the following syllogism:

The crash initiation rates outside the proposed flight restricted airspace are based on data provided by the United States Air Force and are based on the historical crash rates of each type of aircraft that will fly over or near the repository. The crash rates provided by the military are presented as a rate of crashes per flight. The crash rates provided by the Air Force are just that, crash *rates*. The calculated crash density is directly proportional to the number of flights in the airspace in question. Thus, if the number of flights doubles then the number of crashes is expected to double.

*Id.* at 963-64 (emphasis in original).

Nevada again seeks, improperly, to avoid its obligations as a petitioner by simply averring that DOE “has the burden of proving their assumption is true and until this is accomplished, [DOE] cannot take credit for it in [its] crash frequency analysis.” *Id.* at 964. The Commission has made clear, however, that “the *proponent* of a contention has the initial burden of coming forward with factual issues, not merely conclusory statements and vague allegations.” *Northeast Nuclear Energy Co.* (Millstone Nuclear Power Station, Unit No. 3), CLI-01-03, 53 NRC 22, 27 (2001) (emphasis added). Nevada does not meet its initial burden. It offers no reasoned explanation or technical analysis—either in its contention or in an expert affidavit—to bolster its claim that DOE erroneously has assumed that crash density outside the proposed flight restricted airspace is independent of the number of sorties flown annually. In short, Nevada asks

the Board to accept as true or self-evident *its* own assumption that “the calculated crash density is directly proportional to the number of flights in the airspace in question.” Petition at 964. But Nevada does not explain exactly where in its analysis DOE has made an incorrect assumption, why that assumption is incorrect, and how it materially affects the outcome of DOE’s analysis. This does not suffice under the Commission’s strict pleading standards, particularly in this proceeding where, as discussed in Section V.A.1 above, Nevada has a heightened burden to proffer well-pled and adequately supported contentions.

Notably, the only document referenced by Nevada with any specificity is the SAR. Nevada refers to page 1.6-22 of the SAR, but only in its prefatory discussion. Although Nevada mentions DOE’s *Frequency Analysis of Aircraft Hazards for License Application (2007)* (LSN# DN2002488951 and #DEN001564755), identified in the SAR and referred to herein as BSC 2007c, it does not identify any particular section or page of that document. Yet BSC 2007c, as discussed in Section f. of this response below, contains the very analyses and assumptions which Nevada claims are deficient. Furthermore, Nevada cites no other documents as extrinsic sources of information to support its contention. Accordingly, by virtue of its vagueness and failure to adduce any supporting analysis or information, Nevada again “deprives the Board of the ability to make the necessary, reflective assessment” of the alleged deficiencies in the Application. *Private Fuel Storage*, LBP-98-7, 47 NRC at 181. Indeed, from the face of its contention alone, it is not clear what specific portion of DOE’s aircraft hazard frequency analysis Nevada seeks to challenge. Accordingly, because the contention is not supported by facts and a reasoned statement of why the Application is unacceptable in some material respect, it does not meet 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. As the foregoing discussion indicates, Nevada's contention also suffers from this deficiency. Nevada completely ignores the relevant portions of the Application and fails to explain how the alleged defects in the Application have caused DOE allegedly to "understate[]" the risk of a military aircraft crash at the repository. Petitioner at 962. As such, this contention is inadmissible because "the Petitioner's assertion that the application[ ] [is] deficient is simply based upon a failure to read or perform any meaningful analysis of the application[ ]." *Millstone*, LBP-04-15, 60 NRC at 95.

By failing to engage the particulars of DOE's analysis, Nevada fails to controvert the Application directly, as required by 10 C.F.R. § 2.309(f)(1)(vi). Contrary to Nevada's claim, DOE does *not* assume in its analysis that the crash frequency density outside the flight-restricted airspace is independent of the annual number of sorties flown. Section 4.3.3 of BSC 2007c describes in detail the methodology used for evaluating the annual frequency of aircraft crashes into the relevant surface facilities from flights outside the flight-restricted airspace. *See Frequency Analysis of Aircraft Hazards for License Application*, Las Vegas, NV, Bechtel SAIC Company (2007), LSN# DN2002488951 at 56-59 (2007c). The frequency is based on the crash frequency density, which is expressed as an annual number of crashes per unit area. This approach is consistent with NRC guidance set forth in NUREG-0800, Section 3.5.1.6, Item III ("Review Procedures"), Subsection 4 ("Designated Airspaces") (Reference 2.2.31 of BSC 2007c), which states that "[t]he results of the model should be the total probability (C) of an aircraft crash per unit area and time in the vicinity of the proposed site."

The approach detailed in Section 4.3.3 of BSC 2007c is an empirical approach that is designed to account for the Air Force’s recent historical use of the airspace, *including the number of sorties flown*, the mix of aircraft flown, the missions assigned, and other variables that affect the observed number of crashes. By using a multiyear observation period, the analysis accounts for historical variations in the annual number of sorties. Thus, it ensures that the crash frequency density used in the analysis reflects the historical number of crashes that have occurred in the recent past over a large regional setting near the repository site, including any dependence on number of sorties flown. Thus, the calculation of the crash frequency density implicitly accounts for the number of sorties that took place over the observation period, and does not assume—as Nevada incorrectly suggests—that the crash frequency density outside the flight-restricted airspace is independent of the number of sorties flown in a year.

In addition, while Nevada makes an unsupported assertion that unidentified DOE calculations are “incorrect[]” and “understate[]” the risk of an aircraft crash at the repository, it does not address the relative magnitude or significance of the alleged errors. Petition at 962. Nor does it assert that the alleged errors result in a failure to comply with NRC requirements. As discussed in the applicable Legal Standards Section V.A.3 above, contentions that allege errors, omission, uncertainties or alternative approaches—without indicating the specific ramifications or result of such deficiencies—fail to raise a genuine dispute of material fact or law and are, therefore, inadmissible.

On this point, it warrants mention that DOE examined the implications of increases in the average annual number of aircraft crashes. BSC 2007c Attachment VI at VI-14 to VI-15 includes a sensitivity study (titled “Military Crash Density”) exploring a wide spectrum of trends in the annual number of crashes. The sensitivity study includes a significant increase in crash

frequency density (implying increases in the annual number of sorties or changes in other pertinent variables) and demonstrates that the frequency of crashes into relevant repository facilities remains significantly less than the Category 2 threshold frequency of  $2 \times 10^{-6}$  per year. Nevada overlooks this sensitivity analysis and fails to provide any facts or reasoned analysis to support a contrary finding or conclusion. Therefore, Nevada fails to controvert the Application in another significant respect, also contrary to 10 C.F.R. § 2.309(f)(1)(vi).

For all of the reasons discussed above, this contention must be dismissed in its entirety.

## **182. NEV-SAFETY-182 - Glide Distance**

SAR Subsection 1.6.3.4.1 and related subsections depends on the assumption that for flights that are outside the flight restricted airspace the ejection as a result of a crash initiating event that results in a crash occurs before the aircraft enters the flight restricted airspace, but fails to provide any documentary evidence justifying the assumption and fails to consider the frequency of impacts on the facility from aircraft accidents that are initiated outside the flight restricted airspace, leading to an inappropriate screening of aircraft crashes from consideration.

### **RESPONSE**

This contention alleges that DOE incorrectly “assumes that aircraft cannot glide into the proposed flight-restricted airspace with the pilot in the aircraft, and that the pilot will eject before entering that airspace.” Petition at 965. It further asserts that “DOE incorrectly uses the distance that aircraft travels after ejection for risk calculations, instead of the distance traveled after the initiating event of the crash.” *Id.* The contention claims that, as a result, DOE “effectively screen[s] out *the majority* of aircraft crashes outside the flight restricted airspace without documentary evidence or justification.” *Id.* (emphasis in original).

For the reasons discussed below, contrary to 10 C.F.R. § 2.309(f)(1)(v) that requires adequate factual support or expert opinion in order for a contention to be admitted, this contention fails to explain how the alleged facts upon which Nevada relies support the contention, and provides no other supporting information, including expert opinion. In addition, the contention also must be rejected because it fails to establish a genuine dispute with DOE on a material issue of law or fact, contrary to 10 C.F.R. § 2.309(f)(1)(i), (ii), (iv) and (vi). As here, when a contention does not directly controvert a position taken by the applicant in the license application, it is subject to dismissal.

**a. Statement of Issue of Law or Fact to be Controverted**

For the reasons discussed below, Nevada has failed to state an issue of law or fact to be controverted in this proceeding.

**b. Brief Explanation of Basis**

For the reasons explained below, there are no valid factual or legal bases supporting this contention and warranting its admission in this proceeding. Review of the relevant DOE documentation demonstrates that Nevada's allegations are simply not true. For example, the contention's principal claim—*i.e.*, that DOE provides no "documentary evidence" to support the exclusion of pilot ejections within the flight-restricted airspace—is false. Petition at 965. On the contrary, adequate documentation is provided in the *Frequency Analysis of Aircraft Hazards for License Application* (2007) (LSN# DN2002488951 and #DEN001564755), identified in the SAR and herein as BSC 2007c. This, and other reasons, are fully discussed below.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies a litany of subsections in Part 63. See Petition at 965-66. Nevada concludes this general description with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." *Id.* at 966. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In

this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO at 7), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3. This Nevada has not done, as explained below, because while making various unsupported assertions, Nevada does not directly controvert the methodology used—or results obtained—by DOE to determine the annual frequency of aircraft crashes. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

The legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted are discussed in Section V.A.3 above. This contention fails to meet those standards because, as discussed in that Section, it presents only unsupported arguments of counsel, and the associated expert affidavit falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. Notably, the contention fails even to mention the Affidavit of Hugh Horstman (Attachment 12 to Petition), in which Mr. Horstman purports to "adopt as [his] own opinions" the statements contained within Paragraph 5 of the contention. This Affidavit, in any case, is grossly insufficient to support the contention. An expert's attempt to reflexively rubber-stamp unsupported arguments by counsel does not suffice under 10 C.F.R. § 2.309(f)(1)(v). That regulation requires a petitioner—

including its proffered expert—to set forth “the necessary technical analysis to show why the proffered bases support its contention.” *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (citing *Ga. Inst. of Tech.*, LBP-95-6, 41 NRC at 305). No such analysis is presented here.

As in previous contentions, Nevada, contrary to the NRC’s contention admissibility rules, presents the Board with a string of unsupported and uncorroborated assertions as the bases for its contention. For example, with regard to DOE’s aircraft hazard frequency analysis, Nevada claims that DOE incorrectly assumes that:

- In aircraft crashes that are initiated outside the proposed flight-restricted airspace, the pilot will eject from the aircraft before entering the flight restricted airspace;
- The crash initiating event is the pilot ejection;
- Aircraft cannot glide into the proposed flight restricted airspace with the pilot in the aircraft and that the pilot will eject before entering the same airspace; and
- The distance that an aircraft travels is the distance traveled after ejection rather than the distance traveled after the initiating event of the crash.

Petition at 966-67.

Although Nevada relies on these statements as factual predicates for its contention, Nevada fails to specify where in its analysis DOE uses the alleged erroneous assumptions. The most specific reference Nevada provides is “SAR Subsection 1.6.3.4.1 and related subsections.” *Id.* Nevada apparently presumes that the Board will take its statements at face value and assume their veracity, notwithstanding Nevada’s failure to provide any corroborating references. Clearly, the NRC’s strict pleading rules do not permit such a practice, which would be particularly perilous here given that Nevada’s assertions, as shown below, are fallacious.

Similarly, Nevada’s own “factual” assertions lack any supporting or corroborating references. Nevada states that:

- The crash initiating event is defined as the event that ultimately causes an aircraft to crash, not the pilot ejection. Petition at 966.
- In the case of an F-16, the majority of crashes are caused by engine failure. When an F-16 engine fails, by procedure, the pilot performs emergency checklists and, time permitting, attempts to restart the engine. *Id.* at 966-67.
- Depending on the aircraft speed and altitude, the time and distance covered between the initiating event and the pilot ejection can be in excess of several minutes and over 20 miles. *Id.* at 967.
- When the pilot subsequently ejects from the aircraft, it will fly a very small distance to ground impact relative to the total distance flown from the initiating event. *Id.* at 966-67.

Significantly, Nevada provides no references in support of these statements. As noted above, the Affidavit of Hugh Horstman—which the contention does not even reference—contains no technical corroboration (rather, only a perfunctory “adoption”) of these statements.

The Commission’s rules require “a clear statement as to the basis for the contention and the submission of . . . supporting information and references to specific documents and sources that establish the validity of the contention.” *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-06-24, 64 NRC 111, 118-19 (2006) (citations omitted) (emphasis added). Nevada’s contention falls far short of meeting this requirement and, accordingly, does not meet 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. The contention's complete lack of any particularized references to the Application and supporting DOE aircraft hazard frequency analysis makes undeniable Nevada's failure to controvert those documents directly. This alone is grounds for dismissal of the contention.

Moreover, review of the relevant DOE documentation demonstrates that Nevada's allegations are simply not true. For example, the contention's principal claim—i.e., that DOE provides no “documentary evidence” to support the exclusion of pilot ejections within the flight-restricted airspace—is false. On the contrary, adequate documentation is provided in the *Frequency Analysis of Aircraft Hazards for License Application (2007)* (LSN# DN2002488951 and #DEN001564755), identified in the SAR and herein as BSC 2007c. Section 3.2.18 of BSC 2007c states on page 43 as follows:

Table 8 [of BSC 2007c] identifies crashes that have occurred on the NTTR [Nevada Test and Training Range] and Military Operations Areas from May 1990. *However, none of these crashes have occurred in the NTS [Nevada Test Site] or NTTR within a 30-mile radius of the North Portal.* Cross-referencing Table 8 with Table III-1 shows that over 80% of the crashes in Table 8 are a direct result of aggressive maneuvering; specifically, controlled flight into terrain, abandoned aircraft during maneuvering, loss of control during maneuvering, and midair collision. Maneuvering is unlikely to occur near the repository because the repository is located on the edge of the NTTR and NTS and less than 10 miles from the Beatty Corridor (Figure 2). Aggressive maneuvering could be a hazard for the commercial and general aviation flights in the Beatty Corridor. *In addition, as stated in Section 3.2.14, flights over the NTS are limited to overflights. Therefore, crashes due to maneuvering would occur at distances far from the*

*repository*. Note that the crash frequency density determined from the Table 8 crashes is conservatively applied to the area within a 30-mile radius of the North Portal (Assumption 3.2.14). (emphasis added)

Thus, the non-occurrence of aircraft crashes on the Nevada Test and Training Range or adjacent Military Operations Areas within 30 miles of the North Portal, combined with the stated prohibition on maneuvering (*i.e.*, straight and level flight is required) in the airspace above the Nevada Test Site, provides explicit justification for excluding contribution from pilot ejections from aircraft not intentionally overflying the restricted airspace within a much smaller distance, *i.e.*, 5.6 miles, of the North Portal. *See also* BSC 2007c at 38 (stating that “no aggressive maneuvering would be expected in the vicinity of Yucca Mountain”).

Furthermore, it warrants emphasis that DOE’s aircraft hazard frequency analysis does include intentional aircraft overflights of the restricted airspace. In fact, the analysis is highly conservative in this regard because, as indicated in BSC 2007c and above, zero crashes have occurred within a 30-mile radius of the North Portal. The lack of any crashes during the 16.5-year period (May 1990 to December 2006) is strong statistical evidence that the probability of such a future occurrence is extremely small. Nonetheless, for purposes of its analysis, DOE used aircraft crash data that apply to distances *greater* than 30 miles within the 30-mile radius, thereby artificially (and conservatively) increasing the number of projected crashes and ejections within 30 miles of the repository. As Section 3.2.14 of BSC 2007c explains: “Thus, to be conservative and to allow for future changes in airspace use, a crash-frequency density derived from crashes in the NTTR [Nevada Test and Training Range] and MOAs [Military Operations Areas], where aggressive flight and training exercises occur, is applied to flights within the 30-mile boundary in the NTS and NTTR.” BSC 2007c at 38. Nevada neither acknowledges nor controverts this information in its proposed contention.

Also incorrect is Nevada's claim that DOE assumes that "the pilot will eject from the aircraft before entering the flight restricted airspace." Petition at 966. As indicated above, of all of the crashes included in DOE's comprehensive analysis, none has occurred within 30 miles of the North Portal, irrespective of when or if pilot ejection occurred. DOE's analysis does not assume that ejection within the 5.6-mile radius is impossible; rather the relevant data support DOE's conclusion that the likelihood of pilot ejection within the 5.6-mile flight-restricted airspace is negligible in comparison to the incidence of ejection outside that radius and subsequent entry. Moreover, because DOE's analysis is based on actual crash data conservatively applied within 30 miles of the North Portal and not a simulation of postulated events, potentially long flights resulting in a crash are implicitly included in the database. Thus, the data relied upon by DOE—and not controverted by Nevada—directly contradict Nevada's unfounded allegation that DOE is "effectively screening out the majority of aircraft crashes outside the flight-restricted airspace without documentary evidence or justification." Petition at 967. Indeed, as discussed above, DOE took a very conservative approach by applying a crash-frequency density derived from crashes that occurred beyond 30 miles to the area within the 30-mile radius of the North Portal.

As explained in DOE's response to NEV-SAFETY-181, the methodology used by DOE determines the annual frequency of aircraft crashes into the relevant surface facilities from flights outside the flight-restricted airspace. *See* BSC 2007c at 56-59. The frequency is based on the crash frequency density, which is expressed as an annual number of crashes per unit area. *Id.* at 57. The crash frequency density includes a large area of interest and considers crashes *regardless of their point of origin, cause of mishap, or location of mishap initiation*. Therefore, long distances associated with engine mishaps that allow continued flight without pilot ejection

or delayed pilot ejection are either not crashes because of a successful landing, or are in the database used as the basis for this analysis and, therefore, taken into account. This crash frequency density is multiplied by a reduction factor based on the probability that, after the pilot ejects, the plane can travel from outside the flight-restricted airspace and still impact the surface facilities. *Id.* at 58. This reduction factor, however, does not depend on where the mishap originates, only where the pilot ejects. Nevada, while making various unsupported assertions, does not directly controvert the methodology used by DOE to determine the annual frequency of aircraft crashes.

Finally, Nevada ignores another key portion of DOE's aircraft hazard frequency analysis that is relevant to its contention. Although the historical data discussed above indicate no crashes for which pilot ejection occurs inside the flight-restricted airspace, DOE considered this possibility in its analysis. For example, an engine mishap could occur outside the flight-restricted airspace, with the pilot remaining in the aircraft, attempting to resolve the failure, eventually crossing the flight-restricted airspace, inside which the pilot finally ejects at low altitude (i.e., lower than 14,000 feet MSL). This scenario crash is analyzed through a sensitivity study titled "Honoring the Flight-Restricted Airspace," in Attachment VI of BSC 2007c (pp. VI-12 to VI-13).

Significantly, the sensitivity study found that more than 2,000 additional annual flights entering in the flight-restricted zone at an altitude of just 500 ft above the mountains surrounding the repository facilities would be needed for the total crash frequency into relevant surface facilities to reach  $2 \times 10^{-6} \text{ yr}^{-1}$  (i.e., the Beyond Category 2 event sequence screening threshold). *See* BSC 2007c at p. VI-13. This number bounds, with a significant margin, the number of emergency flight-restricted-airspace entries that could reasonably occur during a given year over

the preclosure period (especially given that there have not been any crashes within 5.6 miles of the repository or within 30 miles of the repository in the 16.5-year observation period).

Accordingly, Nevada's contention fails to meet the requirements of criterion (v) and criterion (vi) of 10 C.F.R. § 2.309(f)(1), both of which apply a fundamental precept of administrative law. Specifically, "a protestant does not become entitled to an evidentiary hearing merely on request, or on a bald or conclusory allegation that . . . a dispute exists. The protestant must make a minimal showing that material facts are in dispute, thereby demonstrating that an "inquiry in depth is appropriate." *Conn. Bankers Ass'n v. Bd. of Governors*, 627 F.2d 245, 251 (D.C. Cir. 1980) (internal quotation marks and citation omitted). Nevada has made no such showing in its contention.

For all of the reasons discussed above, this contention must be dismissed in its entirety.

### **183. NEV-SAFETY-183 - Crash Rates**

SAR Subsection 1.6.3.4.1 relies on an analysis that assumes that the crash rate of  $2.74 \times 10^{-8}$  for military overflights of the flight restricted airspace is the updated F-16 accident rate for normal in-flight mode, but fails to provide any documentary evidence that this crash rate is appropriate, meaning that the associated screening decision cannot be justified. Petition at 969.

#### **RESPONSE**

This contention alleges that the crash rate of  $2.74 \times 10^{-8}$  for military overflights of the flight-restricted airspace reflected in SAR Subsection 1.6.3.4.1 “is defined as the updated F-16 accident rate for normal in-flight mode, but the failure to provide any documentary evidence that this crash rate is justified means that the higher crash rate for ‘special’ flight mode for F-16 aircraft must be used.” *Id.* at 969.

#### **a. Statement of Issue of Law or Fact to be Controverted**

As fully discussed below, Nevada has not explained with any specificity the particular safety or legal reasons requiring rejection of the Application. As shown below, Nevada entirely ignores or misapprehends DOE’s derivation and use of the “normal” and “special operations” flight mode crash rates in its aircraft hazard frequency analysis. Thus, Nevada has failed to state a legitimate issue of law or fact to be controverted in this proceeding.

#### **b. Brief Explanation of Basis**

As fully explained below, this contention lacks adequate factual or legal basis. Contrary to Nevada’s unsupported assertion, DOE has not assumed, “without any evidence or justification,” that aircraft cannot enter the flight-restricted airspace “from the side or above.” Petition at 970. Thus, the contention fails to demonstrate “that there has been sufficient

foundation assigned for it to warrant further exploration.” *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC at 428.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. See Petition at 958-59. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. See *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Nevada’s bare assertion that DOE’s “screening decision cannot be justified” does not suffice in demonstrating how its apparent concern involves an issue which is material to a finding that the NRC must make.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. §

2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference, *with the requisite specificity*, any documents other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any credible expert opinion. Nevada's Petition does attach the affidavit of Hugh Horstman (Attachment 12), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraphs 5 of this contention, the affidavit simply "adopts" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

This contention contains two main arguments. The first argument is that DOE has not justified "the assumption that maneuvering aircraft are not permitted in the airspace directly above the proposed flight-restricted airspace." Petition at 970. The second argument is that DOE "assumes that any aircraft experiencing a crash initiating event outside of the [flight-restricted] airspace will not enter the airspace, from above or from the side of the airspace again without any justification." *Id.* at 971. For the reasons discussed below, the contention fails to provide adequate legal or factual support for either argument.

Nevada's first argument merely repeats a claim made by Nevada in several previous contentions. *See* NEV-SAFETY-174, -176, and -179. In fact, Nevada's claim in NEV-SAFETY-179 that DOE falsely "assumes that the flight restricted airspace is a non-maneuvering area" (Petition at 957) is not materially distinguishable from its first argument here. Accordingly, this argument should be rejected for the same reasons set forth above.

Specifically, DOE has identified additional flight restrictions in SAR Sections 1.6.3.4.1 and 5.8.3 for the airspace above the repository surface facilities. DOE's aircraft hazard frequency analysis credits these flight-restricted airspace and operational constraints over the repository. *See Frequency Analysis of Aircraft Hazards for License Application (2007) (LSN# DN2002488951 and #DEN001564755), Section 7 at 75-76 (identified in SAR Section 1.6 and herein as BSC 2007c).* Those restrictions include, among others, the following: "Maneuvering over the flight-restricted airspace is prohibited; flight is straight and level." SAR at 1.6-22, 5.8-7. DOE has incorporated these flight restrictions into specific Preclosure Procedural Safety Controls ("PSCs"), which are included in Table 1.9-10 of the SAR (see PSC-15 to PSC-18 on SAR at 1.9-144 to 1.9-145). The requirement for straight and level flight is specifically contained in PSC-16. *Id.* 1.9-144. The SAR states that the PSCs presented in Table 1.9-10 will "be implemented in facility operations to prevent and mitigate event sequences," and that these PSCs will impose "interface controls on activities outside of the GROA that could potentially lead to an event sequence." *Id.* at 1.9-2.

DOE is the "controlling authority" for the airspace above the repository surface facilities and, as such, has full authority to implement the additional restrictions when needed. SAR Section 1.1.1.3.2.1 describes the NTS airspace. *See* SAR at 1.1-13 to 1.1-14. The NTS airspace is protected by restricted areas R-4808N and R-4808S, known jointly as R-4808. Restricted areas are a type of special-use airspace that separate or confine air activities that are considered dangerous or unsafe to aircraft not involved in the activity. Federal Aviation Administration ("FAA") regulations prohibit flights by nonparticipating military, civilian or commercial aircraft in this special-use airspace without the controlling authority's authorization. If the area is not designated for joint use (nonjoint use), then nonparticipating aircraft are normally not permitted

at any time. The repository surface facility is located in restricted area R-4808N, which is designated as nonjoint use by the FAA. DOE is the controlling authority for the airspace. SAR at 1.1-14. As the controlling authority, DOE allows military aircraft to transit R-4808N. DOE has existing avoidance areas (further flight-restricted areas) over the Device Assembly Facility and over BREN (Bare Reactor Experiment-Nevada) Tower, as well as several other areas within R-4808N. *Id.*

Although the specified additional flight restrictions for the airspace are not needed until nuclear waste forms are actually located at the repository, DOE, pursuant to its authority, nonetheless has taken steps to facilitate implementation of the additional flight-restrictions identified in the SAR. Specifically, interactions with the U.S. Air Force Warfare Center at Nellis Air Force Base, Nevada, have resulted in a revision to Air Force Instruction (AFI) 13-212, Volume 1, Addendum A. AFI 13-212, Vol. 1, IC2, “Summary of Changes – Interim Change to AFI 13-212” (Dec. 17, 2008) (LSN# DEN001606834) at 5. This revision includes the additional restrictions, with a future implementation date, for the airspace above the repository surface facilities consistent with the restrictions outlined in SAR Section 1.6.3.4.1. Currently, these future restrictions serve only as a reference for future use and planning purposes, given that DOE is not yet receiving SNF and HLW at the repository. When repository operations commence under an NRC-approved license, DOE (currently through the National Nuclear Security Administration Nevada Site Office) will implement the applicable flight restrictions. These restrictions will be implemented in the same manner as the current avoidance areas in R-4808N. Specifically, DOE will *require* the Air Force to revise the formal Air Force Instructions to include the restrictions. *Id.* Thus, Nevada presents no legal or factual support for its assertion

that DOE falsely assumes that maneuvering aircraft are not permitted in the airspace directly above the flight-restricted airspace. Petition at 970.

Nevada also fails to provide adequate legal or factual support for its second argument; i.e., that DOE assumes without justification that injured aircraft cannot enter the restricted airspace from the side or above. Petition at 970-71. In so asserting, however, the contention fails to cite any specific sections or pages of DOE's Application or supporting aircraft hazard frequency analysis. The contention further states that DOE's assumption "ignores the existing rules of flight for aircraft experiencing emergencies and also ignores the longstanding F-16 operating procedures," particularly "U.S. Air Force Multi-Command Instruction 11-F-16 Volume 3, Virtual Pilot Operational Procedures – F-16" (Mar. 10, 2006) (LSN# NEV000005429). *Id.* at 971. It is not clear, however, to what "existing rules of flight" Nevada refers in its contention. Nor is it clear what specific portions of U.S. Air Force Multi-Command Instruction 11-F-16 DOE allegedly ignores, as Nevada provides no supporting page citations or explanation of the applicability and import of that document to DOE's aircraft hazard frequency analysis. In any case, the Air Force instruction cited by Nevada applies to "virtual" flight training conducted in simulators. It does not address actual flying operations. Finally, the Affidavit of Hugh Horstman, as attached to Nevada's Petition, offers no further insight into the basis for Nevada's claims.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As discussed in the applicable Legal Standards Section V.A.3 above, a contention that fails to controvert the Application directly, or mistakenly asserts the Application fails to address an issue that the Application does address, is defective. The contention also should be dismissed for this reason. It does not identify any concrete and specific disputes with the Application, and

then explain the supporting reasons for those disputes, such that this Board could possibly conclude that an inquiry in depth is warranted.

Although it is not clear from the contention (which, as stated above, lacks any pinpoint citations to the Application or relevant supporting analyses), Nevada appears to be suggesting that DOE improperly used a crash rate for F-16s in “normal” flight mode of  $2.74 \times 10^{-8}$  per mile. Nevada further contends that DOE must use “special” rather than “normal” crash rates unless it can justify the use of “normal” crash rates. Petition at 970-71. No further explanation is provided by Nevada.

Accordingly, this contention falls far short of directly controverting the Application. As reflected in BSC 2007c, DOE determined the total aircraft crash frequency to be  $5.9 \times 10^{-7}$  per year. BSC 2007c, Section 7, at 75. This is rounded up to  $6 \times 10^{-7}$  per year in SAR Section 1.6.3.4.1. SAR at 6-22. As indicated in SAR Section 1.6.3.4.1 and BSC 2007c Section 7, there are three contributors to the total crash frequency: (1) commercial, private, and military flights in the Beatty Corridor ( $2.9 \times 10^{-8}$  per year); (2) military overflights of the flight-restricted airspace ( $8.5 \times 10^{-8}$  per year); and (3) military flights in combat training exercises that take place outside of the flight-restricted airspace ( $4.8 \times 10^{-7}$  per year). BSC 2007c at 75; SAR at 1.6-22. The derivation of the crash frequencies for these three contributors is discussed in Sections 6.5.1.8 (and Attachment V), 6.5.2, and 6.5.3 of BSC 2007c, respectively. BSC 2007c at 70-71.

As relevant to the particular analysis, the analyses for the individual contributors to the total aircraft crash frequency use a crash rate of  $2.74 \times 10^{-8}$  per mile, which is the updated F-16 accident rate in normal in-flight mode. The derivation of this crash rate is detailed in Attachment IV to BSC 2007c. Section 3.2.13 of BSC 2007c summarizes as follows:

The crash rate for the F-16 has been updated from crash data from 1989 to 1998 ( $2.736 \times 10^{-8} \text{ mi}^{-1}$ ) using methodology that has been deemed acceptable by the US Nuclear Regulatory Commission in *Safety Evaluation Report Concerning the Private Fuel Storage Facility, Docket No. 72-22* (Reference 2.2.30 [DIRS 154930], Section 15.1.2.11). Attachment IV presents the derivation of the crash rates for F-15s and F-16s for the date range used in this analysis, 1990 to 2006, using the same methodology employed to derive the  $2.736 \times 10^{-8} \text{ mi}^{-1}$  crash rate used in Reference 2.2.30. As seen in Attachment IV, the 10-year average crash rate increases slightly for the first three 10-year periods, decreases for three years and then increases slightly. To be conservative and to avoid the possibility of statistical aberrations that might occur from year to year, the 17-year average from 1990 to 2006 is used in this analysis. Thus, the updated crash rate for F-16 normal flight mode of  $2.74 \times 10^{-8} \text{ mi}^{-1}$ , which better represents the contemporary flight operations experience, is used in lieu of the value given in Table 14.

BSC 2007c at 37. Thus, DOE has, in fact, provided “documentary evidence” of the F-16 normal flight mode crash rate, contrary to Nevada’s claim. Nevada’s contention presents no information suggesting that the updated crash rate for F-16 “normal” flight mode of  $2.74 \times 10^{-8} \text{ mi}^{-1}$  is invalid or inadequate.

As stated above, Nevada’s contention suggests that “the historically justified crash rate for ‘special’ flight mode for F-16 aircraft must be used.” Petition at 970. It is unclear from the contention, however, what “special” flight mode crash rate Nevada is alluding to and what “historically justified” crash rate value it believes DOE should adopt. To the extent DOE can discern, Nevada appears to be alluding to the 17-year adjusted F-16 accident rate for “special operations” flight derived in Attachment IV to BSC 2007c, which reflects crash events that occurred during maneuvering and other special operations. BSC 2007c, Attachment IV at IV-2.

DOE uses the special operations crash rate in one of the sensitivity analyses contained in Attachment VI to BSC 2007c. Specifically, Attachment VI to BSC 2007c contains a sensitivity study titled “Honoring the Flight-Restricted Airspace.” Attachment VI at VI-12 to VI-13. This

analysis considers the sensitivity of DOE's calculations to the possibility of emergency flight-restricted airspace entries, whereby pilot ejection occurs inside the flight-restricted airspace. For example, this sensitivity analysis assumes an engine mishap could occur outside the flight-restricted airspace, with the pilot remaining in the aircraft, attempting to resolve the failure, eventually crossing the flight-restricted airspace, inside which the pilot finally ejects at low altitude (i.e., lower than 14,000 feet MSL). Significantly, as indicated in BSC 2007c and DOE's response to NEV-SAFETY-182, there have not been any such crashes within 5.6 miles of the repository or even within 30 miles of the repository in the 16.5-year observation period.

The method used in the sensitivity analysis to assess these potential crashes is similar to that used for overflights of the flight-restricted airspace outlined in Section 4.3.2 of BSC 2007c, with the following adjustments:

- It is assumed that pilot ejection occurs at low altitude, reflecting the loss of altitude over the trajectory that brings the aircraft from the mishap location to the flight-restricted airspace.
- For added conservatism, a more severe crash rate than the normal operation crash rate is used, specifically, the special operations flight crash rate mentioned above is used.

BSC 2007c, Attachment VI at VI-13.

For the purpose of investigating sensitivity to the model used, DOE calculated an upper value for the number of annual violations of the flight-restricted airspace that would be needed to force the total aircraft crash annual frequency to reach the Category 2 event sequence threshold of  $2 \times 10^{-6} \text{ yr}^{-1}$ . *Id.* at VI-12. In addition to the crash contributions of (1) flights in the Beatty Corridor, (2) authorized flights over the flight-restricted zone, and (3) flights for which mishap and ejection occur outside the flight-restricted airspace, the sensitivity study found that more

than 2,000 annual flights entering in the flight-restricted zone—at an altitude of just 500 feet above the mountains surrounding the repository facilities using the “special operations” crash rate (in addition to the 1,000 overflights permitted per year)—would be needed for the total crash frequency into relevant surface facilities to reach  $2 \times 10^{-6} \text{ yr}^{-1}$ . *Id.* at VI-13. This number bounds with significant margin the number of emergency flight-restricted-airspace entries that could reasonably occur during a given year over the preclosure period (especially given that there have not been any crashes within 5.6 miles of the repository or within 30 miles of the repository in the 16.5-year observation period).

In view of the above, Nevada’s contention clearly fails to controvert the Application and supporting aircraft hazard frequency analysis contained in BSC 2007c. Instead, it merely avers that “DOE must use the higher ‘special’ flight mode crash rate of the F-16 aircraft and add these types of flight activities into the crash rate calculations.” Petition at 971. As demonstrated above, Nevada has not presented any information to directly controvert DOE’s derivation and use of the updated normal flight mode crash rate in its analyses. In addition, Nevada completely overlooks, and thus fails to controvert, the sensitivity analysis performed by DOE that considers the possibility of emergency flight-restricted-airspace entries into the flight-restricted airspace and uses a “special operations” flight crash rate for added conservatism.

For all of the reasons discussed above, this contention must be dismissed in its entirety.

**184. NEV-SAFETY-184 - Right-Of-Way N-48602**

Legal issue: SAR Subsection 5.8.1.1, which states that DOE right-of-way N-48602 (expiring in 2014) has been withdrawn from all forms of appropriation under the public laws including mining and geothermal leasing laws, does not properly account for the facts that (a) the right-of-way only provides DOE with the right to perform Yucca Mountain site characterization studies until December 31, 2014, (b) the land associated with the right-of-way is not under the jurisdiction and control of DOE, (c) the land has not been permanently reserved for DOE to construct and operate the Yucca Mountain repository, and (d) the land is not held free and clear of all significant encumbrances.

**RESPONSE**

This contention raises two distinct allegations regarding DOE's efforts to permanently withdraw lands to construct and operate the proposed geologic repository at Yucca Mountain. First, Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), 63.121(a)(1), and 63.121(a)(2) because the land on which the GROA will be located has not been permanently withdrawn and reserved for DOE's use. Petition at 976–77. And, second, Nevada argues that the Application is “materially incomplete because it fails to acknowledge that right-of-way N-48602 is limited in both duration and scope.” *Id.*<sup>108</sup>

This contention is inadmissible for two reasons, as further explained below. First, it is inadmissible because the regulations that Nevada relies upon do not require that DOE complete land withdrawal activities at this point of the proceeding. In this case, DOE has been pursuing federal legislation. Second, this contention fails to raise a genuine dispute on a material issue of

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<sup>108</sup> Nevada raises similar claims in NEV-SAFETY-185; NEV-SAFETY-186; NEV-SAFETY-187; NEV-SAFETY-188; and NEV-SAFETY-193.

fact or law because the information that Nevada alleges is missing from the Application is, in fact, there.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention lacks adequate legal foundation because DOE need not complete land withdrawal activities at this point of the licensing process. Therefore, this contention fails to raise an admissible issue of law subject to adjudication in this proceeding.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the “site” complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a):

(a) Ownership of Land

(1) The [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (i) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

10 C.F.R. § 63.121(a)(1)–(2). To meet these requirements, DOE has been pursuing federal legislation to, among other things, permanently withdraw the requisite lands for use by DOE to construct and operate the GROA.<sup>109</sup>

In essence, this contention seeks to impermissibly litigate DOE’s efforts to obtain land withdrawal and clear all other encumbrances from lands that make up the GROA. Specifically, Nevada argues that DOE has violated 10 C.F.R. § 63.31(a) and § 63.121 because Congress has not yet permanently withdrawn and reserved the requisite land for DOE’s use. Petition at 975. In short, this is not the appropriate time to consider this issue. As discussed under paragraph (f) below, the applicable NRC regulations do not require that DOE complete land withdrawal activities at this early point of the licensing process.

Moreover, Licensing Boards should reject, as a matter of policy and practicality, any contention that attempts to litigate an issue that is, or clearly is about to become, the subject of federal legislation. We note that Licensing Boards reject contentions that attempt to litigate an issue that is “primarily the responsibility of other federal or state/local regulatory agencies.” See *PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. Contentions addressing pending or future federal legislation would similarly expand the scope of this proceeding.

Accordingly, the Licensing Board must dismiss this contention.

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109 As the Application explains, in March 2007, DOE submitted to Congress a bill entitled the “Nuclear Fuel Management and Disposal Act.” SAR at 5.8-2. This bill sought to permanently withdraw the requisite lands for use by DOE to construct and operate the GROA. *Id.*

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize repository construction. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need to Obtain Land Withdrawal at This Stage of the Proceeding**

Nevada argues that DOE has violated NRC regulations because the land on which the GROA will be located has not yet been permanently withdrawn and reserved for DOE’s use. Petition at 975–77. This basis of the contention is inadmissible because DOE is not required to complete land withdrawal activities at this early phase of the licensing process.

The guidance set forth in the YMRP confirms that DOE may continue to pursue land withdrawal activities while the NRC Staff reviews the Application:

**Review Method 1—Ownership of Land**

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities underway *will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.*

YMRP, Controls to Restrict Access and Regulate Land Uses § 2.5.8.1 (emphasis added). An applicant’s compliance with relevant NRC guidance documents demonstrates compliance with the applicable regulations. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC \_\_ (slip op. at 6) (2008) (“the license renewal applicant’s use of an

aging management program identified in the GALL Report [i.e., a Staff guidance document for nuclear power plant license renewal safety reviews] constitutes reasonable assurance” of compliance with regulatory requirements).

At this early stage of the proceeding, therefore, NRC regulations require only that the Application include a “description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site,” and that the Application “be as complete as possible in the light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a), (c)(24) (emphasis added). SAR Section 5.8 provides a sufficient description of these land controls—specifically, this SAR section discusses ownership of land; controls for permanent closure; additional controls through permanent closure; water rights; conceptual design of monuments and markers; and records storage.

In short, there is no dispute that the federal government has not withdrawn the requisite land for DOE use to construct and operate a GROA. DOE has been pursuing legislation for a land withdrawal, and DOE will update its application after the land is withdrawn. The NRC does not require that DOE complete these activities until later stages of the licensing process. Accordingly, this basis of the contention fails to create a genuine dispute on a material issue of law or fact.

**(2) The Application Sufficiently Describes Right-of-Way N-48602**

Nevada also argues that “SAR Subsection 5.8.1.1 is materially incomplete because it fails to acknowledge that right-of-way N-48602 is limited in both duration and scope.” Petition at 976. The contention notes that this right-of-way (1) does not fall under DOE’s jurisdiction and control; (2) does not authorize repository construction or operations; and (3) expires in 2014. *Id.*

at 974. This allegation misses the mark entirely because SAR Section 5.8.1.1 explicitly acknowledges each of these “missing” items. That section provides in relevant part:

DOE already holds legal interests in much of the subject land depicted in Figure 5.8-1. The land on which the GROA will be located is covered by these legal interests, which take the form of two rights-of-way, an administrative land withdrawal, and a public land order. . . . *Currently, these legal interests do not authorize the construction and operation of the repository*[.]

Right-of-way N-48602 was granted to the DOE by the Bureau of Land Management subject to concurrence by the United States Air Force on October 10, 1989, and renewed on June 28, 1994; January 5, 2001; and April 8, 2004. *The most recent renewal of this right-of-way expires in 2014.*

SAR at 5.8-2 to -3 (emphasis added) (citation omitted).

Put simply, this basis for the contention fails to demonstrate a genuine dispute because the Application acknowledges this right-of-way’s scope and duration. As such, the Licensing Board must dismiss this contention to the extent it argues that the Application’s description is “materially incomplete.”

For all the reasons discussed above, this contention must be dismissed in its entirety.

**185. NEV-SAFETY-185 - Right-Of-Way N-47748**

Legal issue: SAR Subsection 5.8.1.1, which states that DOE right-of-way N-47748 (expiring on December 31, 2014) covers public land administered by the Bureau of Land Management, does not properly account for the facts that (a) the right-of-way only provides DOE with the right to perform Yucca Mountain site characterization studies until December 31, 2014, (b) the land associated with the right-of-way is not under the jurisdiction and control of DOE, (c) the land has not been permanently withdrawn from public use, (d) the land has not been permanently reserved for DOE to construct and operate the Yucca Mountain repository, and (e) the land is not held free and clear of all significant encumbrances.

**RESPONSE**

This contention raises two distinct allegations regarding DOE's efforts to permanently withdraw lands to construct and operate the proposed geologic repository at Yucca Mountain. First, Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), 63.121(a)(1), and 63.121(a)(2) because the land on which the GROA will be located has not been permanently withdrawn and reserved for DOE's use. Petition at 978–79. And, second, Nevada argues that the Application is “materially incomplete because it fails to acknowledge that right-of-way N-47748 is limited in both duration and scope.” *Id.* at 980.<sup>110</sup>

This contention is inadmissible for two reasons, as further explained below. First, it is inadmissible because the regulations that Nevada relies upon do not require that DOE complete land withdrawal activities at this point of the proceeding. In this case, DOE has been pursuing federal legislation. Second, this contention fails to raise a genuine dispute on a material issue of

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<sup>110</sup> Nevada raises similar claims in NEV-SAFETY-184; NEV-SAFETY-186; NEV-SAFETY-187; NEV-SAFETY-188; and NEV-SAFETY-193.

fact or law because the information that Nevada alleges is missing from the Application is, in fact, there.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention lacks adequate legal foundation because DOE need not complete land withdrawal activities at this point of the licensing process. Therefore, this contention fails to raise an admissible issue of law subject to adjudication in this proceeding.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the “site” complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a):

(a) Ownership of Land

(1) The [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (i) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

10 C.F.R. § 63.121(a)(1)–(2). To meet these requirements, DOE has been pursuing federal legislation to, among other things, permanently withdraw the requisite lands for use by DOE to construct and operate the GROA.<sup>111</sup>

In essence, this contention seeks to impermissibly litigate DOE’s efforts to obtain land withdrawal and clear all other encumbrances from lands that make up the GROA. Specifically, Nevada argues that DOE has violated 10 C.F.R. § 63.31(a) and § 63.121 because Congress has not yet permanently withdrawn and reserved the requisite land for DOE’s use. Petition at 979. In short, this is not the appropriate time to consider this issue. As discussed under paragraph (f) below, the applicable NRC regulations do not require that DOE complete land withdrawal activities at this early point of the licensing process.

Moreover, Licensing Boards should reject, as a matter of policy and practicality, any contention that attempts to litigate an issue that is, or clearly is about to become, the subject of federal legislation. We note that Licensing Boards reject contentions that attempt to litigate an issue that is “primarily the responsibility of other federal or state/local regulatory agencies.” *See PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. Contentions addressing pending or future federal legislation would similarly expand the scope of this proceeding.

Accordingly, the Licensing Board must dismiss this contention.

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<sup>111</sup> As the Application explains, in March 2007, DOE submitted to Congress a bill entitled the “Nuclear Fuel Management and Disposal Act.” SAR at 5.8-2. This bill sought to permanently withdraw the requisite lands for use by DOE to construct and operate the GROA. *Id.*

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need to Obtain Land Withdrawal at This Stage of the Proceeding**

Nevada argues that DOE has violated NRC regulations because the land on which the GROA will be located has not yet been permanently withdrawn and reserved for DOE's use. Petition at 979-80. This basis of the contention is inadmissible because DOE is not required to complete land withdrawal activities at this early phase of the licensing process.

The guidance set forth in the YMRP confirms that DOE may continue to pursue land withdrawal activities while the NRC Staff reviews the Application:

**Review Method 1—Ownership of Land**

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities underway *will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.*

Final Report, Yucca Mountain Review Plan, NUREG-L804, § 2.5.8.2 at 2.5-96 (emphasis added). An applicant's compliance with relevant NRC guidance documents demonstrates compliance with the applicable regulations. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC\_\_ (slip op. at 6) (October 6, 2008) ("the

license renewal applicant's use of an aging management program identified in the GALL Report [that is, a Staff guidance document for nuclear power plant license renewal safety reviews] constitutes reasonable assurance" of compliance with regulatory requirements).

At this early stage of the proceeding, therefore, NRC regulations require only that the Application include a "description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site," and that the Application "be as complete as possible in light of information that is reasonably available at the time of docketing." 10 C.F.R. § 63.21(a), (c)(24) (emphasis added). SAR § 5.8 provides a sufficient description of these land controls—specifically, this SAR section discusses ownership of land; controls for permanent closure; additional controls through permanent closure; water rights; conceptual design of monuments and markers; and records storage.

In short, there is no dispute that the federal government has not withdrawn the requisite land for DOE use to construct and operate a GROA. DOE has been pursuing legislation for a land withdrawal, and DOE will update its application after the land is withdrawn. The NRC does not require that DOE complete these activities until later stages of the licensing process. Accordingly, this basis of the contention fails to create a genuine dispute on a material issue of law or fact.

**(2) The Application Sufficiently Describes Right-of-Way N-47748**

Nevada also argues that "SAR Subsection 5.8.1.1 is materially incomplete because it fails to acknowledge that right-of-way N-47748 is limited in both duration and scope." Petition at 980. The contention notes that this right-of-way (1) does not fall under DOE's jurisdiction and control; (2) does not authorize repository construction or operations; and (3) expires in 2014. *Id.*

at 978. This allegation misses the mark entirely because SAR Section 5.8.1.1 explicitly acknowledges each of these “missing” items. That section provides in relevant part:

. . . DOE already holds legal interests in much of the subject land depicted in Figure 5.8-1. The land on which the GROA will be located is covered by these legal interests, which take the form of two rights-of-way, an administrative land withdrawal, and a public land order. . . . *Currently, these legal interests do not authorize the construction and operation of the repository*[.]

. . .

Right-of-way N-47748 was granted to the DOE by the Bureau of Land Management on January 6, 1988, and renewed on January 5, 2001 and December 20, 2007. The right-of-way expires on December 31, 2014.

SAR at 5.8-2 to -3 (emphasis added).

Put simply, this basis for the contention fails to demonstrate a genuine dispute because the Application acknowledges this right-of-way’s scope and duration. As such, the Licensing Board must dismiss this contention to the extent it argues that the Application’s description is “materially incomplete.”

For all the reasons discussed above, this contention must be dismissed in its entirety.

## **186. NEV-SAFETY-186 - "Ranch Boundary" Land**

Legal issue: SAR Subsection 5.8.1.1, which states that a Memorandum of Agreement governs Yucca Mountain project activities on 58,000 acres of non-public land on the Nevada Test Site (referred to as the Ranch Boundary), does not properly account for the facts that (a) the agreement only provides DOE with the right to perform Yucca Mountain site characterization studies until that right is terminated upon 90 days' written notice, (b) the land associated with the agreement has not been permanently reserved for DOE to construct and operate the Yucca Mountain repository, and (c) the land is not held free and clear of all significant encumbrances.

### **RESPONSE**

This contention impermissibly challenges DOE's efforts to permanently withdraw lands to construct and operate the proposed geologic repository at Yucca Mountain. Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), 63.121(a)(1), and 63.121(a)(2) because the land on which the GROA will be located has not been permanently withdrawn and reserved for DOE's use. Petition at 982–84. Nevada also claims that SAR Section 5.8 “is both inaccurate and materially incomplete” because it allegedly fails to acknowledge that DOE's land interests, including the Ranch Boundary land, are limited in duration and scope. *Id.* at 984–85.<sup>112</sup>

This contention is inadmissible for two reasons, as further explained below. First, it is inadmissible because the regulations that Nevada relies upon do not require that DOE complete land withdrawal activities at this point of the proceeding. In this case, DOE has been pursuing federal legislation. Second, this contention fails to raise a genuine dispute on a material issue of

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<sup>112</sup> Nevada raises similar claims in NEV-SAFETY-184; NEV-SAFETY-185; NEV-SAFETY-187; NEV-SAFETY-188; and NEV-SAFETY-193.

fact or law because the Application expressly acknowledges that DOE's land interests do not authorize repository construction and operation.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention lacks adequate legal foundation because DOE need not complete land withdrawal activities at this point of the licensing process. Therefore, this contention fails to raise an admissible issue of law subject to adjudication in this proceeding.

**b. Brief Explanation of Basis**

Because, as explained below, the issue proffered in this contention resides outside the scope of the proceeding, it fails to provide an adequate basis for admissibility.

**c. Whether the Issue is Within the Scope of the Proceeding**

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the "site" complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a):

(a) Ownership of Land

(1) The [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (i) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

10 C.F.R. § 63.121(a)(1)–(2). To meet these requirements, DOE has been pursuing federal legislation to, among other things, permanently withdraw the requisite lands for use by DOE to construct and operate the GROA.<sup>113</sup>

In essence, this contention seeks to impermissibly litigate DOE’s efforts to obtain land withdrawal and clear all other encumbrances from lands that make up the GROA. Specifically, Nevada argues that DOE has violated 10 C.F.R. § 63.31(a) and § 63.121 because Congress has not yet permanently withdrawn and reserved the requisite land for DOE’s use. Petition at 982–83. In short, this is not the appropriate time to consider this issue. As discussed under paragraph (f) below, the applicable NRC regulations do not require that DOE complete land withdrawal activities at this point in the licensing process.

Moreover, Licensing Boards should reject, as a matter of policy and practicality, any contention that attempts to litigate an issue that is, or clearly is about to become, the subject of federal legislation. We note that Licensing Boards reject contentions that attempt to litigate an issue that is “primarily the responsibility of other federal or state/local regulatory agencies.” *See PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. Contentions addressing pending or future federal legislation would similarly expand the scope of this proceeding.

Accordingly, the Licensing Board must dismiss this contention.

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113 As the Application explains, in March 2007, DOE submitted to Congress a bill entitled the “Nuclear Fuel Management and Disposal Act.” SAR at 5.8-2. This bill sought to permanently withdraw the requisite lands for use by DOE to construct and operate the GROA. *Id.*

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need to Obtain Land Withdrawal at This Stage of the Proceeding**

Nevada argues that DOE has violated NRC regulations because the land on which the GROA will be located has not yet been permanently withdrawn and reserved for DOE’s use. Petition at 982–83. This basis of the contention is inadmissible because DOE is not required to complete land withdrawal activities at this phase of the licensing process.

The guidance set forth in the YMRP confirms that DOE may continue to pursue land withdrawal activities while the NRC Staff reviews the Application:

**Review Method 1—Ownership of Land**

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities underway *will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.*

YMRP, *Controls to Restrict Access and Regulate Land Uses* § 2.5.8.1 at 2.5-96 (emphasis added). An applicant’s compliance with relevant NRC guidance documents demonstrates compliance with the applicable regulations. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC \_\_, \_\_ (slip op. at 6) (2008) (“the license

renewal applicant's use of an aging management program identified in the GALL Report [that is, a Staff guidance document for nuclear power plant license renewal safety reviews] constitutes reasonable assurance" of compliance with regulatory requirements).

At this stage of the proceeding, therefore, NRC regulations require only that the Application include a "description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site," and that the Application "be as complete as possible in light of information that is reasonably available at the time of docketing." 10 C.F.R. § 63.21(a), (c)(24) (emphasis added). SAR Section 5.8 provides a sufficient description of these land controls—specifically, this SAR section discusses ownership of land; controls for permanent closure; additional controls through permanent closure; water rights; conceptual design of monuments and markers; and records storage.

In short, there is no dispute that the federal government has not withdrawn the requisite land for DOE use to construct and operate a GROA. DOE has been pursuing legislation for a land withdrawal, and DOE will update its application after the land is withdrawn. The NRC does not require that DOE complete these activities until later stages of the licensing process. Accordingly, this basis of the contention fails to create a genuine dispute on a material issue of law or fact.

**(2) SAR Section 5.8 Expressly Acknowledges the Scope of DOE's Land Interests**

Nevada also argues that SAR Section 5.8 is inaccurate and materially incomplete. Petition at 984. The contention claims that the SAR fails to acknowledge that DOE's land interests—including the "Ranch Boundary"—do not permit repository construction and operation.

This allegation misses the mark. As noted above, NRC regulations require only that the Application include a “description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site.” 10 C.F.R. § 63.21(c)(24). SAR Section 5.8 meets this standard. Furthermore, the Application explicitly acknowledges the “missing” information. SAR Section 5.8 provides in relevant part:

. . . DOE already holds legal interests in much of the subject land depicted in Figure 5.8-1. The land on which the GROA will be located is covered by these legal interests, which take the form of two rights-of-way, an administrative land withdrawal, and a public land order. . . . *Currently, these legal interests do not authorize the construction and operation of the repository*[.]

. . .

In addition, a Memorandum of Agreement between the predecessor offices of the DOE National Nuclear Security Agency Nevada Site Office and the DOE Office of Civilian Radioactive Waste Management (Aquilina and Nelson 1994) allows the use of about 58,000 acres on Nevada Test Site land for Yucca Mountain project activities. Figure 5.8-1 shows the agreement area, which is known as the “ranch boundary.”

SAR at 5.8-2 to -3 (emphasis added).<sup>114</sup>

Put simply, this basis for the contention fails to demonstrate a genuine dispute. The Application provides a sufficient description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site. Moreover, the Application acknowledges that its current land interests do not authorize construction or operations activities. As such, the Licensing Board must dismiss this contention to the extent it argues that the Application’s description is inaccurate or materially incomplete.

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114 The Memorandum of Agreement is on the LSN (#DEN001585704) and is cited in the Petition. See Petition at 984.

For all the reasons discussed above, this contention must be dismissed in its entirety.

**187. NEV-SAFETY-187 - Public Land Order 7653**

Legal issue: SAR Subsection 5.8.1.1, which states that Public Land Order 7653 has withdrawn (for ten years) lands for the evaluation of the potential construction, operation and maintenance of a rail line in the Caliente Rail Corridor, does not properly account for the facts that the land associated with the order (a) is not under the jurisdiction and control of DOE, (b) has not been permanently withdrawn from public use, (c) has not been permanently reserved for DOE to construct and operate the Yucca Mountain repository, and (d) is not held free and clear of all significant encumbrances.

**RESPONSE**

This contention raises two distinct allegations regarding DOE's efforts to permanently withdraw lands to construct and operate the proposed geologic repository at Yucca Mountain. First, Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), 63.121(a)(1), and 63.121(a)(2) because the land on which the GROA will be located has not been permanently withdrawn and reserved for DOE's use. Petition at 986-87. And, second, Nevada argues that the Application "does not properly account for" Public Land Order 7653's duration and scope. *Id.* at 986, 988.<sup>115</sup>

This contention is inadmissible for two reasons, as further explained below. First, it is inadmissible because the regulations that Nevada relies upon do not require that DOE complete land withdrawal activities at this point of the proceeding. In this case, DOE has been pursuing federal legislation. Second, this contention fails to raise a genuine dispute on a material issue of fact or law because the information that Nevada alleges is missing from the Application is, in fact, there.

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<sup>115</sup> Nevada raises similar claims in NEV-SAFETY-184; NEV-SAFETY-185; NEV-SAFETY-186; NEV-SAFETY-188; and NEV-SAFETY-193.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention lacks adequate legal foundation because DOE need not complete land withdrawal activities at this point of the licensing process. Therefore, this contention fails to raise an admissible issue of law subject to adjudication in this proceeding.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the “site” complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a):

(a) Ownership of Land

(1) The [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (i) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

10 C.F.R. § 63.121(a)(1)–(2). To meet these requirements, DOE has been pursuing federal legislation to, among other things, permanently withdraw the requisite lands for use by DOE to construct and operate the GROA.<sup>116</sup>

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116 As the Application explains, in March 2007, DOE submitted to Congress a bill entitled the “Nuclear Fuel Management and Disposal Act.” SAR at 5.8-2. This bill sought to permanently withdraw the requisite lands for use by DOE to construct and operate the GROA. *Id.*

In essence, this contention seeks to impermissibly litigate DOE's efforts to obtain land withdrawal and clear all other encumbrances from lands that make up the GROA. Specifically, Nevada argues that DOE has violated 10 C.F.R. § 63.31(a) and § 63.121 because Congress has not yet permanently withdrawn and reserved the requisite land for DOE's use. Petition at 987. In short, this is not the appropriate time to consider this issue. As discussed under paragraph (f) below, the applicable NRC regulations do not require that DOE complete land withdrawal activities at this early point of the licensing process.

Moreover, Licensing Boards should reject, as a matter of policy and practicality, any contention that attempts to litigate an issue that is, or clearly is about to become, the subject of federal legislation. We note that Licensing Boards reject contentions that attempt to litigate an issue that is "primarily the responsibility of other federal or state/local regulatory agencies." *See PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. Contentions addressing pending or future federal legislation would similarly expand the scope of this proceeding.

Accordingly, the Licensing Board must dismiss this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that "the issue raised in the contention is material

to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need to Obtain Land Withdrawal at This Stage of the Proceeding**

Nevada argues that DOE has violated NRC regulations because the land on which the GROA will be located has not yet been permanently withdrawn and reserved for DOE’s use.

Petition at 986-87. This basis of the contention is inadmissible because DOE is not required to complete land withdrawal activities at this early phase of the licensing process.

The guidance set forth in the YMRP confirms that DOE may continue to pursue land withdrawal activities while the NRC Staff reviews the Application:

#### Review Method 1—Ownership of Land

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities underway *will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.*

Final Report, Yucca Mountain Review Plan, NUREG-1804, § 2.5.8.2 at 2.5-96 (emphasis added). An applicant's compliance with relevant NRC guidance documents demonstrates compliance with the applicable regulations. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC \_\_ (slip op. at 6) (October 6, 2008) (“the license renewal applicant’s use of an aging management program identified in the GALL Report [that is, a Staff guidance document for nuclear power plant license renewal safety reviews] constitutes reasonable assurance” of compliance with regulatory requirements).

At this early stage of the proceeding, therefore, NRC regulations require only that the Application include a “description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site,” and that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a), (c)(24) (emphasis added). SAR § 5.8 provides a sufficient description of these land controls—specifically, this SAR section discusses ownership of land; controls for permanent

closure; additional controls through permanent closure; water rights; conceptual design of monuments and markers; and records storage.

In short, there is no dispute that the federal government has not withdrawn the requisite land for DOE use to construct and operate a GROA. DOE has been pursuing legislation for a land withdrawal, and DOE will update its application after the land is withdrawn. The NRC does not require that DOE complete these activities until later stages of the licensing process. Accordingly, this basis of the contention fails to create a genuine dispute on a material issue of law or fact.

**(2) The Application Sufficiently Describes Public Land Order 7653**

Nevada also argues that SAR Subsection 5.8.1.1 is inadequate because it "does not properly account for the facts that" Public Land Order 7653 is limited in both duration and scope. Petition at 986, 988. The contention notes that the land associated with this order (1) does not fall under DOE's jurisdiction and control; (2) does not authorize repository construction or operations; and (3) has not been permanently reserved for DOE's use. *Id.* at 986. This allegation misses the mark entirely because SAR Subsection 5.8.1.1 explicitly acknowledges each of these "missing" items. That section provides in relevant part:

. . . DOE already holds legal interests in much of the subject land depicted in Figure 5.8-1. The land on which the GROA will be located is covered by these legal interests, which take the form of two rights-of-way, an administrative land withdrawal, and a public land order. . . . *Currently, these legal interests do not authorize the construction and operation of the repository[.]*

. . .

Public Land Order 7653 is a land withdrawal *for a period of 10 years* to evaluate the lands for the potential construction, operation,

and maintenance of a rail line (Caliente Rail Corridor) for transportation of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) to a geologic repository at Yucca Mountain (70 FR 76854).

SAR at 5.8-2 to -3 (emphasis added).

Put simply, this basis for the contention fails to demonstrate a genuine dispute because the Application acknowledges this public land order's scope and duration. As such, the Licensing Board must dismiss this contention to the extent it argues that the Application's description is inadequate.

For all the reasons discussed above, this contention must be dismissed in its entirety.

**188. NEV-SAFETY-188 - Public Land Order 6802/7534**

Legal issue: SAR Subsection 5.8.1.1, which states that Public Land Order 6802 (as extended through January 31, 2010 by Public Land Order 7534) withdraws land from the operation of the mining and mineral leasing laws, does not properly account for the facts that the land associated with the orders (a) is not under the jurisdiction and control of DOE, (b) has not been permanently withdrawn from public use, (c) has not been permanently reserved for DOE to construct and operate the Yucca Mountain repository, and (d) is not held free and clear of all significant encumbrances.

**RESPONSE**

This contention raises two distinct allegations regarding DOE's efforts to permanently withdraw lands to construct and operate the proposed geologic repository at Yucca Mountain. First, Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), 63.121(a)(1), and 63.121(a)(2) because the land on which the GROA will be located has not been permanently withdrawn and reserved for DOE's use. Petition at 990-91. And, second, Nevada argues that the Application "does not properly account for" the duration and scope of Public Land Orders 6802/7534. *Id.* at 990.<sup>117</sup>

This contention is inadmissible for two reasons, as further explained below. First, it is inadmissible because the regulations that Nevada relies upon do not require that DOE complete land withdrawal activities at this point of the proceeding. In this case, DOE has been pursuing federal legislation. Second, this contention fails to raise a genuine dispute on a material issue of fact or law because the information that Nevada alleges is missing from the Application is, in fact, there.

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<sup>117</sup> Nevada raises similar claims in NEV-SAFETY-184; NEV-SAFETY-185; NEV-SAFETY-186; NEV-SAFETY-187; and NEV-SAFETY-193.

**a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention lacks adequate legal foundation because DOE need not complete land withdrawal activities at this point of the licensing process. Therefore, this contention fails to raise an admissible issue of law subject to adjudication in this proceeding.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the “site” complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a):

(a) Ownership of Land

(1) The [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (i) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

10 C.F.R. § 63.121(a)(1)–(2). To meet these requirements, DOE has been pursuing federal legislation to, among other things, permanently withdraw the requisite lands for use by DOE to construct and operate the GROA.<sup>118</sup>

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118 As the Application explains, in March 2007, DOE submitted to Congress a bill entitled the “Nuclear Fuel Management and Disposal Act.” SAR at 5.8-2. This bill sought to permanently withdraw the requisite lands for use by DOE to construct and operate the GROA. *Id.*

In essence, this contention seeks to impermissibly litigate DOE's efforts to obtain land withdrawal and clear all other encumbrances from lands that make up the GROA. Specifically, Nevada argues that DOE has violated 10 C.F.R. § 63.31(a) and § 63.121 because Congress has not yet permanently withdrawn and reserved the requisite land for DOE's use. Petition at 990-91. In short, this is not the appropriate time to consider this issue. As discussed under paragraph (f) below, the applicable NRC regulations do not require that DOE complete land withdrawal activities at this early point of the licensing process.

Moreover, Licensing Boards should reject, as a matter of policy and practicality, any contention that attempts to litigate an issue that is, or clearly is about to become, the subject of federal legislation. We note that Licensing Boards reject contentions that attempt to litigate an issue that is "primarily the responsibility of other federal or state/local regulatory agencies." *See PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. Contentions addressing pending or future federal legislation would similarly expand the scope of this proceeding.

Accordingly, the Licensing Board must dismiss this contention.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding." 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that "the issue raised in the contention is material

to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need to Obtain a Land Withdrawal at This Stage of the Proceeding**

Nevada argues that DOE has violated NRC regulations because the land on which the GROA will be located has not yet been permanently withdrawn and reserved for DOE’s use.

Petition at 990-91. This basis of the contention is inadmissible because DOE is not required to complete land withdrawal activities at this early phase of the licensing process.

The guidance set forth in the YMRP confirms that DOE may continue to pursue land withdrawal activities while the NRC Staff reviews the Application:

Review Method 1—Ownership of Land

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities underway *will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.*

Final Report, Yucca Mountain Review Plan, NUREG-1804, § 2.5.8.2 at 2.5-96 (emphasis added). An applicant's compliance with relevant NRC guidance documents demonstrates compliance with the applicable regulations. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC \_\_ (slip op. at 6) (October 6, 2008) (“the license renewal applicant’s use of an aging management program identified in the GALL Report [that is, a Staff guidance document for nuclear power plant license renewal safety reviews] constitutes reasonable assurance” of compliance with regulatory requirements).

At this early stage of the proceeding, therefore, NRC regulations require only that the Application include a “description of the controls that DOE *will* apply to restrict access and to regulate land use at the Yucca Mountain site,” and that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a), (c)(24) (emphasis added). SAR § 5.8 provides a sufficient description of these land controls—specifically, this SAR section discusses ownership of land; controls for permanent

closure; additional controls through permanent closure; water rights; conceptual design of monuments and markers; and records storage.

In short, there is no dispute that the federal government has not withdrawn the requisite land for DOE use to construct and operate a GROA. DOE has been pursuing legislation for a land withdrawal, and DOE will update its application after the land is withdrawn. The NRC does not require that DOE complete these activities until later stages of the licensing process. Accordingly, this basis of the contention fails to create a genuine dispute on a material issue of law or fact.

**(2) The Application Sufficiently Describes Public Land Orders 6802/7534**

Nevada also argues that SAR Subsection 5.8.1.1 is inadequate because it "does not properly account for the facts that" Public Land Orders 6802/7534 are limited in both duration and scope. Petition at 990, 992. The contention notes that the land associated with these orders (1) does not fall under DOE's jurisdiction and control; (2) does not authorize repository construction or operations; and (3) has not been permanently reserved for DOE's use. *Id.* at 990. This allegation misses the mark entirely because SAR Subsection 5.8.1.1 explicitly acknowledges each of these "missing" items. That section provides in relevant part:

. . . DOE already holds legal interests in much of the subject land depicted in Figure 5.8-1. The land on which the GROA will be located is covered by these legal interests, which take the form of two rights-of-way, an administrative land withdrawal, and a public land order. . . . *Currently, these legal interests do not authorize the construction and operation of the repository[.]*

...

Public Land Order 6802 (55 FR 39152) was executed by the U.S. Department of the Interior on September 25, 1990, and extended

by Public Land Order 7534 (67 FR 53359) on July 31, 2002. It expires on January 31, 2010. These public land orders cover 4,255.5 acres and withdraw the land from the operation of the mining and mineral leasing laws and overlay a part of right-of-way N-47748 (BLM 2007). While these public land orders do not grant the DOE additional land-use rights above those specified in the right-of-way, they do preclude the staking and filing of mining claims.

SAR at 5.8-2 to -3 (emphasis added).

Put simply, this basis for the contention fails to demonstrate a genuine dispute because the Application acknowledges these public land orders' scope and duration. As such, the Licensing Board must dismiss this contention to the extent it argues that the Application's description is inadequate.

For all the reasons discussed above, this contention must be dismissed in its entirety.

**189. NEV-SAFETY-189 - Patent 27-83-0002**

Legal issue: SAR Subsection 5.8.2.2.1, which concludes that Patent 27-83-0002 and the associated rights-of-way N-43366 and NEV 066289 do not present an adverse human action that reduces the ability of the Yucca Mountain repository to isolate waste, does not properly account for the fact that DOE does not exercise any jurisdiction or control over the land on which the patent and rights-of-way have been granted even though the land lies wholly within the Yucca Mountain land withdrawal area boundary and the preclosure controlled area boundary.

**RESPONSE**

This contention concerns areas of land and rights-of-way associated with Patent 27-83-0002, a patented mining claim “located approximately 10 miles south of Yucca Mountain[,]” which is outside not only the GROA but also outside the proposed land withdrawal area boundary. SAR at 5.8-5. SAR Figure 5.8-1 shows the location of Patent 27-83-0002 relative to the proposed GROA.

This contention argues that the Application is fatally deficient because DOE does not have legal jurisdiction or control over land and rights-of-way associated with Patent 27-83-0002. Petition at 994, 996. As discussed below, this contention falls outside the scope of the proceeding, lacks adequate factual support or expert opinion, and fails in several respects to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

As discussed below, the contention depends totally on an incorrect statement of the pertinent regulation, 10 C.F.R § 63.121, in asserting that DOE must exercise “jurisdiction and control” over land outside the GROA, based on ownership of land or its permanent withdrawal from public use. It thus depends on a faulty legal premise and unavoidably raises legal issues that are irrelevant to those pertinent to examining lands outside the GROA.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be

read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion before a Licensing Board will admit a contention. As explained below, Nevada fails to provide factual support or expert opinion to substantiate its concern that DOE must control land associated with Patent 27-83-0002. Instead, Nevada offers only unadorned assertions of counsel. This approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation. For this reason, the Licensing Board must dismiss this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention argues that the Application is in “non-compliance” with various NRC regulations because DOE does not exercise adequate jurisdiction or control over lands associated with Patent 27-83-0002. Nevada’s claim fails to demonstrate a genuine dispute on a material issue of law or fact.

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the site complies with the requirements set forth in 10 C.F.R. Part 63, Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a), (b) and (c):

§ 63.121—Requirements for Ownership and Control of Interests in Land

(a) *Ownership of land.*

(1) The geologic repository operations area [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (1) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

(b) *Additional controls for permanent closure.* Appropriate controls must be established *outside* of the [GROA]. DOE shall exercise any jurisdiction and control over surface and subsurface estates necessary to prevent adverse human actions that could significantly reduce the geologic repository's ability to achieve isolation. The rights of DOE may take the form of appropriate possessory interests, servitudes, or withdrawals from location or patent under the general mining laws.

(c) *Additional controls through permanent closure.* Appropriate controls must be established *outside* the [GROA]. DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met. Control includes the authority to exclude members of the public, if necessary.

10 C.F.R. § 63.121(a)–(c) (emphasis added).

The structure of § 63.121 is critical to evaluating this contention. Subsection (a), entitled “Ownership of land,” is limited by its terms to the GROA—the inner part of the proposed land withdrawal area, where actual repository operations are conducted. Thus, the requirement for land to be either “acquired” by DOE or “permanently withdrawn” for its benefit applies only to the GROA. 10 C.F.R. § 63.121(a). Even within the GROA, only “significant” encumbrances must be cleared. Subparagraph 2 then provides examples of “significant” encumbrances. *Id.* § 63.121(a)(2). Subsections (b) and (c) relate to land *outside* the GROA. By contrast with the

requirements for the GROA stated in subsection (a), they require neither ownership nor permanent withdrawal of land. Rather, Subsections (b) and (c) require only “appropriate controls” to be established, and with them, the exercise of “any jurisdiction and control . . . necessary” to meet their stated requirements.

The contention argues that DOE’s current and intended span of control over Patent 27-83-0002 is inherently deficient because DOE does not own, and has not permanently withdrawn this land. This contention conflates the mandatory requirements for ownership or permanent withdrawal applicable only to the GROA with the inherently facts-and-circumstances evaluations involving “appropriate” controls for land outside the GROA. Thus, the contention attempts, incorrectly, to extend ownership-and-control requirements applicable to lands in the heart of the GROA, to areas of land *outside* the GROA, approximately ten miles from Yucca Mountain. Because the contention misstates the requirements of § 63.121, it must be dismissed.

Second, as a matter of fact, the contention errs factually in asserting that the lands at issue in this contention lie “wholly within the Yucca Mountain land withdrawal area boundary[.]” Petition at 994. There is no genuine dispute that these particular land interests are *not* part of the proposed land withdrawal area. The SAR, at 5.8-2, references *Land Records for the Proposed Land Withdrawal Area of the Yucca Mountain Repository*, within which DOE recognizes that the proposed land withdrawal “excludes” the area encompassing this patent. Office of Civilian Radioactive Waste Management, *Land Records for the Proposed Land Withdrawal Area of the Yucca Mountain Repository*, § 1.3, Rev. 1 (Sept. 2007) (TDR-MGR-ND-000003, LSN#

DEN001574941). And Nevada is aware of this fact because it cites this reference in its contention. Petition at 996.<sup>119</sup>

With respect to actual compliance with waste-isolation requirements, set forth in § 63.121(b), the Application reports that “activities associated with Patent 27-83-0002 have been assessed, and that assessment has determined that because the claim is physically remote and down the aquifer gradient from Yucca Mountain, the mining activities do not present an adverse human action that reduces the ability of the repository to isolate waste.” SAR at 5.8-5. The contention does not challenge this sufficient assertion of compliance with the regulation.

With respect to compliance with § 63.121(c), DOE must exercise jurisdiction or control over activities as necessary to ensure that the release and exposure requirements of § 63.111(a) and (b) are met. SAR Section 5.8.3.1 at 5.8-7, sets forth DOE’s general approach to meeting these requirements and refers to SAR Section 1.8 for more detailed discussion. As discussed in SAR Section 1.8, doses to individuals within the area of Patent 27-83-0002 did not need to be and were not specifically calculated in the SAR because that area is not a location of one of the maximum dose receptors that are discussed in SAR Section 1.8.1.4.3. The maximum dose receptors are specified at the locations of the highest annual average and 95th-percentile atmospheric dispersion factors for potential radioactive material releases from within the GROA. For the general environment, that receptor is at the SSE site boundary (*i.e.*, wind from the NNW)

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<sup>119</sup> The contention also raises inconsistencies regarding DOE’s statement of patent ownership and associated patent area acreage, but this does not raise a genuine dispute because the patent is not within the proposed land withdrawal area. It also is not material because it is administrative in nature, and therefore would not affect the outcome of the proceeding. *See, e.g., Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333–34 (1999) (“The dispute at issue is material if its resolution would make a difference in the outcome of the licensing proceeding.”) (internal quotations and citation omitted). According to the DOE Land Records report noted above (Appendix F), the U.S. Department of Interior Bureau of Land Management Mining Claim Geographic Report indicates that although the claimant is listed as Hollie O. Allen, the claim name is given as Cind-R-Lite. SAR Section 5.8.2.2.1 incorrectly inferred that the plot was “owned” by Cind-R-Lite. SAR at 5.8-5. The acreage of the plot (stated as 203 acres) also was in error. The Patented Mining Claim was granted to Hollie O. Allen for 182.5 acres.

as shown on SAR Figure 1.8-2. SAR Table 1.8-36 summarizes preclosure performance objectives and demonstrates that calculated doses at that location are in compliance with 10 C.F.R. §§ 63.111(a) and (b).

The atmospheric dispersion factors used to calculate doses are calculated in Calculation 000-00C-MGR0-02800-000-00B, General Public Atmospheric Dispersion Factors, (LSN#: DN2002456509; DEN001579957) for each of 16 meteorological sectors along the land withdrawal area boundary. As shown in Tables 18, 19 and 20 of Calculation 000-00C-MGR0-02800-000-00B (pages 117 to 118), the highest annual average and 95th-percentile atmospheric dispersion factors in the general environment are in the SSE sector (wind from the NNW). Patent 27-83-0002 is located near the SSW site boundary (i.e., wind from the NNE) as shown on SAR Figure 5.8-1. The calculated atmospheric dispersion factors in Tables 18, 19 and 20 of Calculation 000-00C-MGR0-02800-000-00B (pages 117 to 118) are lower for that SSW sector than for the SSE sector. Thus, doses at the SSW sector would also be lower and calculated doses for the SSE in SAR Table 1.8-36 (page 1.8-112, SAR Rev 0) are conservative for the land patent area location.

That conclusion is valid even considering that Patent 27-83-0002 extends north (scaled to approximately 2000 m on SAR Figure 5.8-1) from the south site boundary. Calculation 000-00C-MGR0-02800-000-00B follows the Regulatory Guide 1.145 methodology that requires the minimum distance for each of the 16 meteorological sectors be based on a 45 degree sector centered on the direction of interest (page 29). Calculation 000-00C-MGR0-02800-000-00B, Attachment 1 (Spreadsheet Site Coordinates - GROA.xls, worksheet GROA distances, CD 3 of 3, LSN# DN20024566509) determined that the minimum distance used to calculate atmospheric dispersion factors for the SSW sector is 16,638 m and that the actual distance along the SSW

sector is 19,886 m. The difference is 3,248 m. Therefore, the atmospheric dispersion factors in the SSW direction are conservatively based on a distance less than the actual distance to Patent 27-83-0002. Again, the contention does not challenge this sufficient assertion of compliance with the regulation.

Accordingly, this contention fails to raise a genuine dispute because DOE has demonstrated compliance with 10 C.F.R. §§ 63.121(b) and (c).

For all these reasons, the Licensing Board must dismiss this contention.

### **190. NEV-SAFETY-190 - Unpatented Lode And Placer Mining Claims**

Legal issue: SAR Subsection 5.8.2.2.2, which concludes that unpatented lode and placer mining claims on land administered by the Bureau of Land Management would have no adverse impact on repository operations, does not properly account for the fact that DOE does not exercise sufficient jurisdiction or control over the land on which the claims are located even though that land lies wholly within the Yucca Mountain land withdrawal area and preclosure controlled area boundaries.

#### **RESPONSE**

This contention concerns areas of land associated with unpatented mining claims *outside*, but in the vicinity, of the GROA. SAR Figure 5.8-1 shows the location of these areas relative to the GROA. SAR at 5.8-15.

Nevada raises two distinct allegations regarding these unpatented mining claims. First, Nevada questions whether “DOE has complied with” 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), and 63.121(b) and (c) because DOE allegedly does not have adequate legal jurisdiction or control over these unpatented mining claims for purposes of constructing and operating a geologic repository at Yucca Mountain. Petition at 998–99. And second, Nevada argues that “SAR Section 5.8.2.2.2 is both inaccurate and materially incomplete because it fails to recognize that at least 60 active unpatented mining claims lie wholly within DOE’s land withdrawal area boundary and preclosure controlled area boundary.” *Id.* at 1000.

As discussed below, this contention falls outside the scope of the proceeding, lacks adequate factual support and expert opinion, and fails in several respects to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

As discussed below, the contention depends totally on an incorrect statement of the pertinent regulation, 10 C.F.R § 63.121, in asserting that DOE must exercise “jurisdiction and control” over land outside the GROA, based on ownership of land or its permanent withdrawal from public use. The contention thus depends on a faulty legal premise and unavoidably raises legal issues that are irrelevant to those pertinent to examining lands outside the GROA.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion before a Licensing Board will admit a contention. As explained in paragraph f. below, Nevada fails to provide factual support or expert opinion to substantiate its concern that DOE must control land associated with unpatented mining claims at issue here. Instead, Nevada offers only recitations from the SAR itself and supporting references, framed by mere assertions of counsel. This approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. For this reason, the Licensing Board must dismiss this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need Ownership or Permanent Withdrawal to Exercise Adequate Jurisdiction and Control Over the Unpatented Mining Claims**

This contention argues that the Application is somehow in “non-compliance” with various NRC regulations because DOE does not exercise control over the unpatented mining claims at issue here. Nevada’s claim is incorrect as a matter of law and fails to demonstrate a genuine dispute on a material issue of law or fact.

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the site complies with the requirements set forth in 10 C.F.R. Part 63, Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a), (b) and (c):

§ 63.121—Requirements for Ownership and Control of Interests in Land

(a) *Ownership of land.*

(1) The geologic repository operations area must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (1) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

(b) *Additional controls for permanent closure.* Appropriate controls must be established *outside* of the [GROA]. DOE shall exercise any jurisdiction and control over surface and subsurface estates necessary to prevent adverse human actions that could significantly reduce the geologic repository’s ability to achieve isolation. The rights of DOE may take the form of appropriate possessory interests, servitudes, or withdrawals from location or patent under the general mining laws.

(c) *Additional controls through permanent closure.* Appropriate controls must be established *outside* the [GROA]. DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met. Control includes the authority to exclude members of the public, if necessary.

10 C.F.R. § 63.121(a)–(c) (emphasis added).

The structure of Section 63.121 is critical to evaluating this contention. Subsection (a), entitled “Ownership of land,” is limited by its terms to the GROA—the inner part of the proposed land withdrawal area, where actual repository operations are conducted. Thus, the requirement that land be either “acquired” by DOE or “permanently withdrawn” for its benefit applies only to the GROA. 10 C.F.R. § 63.121(a). Even within the GROA, only “significant” encumbrances must be cleared. Subparagraph 2 then provides examples of “significant” encumbrances. *Id.* § 63.121(a)(2). Subsections (b) and (c) relate to land *outside* the GROA. By contrast with the requirements for the GROA stated in subsection (a), they require neither ownership nor permanent withdrawal of land. Rather, Subsections (b) and (c) require only “appropriate controls” to be established, and with them, the exercise of “any jurisdiction and control . . . necessary” to meet their stated requirements.

The contention argues that DOE’s current and intended span of control over the unpatented mining claims at issue is inherently deficient because DOE does not own, and has not yet permanently withdrawn this land. This contention conflates the mandatory requirements for ownership or permanent withdrawal applicable only to the GROA with the inherently facts-and-circumstances-based evaluations involving “appropriate” controls for land outside the GROA. It avers categorically, that “[s]ince any one or all of the 60 active unpatented mining claims allow for access to and use of land located within DOE’s land withdrawal area boundary and the

preclosure controlled area, DOE cannot exercise sufficient jurisdiction and control" to meet the requirements of Sections 63.121(b) and (c). Petition at 999-1000.

If the unpatented mining claims were in the GROA, rather than at the outer reach of the southern and southwest boundaries of the withdrawal area, this assertion might be valid. However, given (as the contention recognizes, Petition at p. 999) that the unpatented interests are "primarily located in the far southwestern and south-central part of the area of [BLM] land . . . as depicted on SAR Figure 5.8-1," this portion of the contention amounts to a misstatement of the requirements of Section 63.121. As noted above, the requirements of Section 63.121(b) and (c) beyond the GROA involve "appropriate controls" based on facts. The contention misstates the applicable legal test, and thus does not raise a genuine issue of legal dispute, and must be dismissed.<sup>120</sup>

In fact, the Application demonstrates DOE's compliance with the pertinent requirements governing these unpatented interests. With respect to actual compliance with waste-isolation requirements, set forth in 10 C.F.R. § 63.121(b), the Application concludes, on the facts, that, "due to their remoteness from the repository surface facilities, any activities related to these claims would have no adverse impact on repository operations." SAR at 5.8-6. The contention does not challenge this sufficient assertion of compliance with the regulation.

With respect to compliance with Section 63.121(c), DOE must exercise jurisdiction or control over activities as necessary to ensure that the release and exposure requirements of Section 63.111(a) and (b) are met. SAR Section 5.8.3.1 at 5.8-7 sets forth DOE's general approach to meeting these requirements and refers to SAR Section 1.8 for more detailed factual discussion and demonstration of compliance. Any individual allowed access to an unpatented

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<sup>120</sup> The land on which the unpatented mining claims exist is within the area intended for permanent acquisition by DOE by legislative withdrawal. SAR at 5.8-3. DOE will update its Application after the land is withdrawn.

lode and placer mining claim would be in the category of on-site public. As such, the radiation protection requirements of 10 C.F.R. Part 20 would apply. DOE has included in SAR Section 1.8 in Table 1.8-28 dose estimates at the locations of maximum on-site dose receptors. The maximum on-site dose receptors are at work locations proximate to waste handling operations. Those estimated doses are reduced as distance from the waste handling operations increases because both direct radiation attenuation and atmospheric dispersion increase with distance. Both the attenuation and dispersion effects decrease dose. The unpatented lode and placer mining claims are shown in SAR Figure 5.8-1 and are remote from the waste handling activities. Thus, the dose to an individual at the location of an unpatented lode and placer mining claim would be less than those shown in Table 1.8-28. This demonstrates that the requirements of 10 C.F.R. § 63.111(a) and (b) are met with margin. Again, the contention fails to challenge this fact-based demonstration of compliance.

Accordingly, this basis of the contention fails to raise a genuine dispute because DOE has demonstrated compliance with 10 C.F.R. § 63.121(b) and (c).

**(2) SAR Section 5.8.2.2.2 Provides a Sufficient Description of Unpatented Mining Claims**

SAR Section 5.8.2.2.2 (“Unpatented Mining Claims”) provides a description of these claims. SAR at 5.8-5. For example, the SAR explains that there are two types of unpatented mining claims, and discusses their dimensions and locations. *Id.* SAR Section 5.8.2.2.2 also states that “[a]dditional information for these claims, including the status of surface or subsurface activities, is presented in *Land Records for the Proposed Land Withdrawal Area of the Yucca Mountain Repository* (DOE 2007).” *Id.*

Nevada argues that SAR Section 5.8.2.2.2 “is both inaccurate and materially incomplete because it fails to recognize that at least 60 active unpatented mining claims lie wholly within

DOE's land withdrawal area boundary and preclosure controlled area boundary." Petition at 1000.

This basis of the contention fails to raise a genuine dispute. There is no requirement that the Application explicitly discuss each and every active, unpatented mining claim. Nevertheless, the category has been addressed in the Application. Moreover, SAR Section 5.8.2.2.2 explicitly references the very information on specific unpatented mining claims that Nevada alleges is missing. SAR at 5.8-5 (citing Office of Civilian Radioactive Waste Management, *Land Records for the Proposed Land Withdrawal Area of the Yucca Mountain Repository*, Appendix F (Mining Claim Geographic Report) Rev. 1 (Sept. 2007) (TDR-MGR-ND-000003, LSN# DEN001574941)). Nevada must know this because the contention cites this reference to support its claim that there are at least 60 active unpatented mining claims. Petition at 999. The point is that a category of such claims exists, and the SAR has evaluated it.

The contention fails to challenge the described location of the claims or any other aspects of that evaluation. Accordingly, the Licensing Board must dismiss this contention.

For all the reasons discussed above, this contention must be dismissed in its entirety.

### **191. NEV-SAFETY-191 - Nye County Monitoring Wells**

Legal issue: SAR Subsection 5.8.2.2.3, which states that right-of-way N-62848 granted to Nye County, Nevada to drill several monitoring wells has no adverse effect on the ability of the repository to meet performance objectives, does not account for the fact that DOE does not exercise sufficient jurisdiction or control over the land on which most of the wells are located even though that land lies wholly within the Yucca Mountain land withdrawal area and the preclosure controlled area boundaries.

#### **RESPONSE**

This contention concerns areas of land associated with right-of-way N-62848, which allows Nye County to drill several monitoring wells *outside* the southern boundaries of the GROA. SAR Figure 5.8-3 shows the location of the Nye County monitoring wells relative to the GROA. SAR at 5.8-17.

Nevada raises two distinct allegations relative to these monitoring wells. First, Nevada questions whether “DOE has complied with” 10 C.F.R. § 63.21(c)(24), 63.31(a)(3), and 63.121(b) and (c) because DOE does not have legal jurisdiction or control over this right-of-way, for purposes of constructing and operating a geologic repository at Yucca Mountain. Petition at 1001–02. And second, Nevada argues that “SAR Section 5.8.2.2.3 is both inaccurate and materially incomplete because it fails to recognize that 17 of the monitoring wells lie on land wholly within the Yucca Mountain land withdrawal area and preclosure controlled area boundaries.” *Id.* at 1004.

As discussed below, this contention falls outside the scope of the proceeding and fails in several respects to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

As discussed below, the contention depends totally on an incorrect statement of the pertinent regulation, 10 C.F.R § 63.121, in asserting that DOE must exercise “jurisdiction and control” over land outside the GROA, based on ownership of land or its permanent withdrawal from public use. The contention thus depends on a faulty legal premise and unavoidably raises legal issues that are irrelevant to those pertinent to examining lands outside the GROA.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion before a Licensing Board will admit a contention. As explained in paragraph f. below, Nevada fails to provide factual support or expert opinion to substantiate its concern that DOE must control land associated with the monitoring wells at issue here. Instead, Nevada offers only recitations from the SAR itself and supporting references framed by unadorned assertions of counsel. This approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. For this reason, the Licensing Board must dismiss this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need Ownership or Permanent Withdrawal to Exercise Adequate Jurisdiction and Control over the Land on Which Monitoring Wells Are Placed**

This contention argues that the Application is in “non-compliance” with NRC regulatory provisions because DOE does not exercise control over the land at issue here. Petition at 1000. Nevada’s claim fails to demonstrate a genuine dispute on a material issue of law or fact.

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the site complies with the requirements set forth in 10 C.F.R. Part 63, Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a), (b) and (c):

§ 63.121—Requirements for Ownership and Control of Interests in Land

(a) *Ownership of land.*

(1) The geologic repository operations area must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (1) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

(b) *Additional controls for permanent closure.* Appropriate controls must be established *outside* of the [GROA]. DOE shall exercise any jurisdiction and control over surface and subsurface estates necessary to prevent adverse human actions that could significantly reduce the geologic repository’s ability to achieve isolation. The rights of DOE may take the form of appropriate possessory interests, servitudes, or withdrawals from location or patent under the general mining laws.

(c) *Additional controls through permanent closure.* Appropriate controls must be established *outside* the [GROA]. DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met. Control includes the authority to exclude members of the public, if necessary.

10 C.F.R. § 63.121(a)–(c) (emphasis added).

The structure of § 63.121 is critical to evaluating this contention. Subsection (a), entitled “Ownership of land,” is limited by its terms to the GROA—the inner part of the proposed land withdrawal area, where actual repository operations are conducted. Thus, the requirement that for land to be either “acquired” by DOE or “permanently withdrawn” for its benefit applies only to the GROA. 10 C.F.R. § 63.121(a). Even within the GROA, only “significant” encumbrances must be cleared. Subparagraph 2 then provides examples of “significant” encumbrances. *Id.* § 63.121(a)(2). Subsections (b) and (c) relate to land *outside* the GROA. By contrast with the requirements for the GROA stated in subsection (a), they require neither ownership nor permanent withdrawal of land. Rather, Subsections (b) and (c) require only “appropriate controls” to be established, and with them, the exercise of “any jurisdiction and control . . . necessary” to meet their stated requirements.

The contention argues that DOE’s current and intended span of control over the wells at issue is inherently deficient because DOE does not own, and has not yet permanently withdrawn this land. This contention conflates the mandatory requirements for ownership or permanent withdrawal applicable only to the GROA with the inherently facts-and-circumstances evaluations involving “appropriate” controls for land outside the GROA. Thus, the contention attempts, incorrectly, to extend ownership-and-control requirements applicable to lands in the heart of the GROA, to areas of land *outside* the GROA. Because the contention misstates the requirements of § 63.121 — and fails to make any attempt to show that the land occupied by the wells, all of

which is outside the GROA, must be subject to the degree of control required only for the GROA — it must be dismissed.

In fact, the Application demonstrates DOE's compliance with the pertinent requirements governing the land occupied by these wells. With respect to actual compliance with waste-isolation requirements, set forth in 10 C.F.R. § 63.121(b), SAR Section 5.8.2.2.3 states that DOE has evaluated and determined that the Nye County Early Warning Drilling Program poses negligible potential test interference with existing Yucca Mountain test activities (Determination of Importance Evaluation for Surface-Based Testing Activities, Sections 6.2.4 and 10.4, LSN# DN2002174278). SAR at 5.8-6. Furthermore, FEP 1.1.01.01.0A, LSN# DEN001584824, Open Site Investigation Boreholes, has examined the potential effect of open boreholes within the repository area and excluded these from the performance assessment. Therefore, if Nye County activities do not interfere with the performance objectives of Yucca Mountain testing programs and the other boreholes located within the repository boundary have been found to not impact postclosure performance, it follows that the Nye County activities could not significantly reduce the geologic repository's ability to achieve waste isolation. The contention does not challenge this sufficient assertion of compliance with the regulation.

With respect to 10 C.F.R. § 63.121(c), DOE must exercise jurisdiction or control over activities as necessary to ensure that the release and exposure requirements of § 63.111(a) and (b) are met. SAR Section 5.8.3.1 at 5.8-7 sets forth DOE's general approach to meeting these requirements and refers to SAR Section 1.8 for more detailed factual discussion and demonstration of compliance. Nye County employees operating the monitoring wells would be in the category of on-site public. As such, the radiation protection requirements of 10 C.F.R. 20 would apply. DOE has included in SAR Section 1.8 at 1.8-28, dose estimates at the locations of

maximum on-site dose receptors. The maximum on-site dose receptors are at work locations proximate to waste handling operations. Those estimated doses are reduced as distance from the waste handling operations increase because both direct radiation attenuation and atmospheric dispersion increase with distance. Both the attenuation and dispersion effects decrease dose. The Nye County monitoring wells are shown in SAR Figure 5.8-3 and are remote from waste handling activities. Thus, the dose to an individual at the location of a monitoring well would be less than those shown in Table 1.8-28. This demonstrates that the requirements of 10 CFR § 63.111(a) and (b) are met with margin. Again, the contention fails to challenge this fact-based demonstration of compliance.

Accordingly, this basis of the contention fails to raise a genuine dispute on a material issue, and the Board must reject it.

**(2) The Application Sufficiently Describes the Nye County Monitoring Wells**

Nevada also argues that “SAR Section 5.8.2.2.3 is both inaccurate and materially incomplete because it fails to recognize that 17 of the monitoring wells lie on land wholly within the Yucca Mountain land withdrawal area and preclosure controlled area boundaries.” Petition at 1004. This allegation does not raise a genuine dispute because the SAR explicitly acknowledges the “missing” information.

SAR Section 5.8.2.2.3 states that the Nye County Early Warning monitoring wells are located within the Yucca Mountain land withdrawal area and preclosure controlled area boundaries and points to SAR Figure 5.8-3 for the locations of the individual drill sites. SAR at 5.8-6.

Put simply, this basis of the contention fails to demonstrate a genuine dispute because the Application acknowledges the location of the monitoring wells at issue. As such, the Licensing

Board must dismiss this contention to the extent it argues that the Application's description is inadequate.

For all the reasons discussed above, this contention must be dismissed in its entirety.

**192. NEV-SAFETY-192 - Land Outside DOE's Rights-Of-Way**

Legal issue: SAR Subsection 5.8.1.1, which identifies 5 areas of land in which DOE claims some type of legal interest (i.e., right-of-ways N-48602 and N-47748, Public Land Orders 7653 and 6802/7534 and the Memorandum of Agreement governing the ranch boundary), fails to address whether DOE has any type of legal interest in 3 other areas of land lying outside those 5 areas but within the Yucca Mountain land withdrawal area and preclosure controlled area boundaries and thus does not properly account for the fact that for those 3 additional areas DOE does not exercise any jurisdiction and control.

**RESPONSE**

This contention concerns three areas of land *outside*, but in the vicinity, of the GROA. These three areas, which are included in the proposed land withdrawal area boundary set forth in SAR at 5.8-15 (Figure 5.8-1), are as follows: (1) an area of land north of right-of-way N-48602; (2) an area of land southwest of right-of-way N-47748; and (3) areas of land north, northeast, and southeast of the “Ranch Boundary.” Petition at 1005. Nevada raises two distinct allegations relative to these three areas. First, Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), and 63.121(b) and (c) because DOE does not have legal jurisdiction or control over these areas for purposes of constructing and operating a geologic repository at Yucca Mountain. *Id.* And second, Nevada argues that SAR Section 5.8.1.1 is “materially incomplete” because it “does not properly account” for these three areas. *Id.* at 1005, 1007.

As discussed below, this contention falls outside the scope of the proceeding, lacks adequate factual support and expert opinion, and fails in several respects to raise a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

As discussed below, the contention depends totally on an incorrect statement of the pertinent regulation, 10 C.F.R § 63.121, in asserting that DOE must exercise “jurisdiction and control” over land outside the GROA, based on ownership of land or its permanent withdrawal from public use. The contention thus depends on a faulty legal premise and unavoidably raises legal issues that are irrelevant to those pertinent to examining lands outside the GROA.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion before a Licensing Board will admit a contention. As explained in paragraph f. below, Nevada fails to provide factual support or expert opinion to substantiate its concern that DOE must control the three areas of land at issue in this proceeding. Instead, Nevada offers only recitations from the SAR itself and supporting references, framed by unadorned assertions of counsel. This approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation. For this reason, the Licensing Board must dismiss this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need Ownership or Permanent Withdrawal to Exercise Adequate Jurisdiction and Control Over These Three Areas of Land**

This contention argues that the Application is in “non-compliance” with NRC regulatory provisions because DOE does not exercise control over the lands at issue here. Petition at 1005. Nevada’s claim fails to demonstrate a genuine dispute on a material issue of law or fact.

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the site complies with the requirements set forth in 10 C.F.R. Part 63, Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a), (b) and (c):

§ 63.121—Requirements for Ownership and Control of Interests in Land

(a) *Ownership of land.*

(1) The geologic repository operations area must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (1) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

(b) *Additional controls for permanent closure.* Appropriate controls must be established *outside* of the [GROA]. DOE shall exercise any jurisdiction and control over surface and subsurface estates necessary to prevent adverse human actions that could significantly reduce the geologic repository’s ability to achieve isolation. The rights of DOE may take the form of appropriate possessory interests, servitudes, or withdrawals from location or patent under the general mining laws.

(c) *Additional controls through permanent closure.* Appropriate controls must be established *outside* the [GROA]. DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met. Control includes the authority to exclude members of the public, if necessary.

10 C.F.R. § 63.121(a)–(c) (emphasis added).

The structure of § 63.121 is critical to evaluating this contention. Subsection (a), entitled “Ownership of land,” is limited by its terms to the GROA—the inner part of the proposed land withdrawal area, where actual repository operations are conducted. Thus, the requirement that for land to be either “acquired” by DOE or “permanently withdrawn” for its benefit applies only to the GROA. 10 C.F.R. § 63.121(a). Even within the GROA, only “significant” encumbrances must be cleared. Subparagraph 2 then provides examples of “significant” encumbrances. *Id.* § 63.121(a)(2). Subsections (b) and (c) relate to land *outside* the GROA. By contrast with the requirements for the GROA stated in subsection (a), they require neither ownership nor permanent withdrawal of land. Rather, Subsections (b) and (c) require only “appropriate controls” to be established, and with them, the exercise of “any jurisdiction and control . . . necessary” to meet their stated requirements.

The contention argues that DOE’s current and intended span of control over the areas of land at issue is inherently deficient because DOE does not own, and has not yet permanently withdrawn this land. This contention conflates the mandatory requirements for ownership or permanent withdrawal applicable only to the GROA with the inherently facts-and-circumstances evaluations involving “appropriate” controls for land outside the GROA. Thus, the contention attempts, incorrectly, to extend ownership-and-control requirements applicable to lands in the heart of the GROA, to areas of land *outside* the GROA. Because the contention misstates the

requirements of § 63.121, it must be dismissed with respect to land outside the GROA, and since all of the land at issue is outside the GROA, the contention must be dismissed.

In fact, the Application demonstrates DOE's compliance with the pertinent requirements governing these areas. With respect to actual compliance with waste-isolation requirements, set forth in 10 C.F.R. § 63.121(b), SAR Section 5.8.2.2 states that activities associated with the land surrounding Yucca Mountain outside of, but in the vicinity of, the GROA have been assessed (*see* LSN# 2002193045) and concludes, on the facts, that they do not present an adverse human action that reduces the ability of the repository to isolate waste. The contention does not challenge this sufficient assertion of compliance with the regulation.

With respect to 10 C.F.R. § 63.121(c), DOE must exercise jurisdiction or control over activities as necessary to ensure that the release and exposure requirements of § 63.111(a) and (b) are met. SAR Section 5.8.3.1 at 5.8-7 sets forth DOE's general approach to meeting these requirements and refers to SAR Section 1.8 for a more detailed factual discussion and demonstration of compliance. Any individual allowed access to the three areas of land at issue in this contention would be in the category of on-site public. As such, the radiation protection requirements of 10 C.F.R. Part 20 would apply. DOE has included in SAR Section 1.8 in Table 1.8-28 dose estimates at the locations of maximum on-site dose receptors. The maximum on-site dose receptors are at work locations proximate to waste handling operations. Those estimated doses are reduced as distance from the waste handling operations increases because both direct radiation attenuation and atmospheric dispersion increase with distance. Both of the attenuation and dispersion effects decrease dose. The three areas of land at issue are shown in SAR Figure 5.8-1 and are located remotely from the waste handling activities. Thus, the dose to an individual at a location within those three areas of land would be less than those shown in Table

1.8-28. This demonstrates that the requirements of 10 C.F.R. § 63.111(a) and (b) are met. Again, this contention fails to challenge this fact-based demonstration of compliance.

For these reasons, this basis of the contention is inadmissible.

**(2) SAR Section 5.8.1.1 Addresses Only Land Interests in which the GROA will be Located**

Nevada also argues that SAR Section 5.8.1.1 is “materially incomplete[.]” Petition at 1007. Nevada reasons that because SAR Section 5.8.1.1 addresses other areas within the proposed land withdrawal boundary area, it also should have addressed the three areas of land at issue in this contention. *Id.* at 1005, 1007. This basis of the contention fails to raise a genuine dispute because Nevada misreads SAR Section 5.8.1.1, which concerns, and need concern, only those land interests within the GROA.

SAR Section 5.8.1 (“Ownership of Land”) addresses only the requirement provided in 10 C.F.R. § 63.121(a)—that the GROA must be located in and on lands that are either acquired lands under DOE’s jurisdiction and control or lands permanently withdrawn and reserved for its use. *See* SAR at 5.8-1 (table listing information provided in each SAR sub-section, the corresponding regulatory requirements, and noting that SAR Section 5.8.1 (“Ownership of Land”) corresponds to § 63.121(a)).

Nevada claims that SAR Section 5.8.1.1 also should have addressed three areas of land outside of the GROA: (1) an area of land north of right-of-way N-48602; (2) an area of land southwest of right-of-way N-47748; and (3) an area of land north, northeast, and southeast of the Ranch Boundary. Petition at 1005–07. Nevada’s contention, therefore, attempts to have SAR Section 5.8.1.1 include information that is not required by 10 C.F.R. § 63.121(a). This fails to demonstrate a genuine dispute. Therefore, this basis of the contention is inadmissible.

For all the reasons discussed above, this contention must be dismissed in its entirety.



### **193. NEV-SAFETY-193 - Land Withdrawal**

SAR Subsection 5.8.1.1, which identifies DOE's legal interest in land for the geologic repository operations area and the surrounding land within the Yucca Mountain land withdrawal area boundary and the preclosure controlled area boundary, admits that DOE's interests do not authorize the construction and operation of the repository and therefore Yucca Mountain cannot be licensed by the NRC.

#### **RESPONSE**

This contention impermissibly challenges DOE's efforts to permanently withdraw lands to construct and operate the proposed geologic repository at Yucca Mountain, Nevada. It claims that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3), and 63.121 because the Application "admits that DOE's [land] interests do not authorize the construction and operation of the repository and therefore Yucca Mountain cannot be licensed by the NRC." Petition at 1009.<sup>121</sup>

This contention is inadmissible. The regulations that Nevada relies upon do not require that DOE complete land withdrawal activities at this point of the proceeding. In this case, DOE has been pursuing federal legislation.

#### **a. Statement of Issue of Law or Fact to be Controverted**

As discussed below, this contention lacks adequate legal foundation because DOE need not complete land withdrawal activities at this point of the licensing process. Therefore, this contention fails to raise a legitimate issue of law or fact to be controverted in this proceeding.

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121 Nevada raises similar claims in NEV-SAFETY-184; NEV-SAFETY-185; NEV-SAFETY-186; NEV-SAFETY-187; and NEV-SAFETY-188.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the “site” complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121(a)–(c):

(a) Ownership of Land

(1) The [GROA] must be located in and on lands that are either acquired lands under the jurisdiction and control of DOE, or lands permanently withdrawn and reserved for its use.

(2) These lands must be held free and clear of all encumbrances, if significant, such as: (i) Rights arising under the general mining laws; (ii) Easements for right-of-way; and (iii) All other rights arising under lease, rights of entry, deed, patent, mortgage, appropriation, prescription, or otherwise.

(b) Additional Controls for Permanent Closure—Appropriate controls must be established outside of the [GROA]. DOE shall exercise any jurisdiction and control over surface and subsurface estates necessary to prevent adverse human actions that could significantly reduce the geologic repository’s ability to achieve isolation . . . .

(c) Additional Controls Through Permanent Closure—Appropriate controls must be established outside the [GROA]. DOE shall exercise any jurisdiction or control of activities necessary to ensure the requirements at § 63.111(a) and (b) are met. Control includes the authority to exclude members of the public, if necessary.

10 C.F.R. § 63.121(a)–(c). DOE has been pursuing federal legislation to, among other things, permanently withdraw the requisite lands for use by DOE to construct and operate the GROA.<sup>122</sup>

In essence, this contention seeks to impermissibly litigate DOE’s efforts to obtain land withdrawal and clear all other encumbrances from lands that make up the GROA. Specifically, Nevada argues that DOE has violated 10 C.F.R. § 63.31(a) and § 63.121 because Congress has not yet permanently withdrawn and reserved the requisite land for DOE’s use. Petition at 1009. In short, this is not the appropriate time to consider this issue. As discussed under paragraph (f) below, the applicable NRC regulations do not require that DOE complete land withdrawal activities at this point in the licensing process.

Moreover, Licensing Boards should reject, as a matter of policy and practicality, any contention that attempts to litigate an issue that is, or clearly is about to become, the subject of federal legislation. We note that Licensing Boards reject contentions that attempt to litigate an issue that is “primarily the responsibility of other federal or state/local regulatory agencies.” *See PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. Contentions addressing pending or future federal legislation would similarly expand the scope of this proceeding.

Accordingly, the Licensing Board must dismiss this contention as outside the scope of the proceeding.

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122 As the Application explains, in March 2007, DOE submitted to Congress a bill entitled the “Nuclear Fuel Management and Disposal Act.” SAR at 5.8-2. This bill sought to permanently withdraw the requisite lands for use by DOE to construct and operate the GROA. *Id.*

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

Even if this Licensing Board had the authority to address Nevada's contention, it is inadmissible because DOE is not required to complete land withdrawal activities at this early phase of the licensing process.

The guidance set forth in the YMRP confirms that DOE may continue to pursue land withdrawal activities while the NRC Staff reviews the Application:

**Review Method 1—Ownership of Land**

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities underway *will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.*

YMRP, *Controls to Restrict Access and Regulate Land Uses* § 2.5.8.1 (emphasis added). An applicant's compliance with relevant NRC guidance documents demonstrates compliance with the applicable regulations. *See AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-08-23, 68 NRC \_\_ (slip op. at 6) (2008) ("the license renewal applicant's use of an aging management program identified in the GALL Report [that is, a Staff guidance document for nuclear power plant license renewal safety reviews] constitutes reasonable assurance" of compliance with regulatory requirements).

At this stage of the proceeding, therefore, NRC regulations require only that the Application include a "description of the controls that DOE *will* apply to restrict access and to

regulate land use at the Yucca Mountain site,” and that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a), (c)(24) (emphasis added). SAR Section 5.8 provides a sufficient description of these land controls—specifically, this SAR section discusses ownership of land; controls for permanent closure; additional controls through permanent closure; water rights; conceptual design of monuments and markers; and records storage.

In short, there is no dispute that the federal government has not withdrawn the requisite land for DOE use to construct and operate a GROA. DOE has been pursuing legislation for a land withdrawal, and DOE will update its application after the land is withdrawn. The NRC does not require that DOE complete these activities until later stages of the licensing process.

For all the reasons discussed above, this contention must be dismissed in its entirety.

#### **194. NEV-SAFETY-194 - VH-1 Water Rights**

Legal issue: SAR Subsection 5.8.4, which states that well VH-1 provides DOE with a permanent right to 2.3 acre-feet of water annually, fails to properly account for the fact that the water right is not sufficient to accomplish the purpose of the geologic repository operations area.

#### **RESPONSE**

This contention proffers two distinct bases concerning DOE's efforts to obtain water rights to accomplish the purpose of the GROA. First, Nevada argues that DOE has failed to comply with 10 C.F.R. §§ 63.21(c)(24), 63.31(a)(3) and 63.121 because DOE did not obtain the necessary water rights upon application submittal. Petition at 1012–13. And, second, Nevada argues that SAR Section 5.8 “is materially incomplete because it fails to acknowledge that the water from well VH-1 cannot be used for the construction or operation of the Yucca Mountain repository.” *Id.* at 1014.

This contention is inadmissible for three reasons, as further explained below. First, this Licensing Board does not have the legal authority or jurisdiction to adjudicate DOE's efforts to obtain water rights. Second, even if the Board could consider this issue, this contention is inadmissible because the regulations that Nevada relies upon do not require that DOE obtain the necessary water rights at this point of the proceeding. And, third, this contention is inadmissible because the information that Nevada alleges is missing from the Application is, in fact, there.<sup>123</sup>

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<sup>123</sup> It should be noted that Nevada contradicts itself with respect to its claim that the Application is incomplete. For example, on page 1013, Nevada states that “SAR Subsection 5.8.4 at 5.8-8 further states that well VH-1 only provides DOE with a permanent right to 2.3 acre-feet of water annually, and DOE admits that this supply will not provide for the projected water demands to construct and operate the Yucca Mountain repository.” Petition at 1013.

**a. Statement of Issue of Law or Fact to be Controverted**

As explained below, this contention fails to state a legitimate issue of law or fact to be controverted in this proceeding because it raises an issue that is not in the scope of the proceeding. Thus, the Board lacks jurisdiction over the issue raised in this contention.

**b. Brief Explanation of Basis**

As explained below, Nevada has failed to provide an adequate basis in law or fact to support admission of this contention because the issue raised is outside the scope of this proceeding, depriving it of legal foundation, and the Application contains the information Nevada claims is missing, similarly depriving it of an adequate factual basis.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is inadmissible because challenging DOE's efforts to obtain water rights for the GROA does not raise an issue within the scope of the proceeding.

In accordance with 10 C.F.R. § 63.31(a)(3)(ii), the NRC must determine whether the "site" complies with the requirements set forth in 10 C.F.R. Subpart E, specifically, as applicable here, 10 C.F.R. § 63.121. Section 63.121 requires that DOE obtain the water rights needed to accomplish the purpose of the GROA, and to include water rights in the additional controls that DOE must establish to prevent adverse human actions that could significantly reduce the GROA's ability to achieve isolation. 10 C.F.R. § 63.121(b), (d).

To meet these requirements, DOE has been pursuing water permit applications from the State of Nevada. SAR at 5.8-8. DOE filed water appropriation requests with the Office of Nevada State Engineer on July 22, 1997, for permanent rights to 430 acre-ft. of water annually. *Id.* The Nevada State Engineer denied the permit applications. *Id.* The United States has filed an action seeking declaratory and injunctive relief, and that litigation is currently pending before

the U.S. District Court for the District of Nevada. *Id.* (See *United States v. Nevada*, CV-S-00268-RHL-(LRL)).

The NRC's role here is to determine *whether* DOE has obtained sufficient water rights to accomplish the GROA's purpose. But the NRC does not have the authority or jurisdiction to determine *how* DOE obtains these water rights. Indeed, decisions about water rights will be made by a tribunal other than the NRC (that is, a federal district court based upon an appeal from the Nevada State Engineer). Therefore, this is not the proper forum to challenge DOE's efforts to obtain these rights.

The Commission previously acknowledged its lack of authority to address similar claims in the Statements of Consideration for Part 63:

**Comment**—Commenters were concerned about whether DOE must conform to State water law to obtain water rights (one commenter indicated DOE is required, under State water law, to show beneficial use in order to obtain water). A commenter viewed § 63.121 as giving DOE the right to take water rights in order to achieve waste isolation and stated that the rule must acknowledge the responsibilities of the Federal Government for compensation when initiating takings.

**Response**—Section 63.121(c)(1) requires DOE to obtain such water rights as may be needed to accomplish the purpose of the GROA. . . . *Whether DOE is subject to State law in obtaining any water rights that may be needed for this purpose is a matter to be determined by DOE and the State. The NRC does not have the authority to require that DOE conform to State law.*

Final Rule—Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55,766 (Nov. 2, 2001) (emphasis added).

Accordingly, the NRC does not have the authority to address Nevada's claim.

Finally, as a matter of policy, Licensing Boards should reject contentions that attempt to litigate an issue that is “primarily the responsibility of other federal or state/local regulatory agencies.” *See PPL Susquehanna LLC* (Susquehanna Steam Electric Station, Units 1 and 2), LBP-07-10, 66 NRC 1, 27 (2007). Such contentions expand the scope of the proceeding and significantly divert limited NRC resources. As set forth above, the decision about DOE’s water permit requests will be determined by a federal court, based on an appeal from a state regulatory agency.

Accordingly, the Licensing Board should reject this contention as outside the scope of the proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, this section of the contention identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that “[t]his contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.” 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by Nevada that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding . . . ,” not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a “citation to a statute or regulation that, explicitly or implicitly, has not been satisfied” because specific citations are “preferable” to general citations (June 20, 2008 CMO, at 7), this direction cannot be

read to dispense with the well-recognized requirement that resolving the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on “format” and “procedural matters.” CMO at 3.

However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to create a genuine dispute on a material issue of law or fact.

**(1) DOE Does Not Need to Obtain Water Rights at This Stage of the Proceeding**

Even if the Licensing Board had the legal authority to address Nevada’s water rights claim, this basis of the contention is inadmissible because DOE is not required to complete these activities at this early phase of the licensing process.

10 C.F.R. § 63.121 set forth certain requirements that DOE must establish with respect to land and water rights. The guidance set forth in the YMRP confirms that DOE may continue to pursue these activities while the NRC Staff reviews the Application:

Verify that steps within the U.S. Department of Energy purview to establish effective jurisdiction and control and legislative or other transfer activities will be completed before the completion of the U.S. Nuclear Regulatory Commission review and decision on the license application.

YMRP, *Controls to Restrict Access and Regulate Land Uses*, § 2.5.8 at 2.5 - 96. This guidance is set forth under Review Method 1, which addresses ownership of land on which the GROA will be located. It is only logical that this guidance also provides DOE with time to obtain control of water rights.

At this early stage of the proceeding, therefore, NRC regulations require only that the Application include a “description of the controls that DOE will apply to restrict access and to regulate land use at the Yucca Mountain site and adjacent areas. . . .” 10 C.F.R. § 63.21(c)(24). SAR § 5.8 provides a sufficient description of these issues, including a description of water rights at SAR Section 5.8.4.

In short, there is no dispute that DOE has not obtained the requisite water for the GROA. DOE has been pursuing water permit applications, and DOE will update its application after the water is obtained. The NRC does not require that DOE complete these activities until later stages of the licensing process. Accordingly, this basis of the contention fails to create a genuine dispute on a material issue of law or fact.

**(2) The Application Sufficiently Describes DOE’s Current Water Rights**

Nevada also incorrectly argues that the SAR is “materially incomplete because it fails to acknowledge that the water from well VH-1 cannot be used for the construction and operation of the Yucca Mountain repository.”<sup>124</sup> Nevada Petition at 1014. This allegation is mistaken because SAR Section 5.8.4 explicitly acknowledges the “missing” information. This section provides in relevant part:

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<sup>124</sup> The contention incorrectly refers to SAR Subsection 5.8.1.1, which addresses current DOE land-use interests—not water rights. SAR Subsection 5.8.4 addresses water rights.

The DOE received water appropriation permits from the State of Nevada to support the repository site characterization phase. The permits were issued for wells J-12, J-13, VH-1, and the C-Wells complex. These permits, with the exception of VH-1, expired on April 9, 2002. The DOE has filed proof of beneficial use to establish a permanent right to 2.3 acre-ft of water annually from well VH-1. *This supply from VH-1 will not provide for the projected water demands to construct and operate the repository.*

SAR at 5.8-8 (emphasis added) (citations omitted).

Put simply, this basis of the contention fails to demonstrate a genuine dispute because the Application acknowledges that the supply from this well will not provide for the projected water demands for repository construction and operation. As such, the Licensing Board must dismiss this contention to the extent it argues that the Application's description is "materially incomplete."

For all the reasons discussed above, this contention must be dismissed in its entirety.

**195. NEV-SAFETY-195 - 9/11 Terrorist Attack**

DOE's security measures for physical protection of HLW, as described in section 3 of the General Information portion of the LA at 3-1 to 3-9, are inadequate to protect public health and safety because DOE fails to provide any evidence that there will be any protective or mitigation measures to respond adequately to a terrorist attack using aircraft, including an attack using large aircraft as occurred on 9-11.

**RESPONSE**

This contention raises an issue that is outside the scope of this proceeding because it requests a change to NRC's design basis threat (DBT) rule in 10 C.F.R. Part 73 to require DOE to protect against a terrorist attack using aircraft. Furthermore, it fails to satisfy the standards in Section 2.335 and should not, therefore, be granted a waiver or exception from Part 73.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

As explained below, the purported legal basis for this contention is fundamentally flawed because it seeks to challenge existing NRC regulations in 10 C.F.R. Part 73.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding. The contention challenges NRC regulations, 10 C.F.R. §§ 73.1 and 73.51, by stating that DOE's application fails to provide a description of physical protective measures that are designed for a terrorist attack using an aircraft. This, Nevada cannot do. 10 C.F.R. § 2.335(a) and (b) ("no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding"). Nevada implies that the

Commission, in CLI-08-20, authorized Nevada to raise this issue without running afoul of Section 2.335(a). Petition at 1016. But the Commission’s ruling in CLI-08-20 did not speak to the admissibility of any of Nevada’s arguments in that petition. Rather, the Commission dismissed Nevada’s petition without prejudice to Nevada’s right to pursue its claims as “*proposed* adjudicatory ‘contentions,’ when and if the application is docketed and a Notice of Hearing issues.” *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters), CLI-08-20, 67 NRC \_\_ (slip op. at 5) (August 22, 2008) (emphasis added). In other words, the Commission merely spoke to when, as a procedural matter, it was appropriate for Nevada to raise certain issues and did not rule on whether these issues fell within the scope of this proceeding. *See id.* at 4.

Nevada acknowledges that it is challenging NRC regulations and, in the alternative to having the contention admitted, requests that the Board certify this issue to the Commission for a waiver or exception to the DBT rule, pursuant to 10 C.F.R. § 2.335(d).<sup>125</sup> (Petition at 1017.) Specifically, Nevada seeks a waiver of or exception to the application of the Commission’s DBT rule, codified at 10 C.F.R. § 73.1, which does not include terrorist attacks using large aircraft. *See* Final Rule, Design Basis Threat, 72 Fed. Reg. 12,705, 12,710-11, 12,725 (March 19, 2007). Nevada does not cite 10 C.F.R. § 73.1, but it refers to the DBT which is located in that section.

Nevada’s request does not meet the requirements for waiver or exception under Section 2.335(b) and must be denied. Section 2.335(b) provides that the “sole ground for petition of waiver or exception is that special circumstances with respect to the subject matter of the particular proceeding are such that the application of the rule or regulation (or a provision of it) would not serve the purposes for which the rule or regulation was adopted.” The presiding

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<sup>125</sup> Although Nevada cites to § 2.335(d) as a basis for its request for certification of the waiver issue, the standard for determining whether a *prima facie* showing has been made is in § 2.335(b). *See* 10 C.F.R. § 2.335(b).

officer's role is to determine whether the petitioner has made a *prima facie* showing that application of the rule would not serve the purposes underlying the rule. *See* 10 C.F.R. §§ 2.335(c) and (d). A petitioner seeking waiver or exception (1) must present special circumstances by pleading one or more facts, "not common to a large class of applicants or facilities, that were not considered either explicitly or by necessary implication in the rulemaking proceeding leading to the rule sought to be waived" and (2) must show those special circumstances undermine the purpose of the rule the petitioner seeks to have waived. *See Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3), LBP-07-858, 67 NRC \_\_ (slip op. at 3) (July 31, 2008) (citing *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-88-10, 28 NRC 573, 597 (1988)).

Nevada does not present the required *prima facie* showing because application of the DBT rule in this proceeding will not undermine its purpose. Nevada takes out of context certain portions of the Commission's Statement of Considerations in the final DBT rule to conclude that the rule's purpose is to "recogniz[e] the limits of the private sector in protecting against terrorism." Petition at 1018. Nevada argues that this licensing action under Part 63 presents "special circumstances" because DOE is not a private entity and application of the DBT rule to this LA would undermine its purpose. *See id.*

Nevada's contorted reading of the SOCs for the DBT rule is incorrect. Although the Commission considered the "adversary characteristics which a private sector security force can reasonably be expected to defend" in determining the DBTs, 72 Fed. Reg. at 12,713, this is not the purpose of the DBT rule. The purpose of the DBT rule is to provide NRC licensees with a basis to form "site-specific defensive strategies implemented through physical security plans, safeguards contingency plans, and security personnel training and qualification plans," in order

to “ensure that the public health and safety and common defense and security are adequately protected.” 72 Fed. Reg. at 12,705; *see* 10 C.F.R. § 73.1(a). Applying the DBT rule in this proceeding will not undermine this purpose. In fact, not applying this rule will undermine its purpose by taking away a basis for forming physical security measures. Consequently, Nevada has not made the requisite *prima facie* showing and Nevada’s petition for waiver should be denied.

Perhaps most to the point, the Commission is in the process of changing its regulations with respect to security requirements for a GROA and has explicitly requested comments on whether a specific physical protection protocol for a GROA is needed or if the existing DBT should be applied. *See* Geologic Repository Operations Area Security and Material Control and Accounting Requirements, Proposed Rule, 72 Fed. Reg. 72,522, 72,526 (December 20, 2007). A longstanding agency policy states that “Licensing Boards ‘should not accept in individual license proceedings contentions which are (or are about to become) the subject of general rulemaking by the Commission.’” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 345 (citations omitted); *see Texas Util. Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), LBP-81-51, 14 NRC 896, 898 (1981). The more appropriate forum in which to raise the issue contained in this contention is the associated rulemaking proceeding. *See Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 345 (1999); *cf. Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 21 n.33 (1974) (a contention stating the petitioner’s views about what the regulatory policy should be indicates that the petitioner should choose a role other than a party to an adjudicatory proceeding). Therefore, this contention is not a litigable issue and is outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise a material issue, and must be dismissed. A petitioner must demonstrate that an issue it seeks to raise is material to the findings that the Commission must make in its review of DOE's LA. As discussed above, a challenge to NRC regulations on the DBT is not material to the findings the NRC must make with respect to *this proceeding*.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

To show that there is a genuine dispute with DOE on a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi), Petitioner "must include references to specific portions of the application . . . that the petitioner disputes . . . or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure . . ." As explained above, the issue that Petitioner disputes is whether currently established NRC regulations are adequate. There is no dispute that DOE's application meets the physical security regulations currently in force. Additionally, Nevada has failed to establish a *prima facie* showing warranting certification of its petition for waiver or exception to the Commission. Consequently, this contention does not give rise to a genuine dispute because it is an impermissible challenge to NRC regulations. Therefore, the contention must be dismissed in its entirety.

**196. NEV-SAFETY-196 - Description Of Security Measures**

The application does not describe the detailed security measures required for physical protection as required by the regulations.

**RESPONSE**

This contention argues, incorrectly, that the Application’s GI Section 3 fails to provide a “description of the detailed security measures for physical protection,” contrary to 10 C.F.R. § 63.21(b)(3). Petition at 1021. According to Nevada, the Application states only that DOE will submit a full Physical Protection Plan to the NRC after it grants construction authorization and that the Application merely “track[s] each acceptance criterion of NUREG-1804 § 1.3 and its Subparts, and announce[s] that these criteria will be met by whatever will be provided.” *Id.* Because Petitioner has mischaracterized both the governing regulatory requirements and the content of the Application, the purported bases for the contention are deficient and there is no genuine issue for the Licensing Board to resolve here.

**a. Statement of Issue of Law or Fact to be Controverted**

Contrary to the contention’s stated premise, the Application adequately *describes*, in sufficient detail, the security measures for physical protection of HLW, and does not simply pair a commitment with a cursory tracking of relevant acceptance criteria.

**b. Brief Explanation of Basis**

In its stated basis for the contention, Nevada claims that “[i]nstead of describing the detailed security measures, the application merely declares that there will be a physical protection plan” after the NRC issues a construction authorization. Petition at 1020. The contention then cites numerous subsections in GI Section 3. As discussed above, the cited bases for the contention are not adequate to support its admission, as the actual content meets the

requirements of 10 C.F.R. § 63.21(b)(3) that an applicant provide a “description” of its intended Physical Protection Plan.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because: (1) the contention does not reference any documents, other than the license application and YMRP; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. This approach falls short of the requirement to provide conclusions supported by reasoned bases or explanation.

For the reasons set forth in the following section, Nevada has not provided adequate support for its contention or erroneous interpretation of 10 C.F.R. § 63.21(b)(3). Accordingly, the Licensing Board must dismiss this contention.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

10 C.F.R. Part 63 requires only that DOE provide a “description” of the Physical Protection Plan with its initial Application. 10 C.F.R. § 63.21(b)(3). The regulation by no means requires that DOE include the actual plan in the Application.

A Physical Protection Plan need only be submitted after issuance of the Construction Authorization. *See, e.g.*, Final Report, Yucca Mountain Review Plan, NUREG-1804, Rev. 2, 68 Fed. Reg. 45,086, 45,090 (July 31, 2003) (YMRP) (“After the issuance of a construction authorization, the applicant [DOE] would submit a baseline physical protection plan for technical review to enable the NRC staff to determine whether the requirements of 10 C.F.R. § 73.51 are met.”) A Physical Protection Plan is needed to safeguard SNF and HLW, which DOE will not be authorized to receive until the NRC grants DOE a license to receive that radioactive material. That is why a “description” of the Plan is appropriate at this stage of the licensing proceeding. The NRC addressed this point in the Statements of Consideration for Part 63:

[P]art 63 provides for a multi-staged licensing process that affords the Commission the flexibility to make decisions in a logical time sequence that accounts for DOE collecting and analyzing additional information over the construction and operational phases of the repository. The multi-staged approach comprises four major decisions by the Commission: (1) Construction authorization; (2) license to receive and emplace waste; (3) license amendment for permanent closure; and (4) termination of license. The time required to complete the stages of this process . . . is extensive and will allow for generation of additional information. Clearly, the knowledge available at the time of construction authorization will be less than at the subsequent stages.

Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 66 Fed. Reg. 55,732, 55,738 (November 2, 2001). The NRC made a point directly applicable to this contention in the recent Statements of Consideration accompanying the

Commission’s proposed rule regarding GROA security. There, the Commission noted that DOE should submit its Physical Protection Plan after construction authorization so that it “can take advantage of any new technology and concepts that may not be available at the time the construction application is submitted.” Geologic Repository Operations Area Security and Material Control and Accounting Requirements, 72 Fed. Reg. 72,522, 72,524 (December 20, 2007).

Accordingly, the only issue for consideration in this proceeding is whether the Application’s “description” is reasonably sufficient—particularly in light of the fact that Section 63.21(a) expressly states that the Application “must be as complete as *possible in the light of the information that is reasonably available at the time of docketing.*” 10 C.F.R. § 63.21(a) (emphasis added).

The description of the Physical Protection Plan provided by DOE in the Application is reasonably sufficient. Nevada erroneously asserts that the Application merely tracks each acceptance criterion in Section 1.3 of the YMRP. While it is true that the Application appropriately addresses the relevant YMRP acceptance criteria and contains certain commitments consistent therewith, GI Section 3 goes beyond simply tracking the acceptance criteria’s language. For example:

- The Application includes a *description* of DOE’s general performance objectives and its protection goal to protect against a loss of control that could cause radiation exposures exceeding dose requirements. GI at 3-4.
- The Application includes a *description* of various aspects of the project’s security organization. The Application notes that the security force will be subject to a fitness-for-duty program and that the organization will be in place before receiving waste. The

security force will operate under DOE authority to carry firearms and make limited arrests consistent with the regulations set forth in 10 C.F.R. Parts 1046 and 1047.

Security force suitability and qualifications include physical suitability and requirements for education, reasoning skills, and knowledge of and ability to perform security-related tasks. The Application also discusses the training program for the security force; it will involve classroom and exercise modules, including firearm training and qualification.

Refresher training courses will be conducted annually. Training for those providing offsite assistance will be accomplished by preparing for and participating in coordinated exercises. GI at 3-4 to -5.

- The Application includes a *description* of the DOE's physical barrier and access control subsystems. The Application discusses that access to nuclear material will require passage through or penetration of two physical barriers, one barrier at the perimeter of the protected area and one barrier offering substantial penetration resistance consistent with 10 C.F.R. § 73.51. The Application states that records of access control will be retained for 3 years after the record is generated or until the NRC terminates the license. GI at 3-5 to -6.
- The Application includes a *description* of DOE's active intrusion detection system at the protected area perimeter. The isolation zone will be monitored to detect the presence of individuals or vehicles within the zone. The intrusion detectors and associated alarm systems will be installed to cover the entire perimeter of the protected area barrier. Sensors will be positioned to overlap so that there are no gaps in the coverage of the perimeter of the protected area. The protected area's perimeter will be under continuous surveillance by video systems or by members of the security force. The protected area

perimeter will be divided into multiple segments that are independently alarmed. The primary alarm station will have bullet-resisting walls, doors, ceilings, and floors and the interior will not be visible from outside the protected area. GI 3-6 to -7.

- The Application includes a *description* of the communication subsystem and equipment operability and compensatory measures. After installation, security equipment will be initially and periodically tested to demonstrate its ability to meet the manufacturer's operating specifications and the physical protection needs. Furthermore, to verify the integrity of physical barriers, the protected area, including movable openings such as gates, will be patrolled at random intervals by members of the security force. GI at 3-7 to -8.
- And the Application includes a *description* of what the Safeguards Contingency Plan will include and how DOE will report safeguards events to the NRC. GI at 3-8 to -9.

Based on these examples—and more importantly on the information in the Application—it is clear that Nevada has mischaracterized the content of the Application. It goes beyond merely restating the YMRP acceptance criteria as Nevada contends.

Finally, Nevada has failed to explain how purportedly “missing” information violates the regulations or precludes the NRC from making the requisite findings for granting construction authorization. As explained above, NRC regulations require only that the Application “be as complete as possible in light of information that is reasonably available at the time of docketing.” 10 C.F.R. § 63.21(a). Nevada asserts that some undefined security-related design information was reasonably available to DOE at the time it submitted the Application, Petition at 1023-4, yet nowhere provides a single example of such information. This lack of specificity runs afoul of

NRC pleading requirements, and further demonstrates that Nevada has failed to shoulder its burden as a petitioner.

Accordingly, this contention is inadmissible and must be dismissed.

**197. NEV-SAFETY-197 - Physical Protection Standard**

DOE purports to adopt security measures for physical protection in accordance with standards that date largely from 1998 but, because the Commission has recently determined that those standards are inadequate in light of the terrorist attacks of September 11, 2001, DOE's plans are not adequate to protect the public and safety or the common defense and security. This contention petitions for a rule challenge pursuant to 10 C.F.R. § 2.335.

**RESPONSE**

This contention asserts that the NRC regulations regarding physical security measures are inadequate to protect the public health and safety or common defense and security in light of the terrorist attacks of September 11, 2001. Based upon this assertion, Nevada concludes that the security measures described in DOE's application are inadequate because they comply with current NRC regulations, and if determined to be a challenge to the current regulations, "petitions for a rule challenge pursuant to 10 C.F.R. § 2.335." Petition at 1025. As explained below, the contention itself falls far afield of the scope of the proceeding as, on its face, it challenges an NRC rule. Moreover, Petitioner has failed to satisfy the standards governing regulatory waivers as set forth in Section 2.335. Therefore, the contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

As Nevada seeks to challenge an existing NRC regulation, it must seek a waiver pursuant to 10 C.F.R. § 2.335, as it has done. Because Petitioner has failed to meet the governing waiver standards, however, it has failed to state an issue of law within the jurisdiction of this Board. As a result, the Board cannot grant it the relief it seeks through this contention and it should be dismissed.

**b. Brief Explanation of Basis**

As explained below, the purported legal basis for this contention is fundamentally flawed because it seeks to challenge existing NRC regulations in 10 C.F.R. Part 73, by relying on the statements of considerations on the proposed rule for Geologic Repository Operations Area Security and Material Control and Accounting Requirements, at 72 Fed. Reg. 72,522 (December 20, 2007).<sup>126</sup> Moreover, Petitioner has failed to justify issuance of the requested waiver pursuant to Section 2.335, thereby depriving it of a legal basis upon which to proceed.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is outside the scope of this proceeding. Specifically, the contention improperly challenges NRC regulations, 10 C.F.R. §§ 73.2, 73.51, and 10 C.F.R. Part 73, Appendices B, C, and G, by stating that DOE's application fails to provide a description of physical security measures that are adequate in light of the terrorist attacks of September 11, 2001. 10 C.F.R. § 2.335(a) and (b) ("no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding").

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In apparent recognition of the fact that the contention is outside the scope of this proceeding, Nevada explicitly "petitions for a rule challenge pursuant to 10 C.F.R. § 2.335." *See* Petition at 1025. Nevada's purported justification, set forth in paragraph 4 of the contention and in paragraphs 5 through 7 of the Fitzpatrick Affidavit, however, fails to satisfy the requirements for issuance of a waiver or exception as explained below.<sup>127</sup>

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<sup>126</sup> This proposed rule has not been finalized. DOE commented on the proposed rule.

<sup>127</sup> Nevada also vaguely refers to a "previously filed affidavit" to support its request for waiver. Petition at 1027. As discussed further below, Nevada does not specifically identify what affidavit it is referring to, nor has it met the stricter requirement of identifying specific portions of the affidavit it relies on. *See Pub. Serv. Co. of N.H.*

As a threshold matter, Section 2.335(b) provides that the “sole ground for petition of waiver or exception is that special circumstances with respect to the subject matter of the particular proceeding are such that the application of the rule or regulation (or a provision of it) would not serve the purposes for which the rule or regulation was adopted.” The presiding officer’s role is to determine whether the petitioner has made a *prima facie* showing that application of the rule would not serve the purposes underlying the rule. *See* 10 C.F.R. §§ 2.335(c) and (d). A petitioner seeking waiver or exception: (1) must present special circumstances by pleading one or more facts, “not common to a large class of applicants or facilities, that were not considered either explicitly or by necessary implication in the rulemaking proceeding leading to the rule sought to be waived;” and (2) must show those special circumstances undermine the purpose of the rule the petitioner seeks to have waived. *See Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3), LBP 07 858, 68 NRC \_\_ (slip op. at 3) (July 31, 2008) (citing *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-88-10, 28 NRC 573, 597 (1988)).

Nevada cites to the affidavit of Charles J. Fitzpatrick, one of Nevada's attorneys, to identify the purported special circumstances that it asserts undermines the purpose of the physical protection rules. Petition at 1026. Specifically, Nevada relies on paragraphs 5 through 7 of the Fitzpatrick Affidavit. *Id.* Paragraph 5 of the affidavit merely lists the sections of the LA, in which DOE states its intention to conform to existing security regulations, and identifies 10 C.F.R. §§ 73.2, 73.51, and 10 C.F.R. Part 73, Appendices B, C, and G, as the relevant regulations. Fitzpatrick Affidavit at ¶ 5. Paragraph 6 relies on the proposed rule for Geologic Repository Operations Area Security and Material Control and Accounting Requirements for the

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(Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Consequently, this “previously filed affidavit” does not support the requirements for waiver or exception from the NRC rules.

position that the Commission has found the existing regulations inadequate. *Id.* at ¶ 6. In paragraph 7, Fitzpatrick then draws on these generic pieces of information to conclude that the Commission's statement that these regulations are inadequate constitutes a special circumstance that makes application of Sections 73.2, 73.51, and 10 C.F.R. Part 73, Appendices B, C, and G, undermine the purpose of these regulations. *See id.* at ¶ 7.

Standing alone, the Commission's statement that the current security requirements are not adequate in light of the post-September 11, 2001 threat environment does not constitute a special circumstance in and of itself. As acknowledged in the Fitzpatrick Affidavit, the Commission made this statement when explaining its reasons for revising regulations addressing security requirements for a GROA. *See* Geologic Repository Operations Area Security and Material Control and Accounting Requirements, Proposed Rule, 72 Fed. Reg. 72,522 (December 20, 2007). Rather than constituting special circumstances, the fact that there is an ongoing rulemaking proceeding demonstrates that this is an impermissible contention. It is longstanding agency policy that, "Licensing Boards 'should not accept in individual license proceedings contentions which are (or are about to become) the subject of general rulemaking by the Commission.'" *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 345 (1999) (citations omitted); *see Texas Util. Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), LBP-81-51, 14 NRC 896, 898 (1981). The more appropriate forum for Nevada's concerns about the Commission's physical security regulations is the ongoing rulemaking proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 345; *cf. Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 21 n.33 (1974) (a contention stating the petitioner's views about what the regulatory policy should be indicates that the petitioner should choose a role other than a party to an adjudicatory

proceeding). Consequently, this issue is not a litigable issue and is outside the scope of this proceeding.

Moreover, even if it could be said that the Commission's pending rulemaking proceeding constituted "special circumstances," Nevada has not shown that application of the current security requirements would undermine the purpose of the regulations. The purpose of 10 C.F.R. Part 73 is to "prescribe[] requirements for the establishment and maintenance of a physical protection system which will have capabilities for the protection of special nuclear material at fixed sites and in transit and of plants." 10 C.F.R. § 73.1(a). Notwithstanding the Commission's reason for revising the security regulations, application of the current security regulations will not undermine their purpose. In fact, the waiver or exception that Nevada seeks is not even specified. Nowhere does Nevada explain what requirements it believes should be put in place of the existing rules. Nevada's request, if granted, would leave no requirements for establishing and maintaining a physical protection system in place. Consequently, the grant of the requested exception, not the application of the regulations, would undermine the purpose of these requirements. Therefore, Nevada has failed to make the *prima facie* showing required and Nevada's petition for waiver or exception should be denied.

For all of these reasons, this contention fails to raise a material issue or justify issuance of a waiver, contrary to 10 C.F.R. §§ 2.309(f)(1)(iv) or 2.335, and therefore must be dismissed. A petitioner must demonstrate that an issue it seeks to raise is material to the findings that the Commission must make in its review of DOE's LA. As discussed above, a challenge to NRC regulations is not material to the findings the NRC must make with respect to *this proceeding*.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

As discussed above, the supporting Fitzpatrick Affidavit does not provide the requisite support for this contention, or issuance of the requested waiver under Section 2.335. Furthermore, the contention suggests that a “previously filed [] affidavit, pursuant to 10 C.F.R. § 2.335(b), [] identifies the specific aspects of the subject matter of the proceeding as to which the application of the rule or regulation (or provision of it) would not serve the purposes for which the rule or regulation was adopted,” but does not in any way elaborate on this alleged deficiency. Petition at 1027. Nevada is required to identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). This vague reference to a “previously filed affidavit” does not meet this requirement. Moreover, the Commission has previously cautioned against such generalized claims followed by citations of earlier briefs: “The Commission should not be expected to sift unaided through large swaths of earlier briefs . . . in order to piece together and discern the intervenors’ particular concerns or the grounds for their claims.” *Hydro Res., Inc.* (P.O. Box 15910 Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 46 (2001). Therefore, Nevada has failed to provide the requisite support for this contention, or issuance of the requested waiver or exception under Section 2.335.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

To show that there is a genuine dispute with DOE on a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi), Petitioner “must include references to specific portions of the application . . . that the petitioner disputes . . . or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification

of each failure . . .” As explained above, the heart of the issue that Petitioner disputes does not reside in the application, but rather in NRC regulations—and it questions their adequacy. There is no dispute raised by this contention that questions how DOE’s application satisfies currently-effective NRC physical security regulations. In recognition of this deficiency, Nevada has requested a waiver under Section 2.335, but has failed to establish a *prima facie* showing warranting certification of its petition for waiver or exception to the Commission. Consequently, this contention does not give rise to a genuine dispute and must be dismissed in its entirety.

**198. NEV-SAFETY-198 - Material Control And Accounting Plan**

DOE purports to adopt a material control and accounting program in accordance with standards that date largely from 1998 but, because the Commission has recently determined that those standards are inadequate in light of the terrorist attacks of September 11, 2001, DOE's plans are not adequate to protect the public and safety or the common defense and security. This contention petitions for a rule challenge pursuant to 10 C.F.R. § 2.335.

**RESPONSE**

This contention asserts that the NRC regulations regarding material control and accounting measures are inadequate to protect the public health and safety or common defense and security in light of the terrorist attacks of September 11, 2001. Based upon this assertion, Nevada concludes that the material control and accounting measures described in DOE's application are inadequate because they comply with current NRC regulations, and if determined to be a challenge to the current regulations, "petitions for a rule challenge pursuant to 10 C.F.R. § 2.335." Petition at 1028. As explained below, the contention itself falls outside the scope of this proceeding as, on its face, it challenges an NRC rule. Moreover, Petitioner has failed to satisfy the standards governing regulatory waivers as set forth in Section 2.335. Therefore, this contention is inadmissible.

**a. Statement of Issue of Law or Fact to be Controverted**

As Nevada seeks to challenge an existing NRC regulation, it must seek a waiver pursuant to 10 C.F.R. § 2.335, as it has done. Because Petitioner has failed to meet the governing waiver standards, however, it has failed to state an issue of law within the jurisdiction of this Board. As a result, the Board cannot grant it the relief it seeks through this contention and it should be dismissed.

**b. Brief Explanation of Basis**

As explained below, the purported legal basis for this contention is fundamentally flawed because it seeks to challenge existing NRC regulations in 10 C.F.R. Parts 72 and 74 by relying on the statements of considerations on the proposed rule for Geologic Repository Operations Area Security and Material Control and Accounting Requirements, at 72 Fed. Reg. 72,522 (December 20, 2007).<sup>128</sup> Moreover, Petitioner has failed to justify issuance of the requested waiver pursuant to 10 C.F.R. § 2.335, thereby depriving it of a legal basis upon which to proceed.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is clearly outside the scope of the licensing action, contrary to 10 C.F.R. § 2.309(f)(1)(iii). Specifically, the contention improperly challenges NRC regulations, 10 C.F.R. §§ 72.72, 72.74, 72.76, 72.78, and 74.4, by stating that DOE's application fails to provide a material control and accounting program that is adequate in light of the terrorist attacks of September 11, 2001. 10 C.F.R. § 2.335(a) and (b) ("no rule or regulation of the Commission ... is subject to attack ... in any adjudicatory proceeding").

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In apparent recognition of the fact that the contention is outside the scope of this proceeding, Nevada explicitly "petitions for a rule challenge pursuant to 10 C.F.R. § 2.335." Petition at 1028. Nevada's purported justification, set forth in paragraphs 8 through 10 of the

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<sup>128</sup> This proposed rule has not been finalized. DOE commented on the proposed rule.

Fitzpatrick Affidavit, however, fails to satisfy the requirements for issuance of a waiver or exception as explained below.<sup>129</sup>

As a threshold matter, 10 C.F.R. § 2.335(b) provides that the “sole ground for petition of waiver or exception is that special circumstances with respect to the subject matter of the particular proceeding are such that the application of the rule or regulation (or a provision of it) would not serve the purposes for which the rule or regulation was adopted.” The presiding officer’s role is to determine whether the petitioner has made a *prima facie* showing that application of the rule would not serve the purposes underlying the rule. *See* 10 C.F.R. §§ 2.335(c) and (d). A petitioner seeking waiver or exception (1) must present special circumstances by pleading one or more facts, “not common to a large class of applicants or facilities, that were not considered either explicitly or by necessary implication in the rulemaking proceeding leading to the rule sought to be waived;” and (2) must show those special circumstances undermine the purpose of the rule the petitioner seeks to have waived. *See Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3), LBP 07-858, 68 NRC \_\_ (slip op. at 3) (July 31, 2008) (citing *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-88-10, 28 NRC 573, 597 (1988)).

Nevada cites to the affidavit of Charles J. Fitzpatrick, one of Nevada's attorneys, to identify the purported special circumstances that, it asserts, undermines the purpose of the material control and accounting rules. Petition at 1029. Specifically, Nevada relies on paragraphs 8 through 10 of the Fitzpatrick Affidavit. *Id.* Paragraph 8 of the affidavit merely

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129 Nevada also vaguely refers to a “previously filed affidavit” to support its request for waiver. Petition at 1030. As discussed further below, Nevada does not specifically identify what affidavit it is referring to, nor has it met the stricter requirement of identifying specific portions of the affidavit it relies on. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). Consequently, this “previously filed affidavit” does not support the requirements for waiver or exception from the NRC rules.

lists the sections of the LA, in which DOE states its intention to conform to existing material control and accounting regulations, and identifies 10 C.F.R. §§ 72.72, 72.74, 72.76, 72.78, and 74.4, as the relevant regulations. Fitzpatrick Affidavit at ¶ 8. Paragraph 9 relies on the proposed rule for Geologic Repository Operations Area Security and Material Control and Accounting Requirements for the positions that the Commission has found the existing regulations inadequate. *id.* at ¶ 9. In paragraph 10, Fitzpatrick then draws on these generic pieces of information to conclude that the Commission's statement that these regulations are inadequate constitutes a special circumstance that makes application of Sections 72.72, 72.74, 72.76, 72.78, and 74.4, undermine the purpose of these regulations. *See id.* at ¶ 10.

Standing alone, the Commission's statement that the current material control and accounting requirements are not adequate in light of the post-September 11, 2001 threat environment does not constitute a special circumstance in and of itself. As acknowledged in the Fitzpatrick Affidavit, the Commission made this statement when explaining its reasons for revising regulations addressing material control and accounting requirements for a GROA. *See* Geologic Repository Operations Area Security and Material Control and Accounting Requirements, Proposed Rule, 72 Fed. Reg. 72,522 (December 20, 2007). Rather than constituting special circumstances, the fact that there is an on-going rulemaking proceeding demonstrates that this is an impermissible contention. It is longstanding agency policy that, "Licensing Boards 'should not accept in individual license proceedings contentions which are (or are about to become) the subject of general rulemaking by the Commission.'" *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 345 (1999) (citations omitted); *see Texas Util. Generating Co.* (Comanche Peak Steam Electric Station, Units 1 and 2), LBP-81-51, 14 NRC 896, 898 (1981). Perhaps the more appropriate forum for

Nevada's concerns about the Commission's material control and accounting regulations is the on-going rulemaking proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 345; *cf. Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 21 n.33 (1974) (a contention stating the petitioner's views about what the regulatory policy should be indicates that the petitioner should choose a role other than a party to an adjudicatory proceeding). Consequently, this issue is not a litigable issue and is outside the scope of this proceeding.

Moreover, even if it could be said that the Commission's pending rulemaking proceeding constituted "special circumstances," Nevada has not shown that application of the current material control and accounting requirements would undermine the purpose of the regulations. The purpose of 10 C.F.R. Part 72, in part, is to "establish requirements, procedures, and criteria for the issuance of licenses to the Department of Energy (DOE) to receive, transfer, package, and possess power reactor spent fuel, high-level radioactive waste, power reactor-related GTCC waste, and other radioactive materials associated with the storage of these materials in a monitored retrievable storage installation (MRS)." 10 C.F.R. § 72.1. The purpose of 10 C.F.R. Part 74 is to "contain the requirements for the control and accounting of special nuclear material at fixed sites and for documenting the transfer of special nuclear material." 10 C.F.R. § 74.1(a). Notwithstanding the Commission's reason for revising these regulations, application of the current material control and accounting regulations will not undermine their purpose. In fact, the waiver or exception that Nevada seeks is not even specified. Nowhere does Nevada explain what requirements it believes should be put in place of the existing rules. Nevada's request, if granted, would leave no requirements for DOE's material control and accounting measures in place. Consequently, the grant of the requested exception, not the application of the regulations,

would undermine the purpose of these requirements. Therefore, Nevada has failed to make the *prima facie* showing required and Nevada's petition for waiver or exception should be denied.

For all of these reasons, this contention fails to raise a material issue or justify issuance of a waiver or exception, contrary to 10 C.F.R. §§ 2.309(f)(1)(iv) or 2.335, and therefore must be dismissed. A petitioner must demonstrate that an issue it seeks to raise is material to the findings that the Commission must make in its review of DOE's LA. As discussed above, a challenge to NRC regulations is not material to the findings the NRC must make with respect to *this proceeding*.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

As discussed above, the supporting Fitzpatrick Affidavit does not provide the requisite support for this contention, or issuance of the requested waiver or exception under Section 2.335. Furthermore, the contention suggests that a "previously filed [] affidavit, pursuant to 10 C.F.R. § 2.335(b), [] identifies the specific aspects of the subject matter of the proceeding as to which the application of the rule or regulation (or provision of it) would not serve the purposes for which the rule or regulation was adopted," but does not in any way elaborate on this alleged deficiency. Petition at 1030. Nevada is required to identify specific portions of the documents on which it relies. *See Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989). This vague reference to a "previously filed affidavit" does not meet this requirement. Moreover, the Commission has previously cautioned against such generalized claims followed by citations of earlier briefs: "The Commission should not be expected to sift unaided through large swaths of earlier briefs . . . in order to piece together and discern the intervenors' particular concerns or the grounds for their claims." *Hydro Res., Inc.* (P.O. Box 15910 Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 46 (2001). Therefore, Nevada has

failed to provide the requisite support for this contention, or issuance of the requested waiver or exception under Section 2.335.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

To show that there is a genuine dispute with DOE on a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi), Petitioner “must include references to specific portions of the application . . . that the petitioner disputes . . . or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure . . .” As explained above, the heart of the issue that Petitioner disputes does not reside in the application, but rather in NRC regulations—and it questions their adequacy. There is no dispute raised by this contention that questions how DOE’s application satisfies currently-effective NRC material control and accounting regulations. In recognition of this deficiency, Nevada has requested a waiver under Section 2.335, but has failed to establish the *prima facie* showing necessary for the Board to certify its petition for waiver or exception to the Commission pursuant to Section 2.335(d). Consequently, this contention does not give rise to a genuine dispute and must be dismissed in its entirety.

**199. NEV-SAFETY-199 - Performance Confirmation And Available Technology**

SAR Chapter 4, which describes what purports to be DOE's Performance Confirmation Program, fails to provide sufficient description of key equipment and process activities critical to implementation of the Performance Confirmation Program as described, and some of the key activities needed for the Program, as described, rely impermissibly on technology development or integration that is not currently available.

**RESPONSE**

This contention asserts that DOE has failed "to provide sufficient description of key equipment and process activities critical to implementation of the Performance Confirmation Program as described, and some of the key activities needed for the Program, as described, rely impermissibly on technology development or integration that is not currently available." Petition at 1031.

**a. Statement of Issue of Law or Fact to be Controverted**

Nevada's assertion that DOE's Performance Confirmation Program relies impermissibly on future technology development or integration is based on a misapplication of 10 C.F.R. § 63.305(b), which states:

DOE should not project changes in society, ... human biology, or increases or decreases of human knowledge or technology. In all analyses done to demonstrate compliance with this part, DOE must assume that all of those factors remain constant as they are at the time of submission of the license application.

This regulation, which is entitled, "Required characteristics of the reference biosphere" and is not even applicable to the Performance Confirmation Program. 10 C.F.R. § 63.305(b), which is found in Subpart L-Postclosure *Public Health and Environmental Standards* (emphasis added), is applicable to 1) health and environmental standards; 2) analyses of the reference biosphere; and

3) human knowledge or technology during the postclosure period. In contrast, the Performance Confirmation Program focuses on collecting, evaluating, and reporting on data used to confirm the basis for estimates of repository performance (Performance Confirmation Plan, TDR-PCS-SE-000001 REV 05 AD 01 (Feb. 2008) LSN# DEN001590480 at xi); which is based on “parameters and natural processes pertaining to the geologic setting” (10 C.F.R. § 63.131(d)(2)), not health and environmental standards. Nowhere in 10 C.F.R. Subpart F, Performance Confirmation Program, does the word “analyses” even appear, much less any mention of the reference biosphere. Finally, 10 C.F.R. § 63.305(b) is applicable to technology development during the *postclosure* period, while the Performance Confirmation Program will be conducted during the *preclosure* period, so any technology development to be applied to the Performance Confirmation Program will necessarily occur well in advance of the postclosure period. For all of these reasons, Nevada’s asserted legal basis is wholly inapplicable to its contention, which is therefore inadmissible.

**b. Brief Explanation of Basis**

As explained in Section *a* above, Nevada misinterprets the regulatory requirements in Part 63. Therefore, it fails to provide "sufficient foundation" for its assertion that some of the key Performance Confirmation Program activities rely impermissibly on technology development or integration that is not currently available. *See Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC 395, 428 (1990). Accordingly, Nevada fails to provide a litigable basis for the contention, which must be dismissed.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." Petition at 1032. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In addition, Nevada's misinterpretation of the regulatory requirements as described above in a cannot provide a basis for a finding that Nevada has raised a material issue.

Nevada asserts that a more detailed description of the Performance Confirmation Program is required in the License Application and that some of the key activities rely impermissibly on technology development or integration that is not currently available. Petition at 1031. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach two affidavits (Douglas F. Hambley and Steven A. Frishman), which purportedly provide expert opinions to support this contention. However, rather than providing information to support the assertions in this contention, the affidavits simply "adopt" Paragraph 5 of the otherwise unsupported assertions made in the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to raise a genuine dispute on a material issue of law or fact. Nevada criticizes DOE for improperly

assuming the near-future availability of technology to meet the requirements for its performance confirmation program, without which the required performance confirmation would be ineffectual in meeting the requirements of 10 C.F.R. §§ 63.21(c)(17), 63.102(m), 63.131(c), 63.132(b), 63.134(a) and 63.305(b). DOE has provided no technical basis for its assumption, nor has it considered alternative methodologies in the event of not being able to provide required in situ monitoring and testing of some of the most important elements of repository performance.

Petition at 1034.

For the reasons discussed below, these arguments do not raise a genuine dispute of material fact or law and must be dismissed.

First, as discussed above in Section a, Nevada relies on an inapplicable regulation for its assertion that DOE cannot rely on near-future “technology to meet the requirements for its performance confirmation program.” Petition at 1034. Therefore, the contention does not establish a genuine issue of material fact.

Second, Nevada cites examples of seepage monitoring, drift inspection, thermally accelerated drift in-drift environment monitoring, thermally accelerated drift thermal-mechanical monitoring, and waste package monitoring as the elements of the program that require the need for remote monitoring under conditions of ambient high temperature and high radiation. It goes on to assert, without any support, “[i]f the technology existed to overcome and perform adequately under these challenging conditions, the SAR would have so stated and demonstrated, at least by reference, which it has not.” Petition at 1033. Nevada has not established, or even

asserted that DOE is required to include in the SAR details about the specific technology that will be used in performing the referenced monitoring activities. An allegation that some aspect of the LA is inadequate or deficient does not give rise to a genuine dispute, unless it is supported by facts and a reasoned statement of why the LA is unacceptable in some material respect. *See Fla. Power & Light Co.* LBP-90-16, 31 NRC 509, 521 n.12 (1990). Nevada has not met this burden.

Finally, Nevada asserts that DOE has not “considered alternative methodologies in the event of not being able to provide required in situ monitoring and testing of some of the most important elements of repository performance.” Petition at 1034. This statement cites to no requirement that DOE consider such alternative methodologies, nor does it provide any details about what types of alternative methodologies DOE should have considered. Furthermore, there is no mention whatsoever of alternative technologies in any of the Performance Confirmation Program regulations. *See* 10 C.F.R. § 63.2, 63.21(c)(17), 63.102(m) and Subpart F. Therefore, Nevada’s claim regarding DOE’s failure to consider alternative methodologies must necessarily fail, as it lacks both supporting facts and a reasoned statement of why the LA is unacceptable. *See Fla. Power & Light Co.*, LBP-90-16, 31 NRC at 521 n.12.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**200. NEV-SAFETY-200 - Performance Confirmation Program Level Of Information**

SAR Chapter 4, which describes what purports to be DOE's Performance Confirmation Program, fails to provide an adequate description of such a program because DOE's efforts to develop its Program are so incomplete that meaningful and reviewable descriptions are impossible.

**RESPONSE**

This contention asserts that DOE has failed to provide an adequate description of a Performance Confirmation Program because "DOE's efforts to develop its Program are so incomplete that meaningful and reviewable descriptions are impossible." Petition at 1035.

**a. Statement of Issue of Law or Fact to be Controverted**

Nevada claims that, in connection with the Performance Confirmation Program, DOE has violated 10 C.F.R. § 63.305(b), which states:

DOE should not project changes in society, ... human biology, or increases or decreases of human knowledge or technology. In all analyses done to demonstrate compliance with this part, DOE must assume that all of those factors remain constant as they are at the time of submission of the license application.

This regulation, which is entitled, "Required characteristics of the reference biosphere," is not even applicable to the Performance Confirmation Program. 10 C.F.R. § 63.305(b), which is found in Subpart L-Postclosure *Public Health and Environmental Standards* (emphasis added), is applicable to 1) health and environmental standards; 2) analyses of the reference biosphere; and 3) human knowledge or technology during the postclosure period. In contrast, the Performance Confirmation Program focuses on collecting, evaluating, and reporting on data used to confirm

the basis for estimates of repository performance (Performance Confirmation Plan. TDR-PCS-SE-000001 REV 05 AD 01 (Feb. 1008), LSN# DEN001590480 at xi); which is based on “parameters and natural processes pertaining to the geologic setting” (10 C.F.R. § 63.131(d)(2)), not health and environmental standards. Nowhere in 10 C.F.R. Subpart F, Performance Confirmation Program, does the word “analyses” even appear, much less any mention of the reference biosphere. Finally, 10 C.F.R. § 63.305(b) is applicable to technology development during the *postclosure* period, while the Performance Confirmation Program will be conducted during the *preclosure* period, so any technology development to be applied to the Performance Confirmation Program will necessarily occur well in advance of the postclosure period. For all of these reasons, Nevada’s asserted legal basis is inapplicable to its contention, which is therefore inadmissible.

**b. Brief Explanation of Basis**

As explained in a above, Nevada misinterprets the regulatory requirements in Part 63. Therefore, it fails to provide a “sufficient foundation” for its assertion that some of the key Performance Confirmation Program activities rely impermissibly on technology development or integration that is not currently available. *See Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-942, 32 NRC 395, 428 (1990). Accordingly, Nevada fails to provide a litigable basis for the contention, which must be dismissed.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In its attempt to demonstrate that this contention is material to the findings that the NRC must make in this proceeding, Nevada identifies various regulations. Nevada concludes this general description of various sections of 10 C.F.R. Part 63 with the mere assertion that "this contention alleges noncompliance with these regulatory provisions and therefore raises a material issue." Petition at 1036. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that "the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ...," not merely a citation of the relevant regulations. In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

While the Advisory PAPO Board directed the potential parties to provide a "citation to a statute or regulation that, explicitly or implicitly, has not been satisfied" because specific citations are "preferable" to general citations (June 20, 2008 CMO, at 7.), this direction cannot be read to dispense with the well-recognized requirement that resolution of the contention would make a difference in the outcome of the proceeding, particularly since the CMO focused exclusively on "format" and "procedural matters." CMO at 3.

In particular, because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However, as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101 (a)(2), "because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system," DOE is *not* required to provide complete

assurance that each postclosure performance objective specified at § 63.113 will be met.

Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing the issue in the contention is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

As stated in Section V.A.3. above, Part 63 permits DOE to use probabilistic analyses to calculate potential postclosure radiation doses, 10 C.F.R. § 63.102(j), and to report those doses as mean doses. *See* 10 C.F.R. § 63.303. Therefore, contentions that either independently or cumulatively, fail to demonstrate an increase in the mean dose above regulatory limits are immaterial and inadmissible because they would not “make a difference in the outcome of the licensing proceeding.” *Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34. Also as stated in Section V.A.3, Nevada has the ability to undertake quantitative and qualitative analyses of how a contention will impact the postclosure model. Nevada has failed to provide even a qualitative analysis of the impacts of this contention on dose, much less identify a likelihood of a dose limit being exceeded. Therefore, Nevada has not demonstrated that its contention is material to this proceeding.

In addition, Nevada's misinterpretation of the regulatory requirements as described above in a cannot provide a basis for a finding that Nevada has raised a material issue.

Nevada asserts that that a more detailed description of the Performance Confirmation Program is required in the License Application. However, Nevada fails to demonstrate that this issue is material to any finding the NRC must make to authorize construction of the repository. Specifically, Nevada fails to demonstrate that resolution of the contention would make a difference in the proceeding.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Section V.A.3 above discusses the legal standards under 10 C.F.R. § 2.309(f)(1)(v) that require adequate factual support or expert opinion in order for a contention to be admitted. This contention fails to meet those standards because, in contrast to the requirements of 10 C.F.R. § 2.309(f)(1)(v), as discussed in Section V.A.3 above and the specific response below: (1) the contention does not reference any documents, other than the license application and DOE's supporting documents; (2) the contention contains only unsupported assertions of counsel; and (3) the contention does not reference any expert opinion. Nevada's Petition does attach one affidavit (Steven A. Frishman), which purportedly provides expert opinions to support this contention. However, rather than providing information to support the assertions in paragraph 5 of this contention, the affidavit simply "adopt[s]" the otherwise unsupported assertions made in paragraph 5 of the contention. That approach falls far short of the requirement to provide conclusions supported by reasoned bases or explanation.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to raise a genuine dispute on a material issue of law or fact. Nevada challenges “SAR Chapter 4 compliance with the requirements of 10 C.F.R. §§ 63.21(c)(17) to provide a description of the performance confirmation program, as defined in 10 C.F.R. § 63.2, and failure to implement the concept of Performance Confirmation, as described in 10 C.F.R. §§ 63.102(m), 63.131(c), 63.132(b), 63.134(a) and 63.305(b).” Petition at 1038. For the reasons discussed below, these arguments do not raise a genuine dispute of material fact or law and must be dismissed.

First, Nevada claims that the plans and procedures for the Performance Confirmation Program “already should have been completed and described in the SAR.” Petition at 1038. However, it provides no basis for asserting the existence of a requirement for completed plans and procedures as of the time of filing the LA. Nevada has not cited to any regulatory requirement for the completion of program plans and procedures before LA filing. In fact, examination of the regulations applicable to the Performance Confirmation Program reveals that there is no mention of any such requirement. *See* 10 C.F.R. §§ 63.2, 63.102(m), and Part 63, Subpart F. Absent a requirement for completed plans and procedures, Nevada’s contention fails to establish the existence of a genuine dispute on a material issue of law or fact.

Second, Nevada’s criticisms of SAR Chapter 4 are factually incorrect and inconsistent with the SAR. Nevada states that “at least in respect to operational period activities, the Performance Confirmation Program is simply a plan for a plan for which there is *no committed substance*.” Petition at 1037 (emphasis added). To the contrary, the Performance Confirmation Plan, which is the primary reference for SAR Chapter 4, provides, for each of the 20 program activities, “a title, description, purpose, selection justification (both technical and regulatory), a

current understanding of each activity, and the anticipated methodology for the test.”

Performance Confirmation Plan. TDR-PCS-SE-000001 REV 05 AD 01, (Feb. 2008) LSN# DEN001590480 at 3-1. For each activity description, DOE has also identified candidate parameters for comparison of the monitoring and testing results with the model inputs and assumptions. *Id.* at Table 3-2. Nevada has apparently interpreted “committed substance” of the program to mean completed technical plans and procedures, a definitional exercise lacking any basis in the applicable regulations. Nevada cites as its only support for its narrow definition of “committed substance” a DOE statement that distinguishes between the Performance Confirmation Plan and the test plans and indicates that changes may need to be made to the Performance Confirmation Plan as detailed test plans are developed. *See* Petition at 1037, citing Performance Confirmation Plan. TDR-PCS-SE-000001 REV 05 AD 01, (Feb. 2008) LSN# DEN001590480 at 1[a]. However, the possibility of changes does not mean that there is no committed substance to the program, as changes are anticipated and controlled under the regulations. *See* 10 C.F.R. § 63.44. Therefore, Nevada’s criticisms of SAR Chapter 4 fail to raise a genuine dispute on a material issue of fact.

In summary, this contention does not establish a genuine issue of material fact. Therefore, the contention does not satisfy 10 C.F.R. § 2.309(f)(1)(vi) and should be rejected.

**201. NEV-SAFETY-201 - Reliance On Preliminary Or Conceptual Design Information**

Legal Issue: The LA cannot be granted because it relies on preliminary or conceptual design information for both preclosure and postclosure aspects.

**RESPONSE**

This contention is identical to NEV-SAFETY-146, and must be dismissed for the reasons given in the response to that contention.

## **202. NEV-MISC-01 - Erosion And Geologic Disposal**

Legal issue: The construction authorization cannot be granted because, as contention NEV-SAFETY-41 establishes, Yucca Mountain will erode to the level of the repository drifts beginning around 500,000 years after waste emplacement, thereby exposing the waste packages to the atmosphere, with the result that for the period after about 500,000 years and continuing throughout the period of geologic stability the facility will no longer constitute a "repository" but would, at best, constitute a retrievable storage facility, in violation of sections 2(18), 114(d), 141(g) and 302(d) of the NWPA, section 801(a) of the EnPA, and Public Law No. 107-200 (42 U.S.C. § 10135 note).

### **RESPONSE**

Nevada challenges DOE's characterization of Yucca Mountain and the jurisdiction of the NRC to grant a construction authorization for the repository because it claims that erosion will cause the emplaced waste packages to be exposed to the atmosphere 500,000 years after permanent closure. Nevada also asserts that when this occurs, the facility will cease to be a geological repository as defined by sections 2(18), 114(d), 141(g) and 302(d) of the NWPA, Section 801(a) of the EnPA, and Public Law No. 107-200 (42 U.S.C. § 10135 note), and in violation of Section 141(g) of the NWPA.

#### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Nevada must demonstrate that the issue raised in the contention is within the scope of the proceeding. Underlying the issues Nevada raises in the contention is its position that Yucca Mountain will cease to be a suitable location for a geologic repository 500,000 years after permanent closure. *See* Petition at 1144. This, however, is a direct challenge to DOE's site recommendation and, as a result, is outside the scope of this proceeding and must be dismissed under 10 C.F.R. § 2.309(f)(1)(iii).

In 2002, the Secretary of Energy officially recommended Yucca Mountain to the President as the site for a geological repository for spent nuclear fuel and HLW. The President thereafter recommended the site to Congress, and over Nevada's notice of disapproval, Congress passed a Joint Resolution, pursuant to NWPA § 115(c), designating Yucca Mountain as the site for the geological repository. *See* Pub. L. No. 107-2000. The NWPA also specifically restricts the quantity of waste that can be emplaced at Yucca Mountain to 70 metric tons (MTHM). NWPA § 114(d). By, in effect, asking this Board to reconsider the Secretary and President's site approval and the Joint Congressional Resolution affirming this recommendation based on allegations that Yucca Mountain is not a suitable location for a geologic repository, this contention seeks to reverse the decisions of the President and of Congress to construct the geologic repository at Yucca Mountain.

Furthermore, site selection has already been the subject of a judicial challenge, which was found to be without merit. In 2004, a group challenged the suitability of the Yucca

Mountain site, attacking, among other things, the Secretary of Energy's recommendation to the President and the President's subsequent recommendation to Congress. *Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251 (D.C. Cir. 2004). The D.C. Circuit, in holding that it had no authority to overturn the Joint Congressional Resolution, found that Congress had unequivocally intended to approve the Yucca Mountain site as suitable for a geological repository. *Id.* at 1309-11.

This licensing proceeding is an inappropriate forum for a petitioner to raise attacks on that decision. The NRC must base its decision to grant or deny DOE's license application on the criteria identified in 10 C.F.R. Part 63. It cannot consider Nevada's challenges to decisions made at the highest level by various government bodies in selecting the Yucca Mountain site, and in the courts in affirming those decisions. Thus, any attempt to litigate this issue is outside the scope of this proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention also fails to raise an issue that is material to the findings that the Commission must make in this proceeding, and must be dismissed. As noted above, the contention's challenge to the selection of the Yucca Mountain site is outside the scope of this proceeding and, therefore, the contention does not raise an issue material to the finding the Commission must make. The reasons set forth below provide additional bases demonstrating that Nevada's contention fails to raise a material issue.

Because the issue presented in this contention concerns postclosure performance, Nevada must demonstrate that the resolution of the issue would prevent the NRC from finding that there is a "reasonable expectation" that the radioactive materials can be disposed of without unreasonable risk to the health and safety of the public. *See* 10 C.F.R. § 63.31(a)(2). However,

as discussed in Section V.A.3 *supra*, and in 10 C.F.R. § 63.101(a)(2), “because of the uncertainties inherent in the understanding of the evolution of the geologic setting, biosphere, and engineered barrier system,” DOE is not required to provide complete assurance that each postclosure performance objective specified at § 63.113 will be met. Therefore, Nevada must demonstrate that there is no reasonable expectation that the overall objective could be met. This contention makes no such showing.

The method the DOE used in addressing erosion is consistent with what the NRC contemplates in 10 C.F.R. § 63.304, which recognizes that determining that there is a “reasonable expectation”: (1) requires less than absolute proof, (2) accounts for the inherently greater uncertainties in making long-term projections of disposal system performance, (3) does not exclude important parameters from assessments and analyses due to the difficulty in quantifying with a high degree of confidence, and (4) focuses on performance assessments and analyses on the full range of defensible and reasonable parameter distributions rather than only upon extreme physical situations and parameter values.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

This contention relies almost entirely upon another contention by Nevada, NEV-SAFETY-41. *See* Petition at 1145. For the reasons discussed in the response to NEV-SAFETY-41, Nevada does not sufficiently identify documents or expert opinion to support either contention. Therefore, this contention does not satisfy 10 C.F.R. § 2.309(f)(1)(v) and should be rejected.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention bootstraps Nevada's technical argument made in NEV-SAFETY-41 into an alleged statutory violation, and in doing so, fails to raise a genuine dispute. Admission of this contention depends upon admission of NEV-SAFETY-41, which, as DOE has shown in its response to that contention, falls short of the admissibility criteria at 10 C.F.R. § 2.309(f)(1)(iv)-(vi) and must be rejected.

Relying on the flawed technical argument presented at NEV-SAFETY-41, this contention embarks upon unreasonable speculation assuming all conservative parameters for erosion. *See* NEV-SAFETY-41 at 240-241 (citing LSN# NEV000005187, at 1 (predicting significant erosion within 500,000 to 5,000,000 years only with "conservative estimates for all involved parameters")). Nevada's assumptions are in conflict with the requirements of proposed 10 C.F.R. § 63.305(c), which states that DOE must vary factors related to geology based upon "cautious, but *reasonable* assumptions" that could affect Yucca Mountain during the period of geologic stability. 70 Fed. Reg. at 53,319 (emphasis added). Nevada's speculation thus fails to raise a genuine dispute of a material issue.

Nevada's speculative position regarding statutory violations that may result from the unrealistic erosion rates it predicts in NEV-SAFETY-41 is the only position that distinguishes this contention from that one. In presenting this position, Nevada attempts to fabricate a violation where there is none. Clearly, the entire design and analysis for the proposed facility at Yucca Mountain has been for a deep, geological repository. The facility, as designed, complies with all applicable statutes and regulations. Accordingly, Nevada fails to raise a genuine issue of material fact or law.

For the aforementioned reasons, the contention does not satisfy 10 C.F.R.  
§ 2.309(f)(1)(vi) and must be rejected.

**203. NEV-MISC-02 - Alternate Waste Storage Plans**

Legal issue: The LA cannot be granted because its discussion of alternate storage plans for spent fuel following retrieval violates the NWPA.

**RESPONSE**

In this contention, Nevada argues that DOE’s proposed alternate storage plans for SNF following retrieval violates Section 141(g) of the NWPA, which prohibits locating a monitored retrievable storage (MRS) facility in the State of Nevada. *See* 42 U.S.C. § 10142 (“No . . . [MRS] developed pursuant to this section may be constructed in any State in which there is located any site approved under Section 112 [of the NWPA].”). Nevada suggests, but does not explicitly state, that the alternate storage areas constitute a MRS because they are facilities “for indefinitely long-term storage of spent fuel in Nevada, unrelated to efficient disposal of spent fuel in a safe and viable repository.” Petition at 1147.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention should be dismissed because the issue that it raises is outside the scope of this proceeding. As discussed in section f. of this response, DOE’s current plans for alternate storage areas do not fit the definition of a MRS, nor do they violate the NWPA in any other way. Nevada’s claim to the contrary amounts to a challenge of Section 122 of the NWPA, which as

explained below, requires that DOE design and construct the proposed repository in a way that will permit the retrieval of SNF. The NRC's regulations implementing this provision clearly allow for and explicitly contemplate DOE's use of alternate storage areas as a part of the repository design so that DOE can meet its obligations under Section 122 of the NWPA. 10 C.F.R. § 63.21(c)(7).

Accordingly, in arguing against the use of alternate storage areas at the repository, Nevada is challenging Section 122 of the NWPA and the NRC's reasonable interpretation and implementation of that provision. It is well established that a petitioner may not challenge applicable statutes or regulations as part of an adjudicatory proceeding. *Carolina Power & Light* (Shearon Harris Nuclear Power Plant Unit 1), LBP-07-11, 65 NRC 41, 57-58 (2007)(citing *Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 and 3), ALAB-216, 8 AEC 13, 20 (1974)) (stating that any contention that collaterally attacks applicable statutory requirements must be rejected by the Board as outside the scope of the proceeding); 10 C.F.R. § 2.335(a) (providing that "no rule or regulation of the Commission . . . is subject to attack . . . in any adjudicatory proceeding").

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The NWPA and associated NRC regulations demonstrate that the proposed geologic repository must allow for the retrieval of SNF and may include alternate storage areas at the surface of the GROA to facilitate retrieval activities. Section 122 of the NWPA provides that the repository “must be designed and constructed to permit the retrieval of any [SNF] . . . placed in . . . [the] repository,” 42 U.S.C. § 10142; and one of the NRC’s regulations implementing this requirement explains that “[t]o satisfy this objective, the [GROA] must be designed so that any or all of the emplaced waste could be retrieved on a reasonable schedule.” 10 C.F.R. § 63.111(e).

These provisions clearly contemplate the possibility that alternate storage areas may be located at the surface portion of the GROA for the purpose of facilitating retrieval, should a decision to retrieve SNF from the repository be made. Indeed, the NRC’s regulations governing the content of the Application require that DOE include “[a] description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary.” 10 C.F.R. § 63.21. Although this provision does not expressly require that the alternate storage areas be located at the GROA, 10 C.F.R. Part 63 clearly contemplates that they could be included among the repository’s *surface* facilities for receiving, handling, packaging, and *storing* waste. 10 C.F.R. § 63.2.

In this contention, Nevada ignores all of these principles, including DOE’s obligation to demonstrate to the NRC that it will be able to execute retrieval operations, if necessary, within a reasonable schedule, as well as the NRC’s obvious recognition, as reflected in its regulations, that in order to meet DOE’s obligation, DOE can develop alternative storage areas, and that such areas could be located at the GROA. Nevada addresses none of these points in its contention. Instead, Nevada implicitly argues that the alternative storage areas violate Section 141(g) of the

NWPA, as a MRS facility because they are facilities “for indefinitely long-term storage of spent fuel in Nevada, unrelated to efficient disposal of spent fuel in a safe and viable repository.”

Petition at 1147.

Nevada misunderstands the concept of a MRS. Subtitle C of the NWPA authorized DOE to study the need for, site, construct and operate a MRS facility for SNF. 42 U.S.C. § 10161. According to the statute’s legislative history, the MRS, if approved by Congress, “would serve as a “*back-up*” to the repository program.” *Tennessee v. Herrington*, 806 F.2d 642, 644 (6th Cir. 1986) (discussing NWPA legislative history) (quoting H.R. Rep. No. 491, *reprinted in* 1982 U.S. Code Cong. & Ad. News at 3810). The NRC promulgated regulations in 10 CFR Part 72 that govern licensing a MRS. There, the NRC defines a MRS as a “complex . . . for the receipt, transfer, handling, packaging, possession, safeguarding, and storage . . . *pending shipment to a HLW repository . . .*” 10 C.F.R. § 72.3 (emphasis added).

In sum, the MRS was intended to support the repository program as a separate, *back-up* facility used to store SNF *before* sending it to a repository. In contrast, DOE’s current concept for alternate storage areas at the GROA treats these areas as *part of* the repository; and they are intended to store SNF *after* it has been sent to the repository. Obviously, the SNF to be retrieved and stored at the alternate storage areas will already be at the repository. In this regard, Nevada is correct in asserting that the alternate storage areas do not facilitate the “efficient disposal of [SNF].” Petition at 1147. That, however, only distinguishes an alternate storage area from a MRS facility.

Furthermore, rather than functioning as a separate “*back-up facility*,” alternate storage areas are intended to function as part of the facility. Thus, an alternate storage area and a MRS are very different. In light of this, the fact that the alternate storage areas may support the long-

term storage of SNF is a red-herring. What ultimately matters is the integrated function of the areas, not how long they will be used to store SNF. Here, unlike a MRS, DOE's proposed alternate storage areas are part of the proposed "repository" under the NWPA and 10 C.F.R. Part 63.

Accordingly, the Licensing Board must dismiss this contention because it does not establish a genuine dispute on a material issue of law or fact.

#### **204. NEV-MISC-03 - LA References**

Error of Omission: The LA SAR is insufficient on its face because it cannot be determined whether its safety conclusions are correct without also considering about 196 references listed therein, but as provided in LA General Information Subsection 1.4.1 at 1-21, DOE refuses to incorporate these references into the LA.

#### **RESPONSE**

This contention asserts that the LA SAR is insufficient “on its face” because it assertedly relies on 196 references that are not incorporated into the LA. Petition at 1149. Nevada contends that these references must be reviewed to determine the validity of the safety conclusions contained in the SAR and that because these references are not incorporated by reference, the LA is insufficient. *Id.* As explained below, this contention should be dismissed because it falls outside the scope of this proceeding, does not present an issue material to the findings that the NRC must make, is not supported by factual or expert opinion, and presents no genuine dispute on a material issue of law or fact.

##### **a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

##### **b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

##### **c. Whether the Issue is Within the Scope of the Proceeding**

Nevada asserts that the Application is insufficient because, although DOE submitted the 196 references to the NRC, DOE did not incorporate them by reference into the Application.

Petition at 1149. The reason for the alleged insufficiency is less clear. The actual tenor of Nevada's complaint might be that non-inclusion of these references fatally prejudices its ability to review the Application and prepare contentions; or that the Staff is legally precluded from availing itself of information in those references; or that DOE is legally estopped from relying on them in the presentation of its case. Whatever the intended focus, the contention seeks to raise issues that either do not pose a genuine dispute on a material issue of fact or law, as outlined further in section f. below, or challenge a decision that is committed to the discretion of the NRC Staff. In either case, they do not raise an issue within the scope of the proceeding.

This contention impermissibly challenges the Staff's underlying sufficiency determination that resulted in the docketing of the Application. And this is not the first time that Nevada has raised this issue. In response to an inquiry from Nevada's counsel, the NRC stated that DOE did *not* need to incorporate by reference these documents into the LA. *See* Letter from Lawrence E. Kokajko, Director, Division of High-Level Waste Repository Safety Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Comm'n to Martin G. Malsch, Esq., "Response to Egan, Fitzpatrick & Malsch, PLLC Letter of July 25, 2008 Concerning the Status of 196 Yucca Mountain Reference Documents," August 29, 2008, *available at* ADAMS Accession No. ML082420891 (Kokajko Letter); NRC Presentation at September 23, 2008 Public Outreach Meeting, *available at* ADAMS Accession No. ML083030512 (Public Outreach Meeting Presentation). Nevada cannot use this proceeding to litigate the Staff's docketing determination. That determination is solely within the discretion of the NRC Staff. Therefore, this contention is outside the scope of this proceeding.

Nevada also alleges that DOE "refuses" to incorporate by reference the 196 references in the LA. Petition at 1149. DOE does not "refuse" to incorporate these references into the LA;

rather the DOE is following the regulatory requirements for the contents of the Application as well as years of licensing precedent and numerous previously submitted safety analysis reports when it chooses to describe in the Application either directly, or in summary form, information from supporting documents. Such rhetoric does not raise an issue within the scope of the proceeding.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada characterizes this contention as presenting a material issue by stating that “[t]his contention raises the issue whether the safety findings required by 10 C.F.R. § 63.31(a) can be made on the basis of the information in the SAR itself and the closely related issue whether DOE has complied with 10 C.F.R. § 63.24.” Petition at 1149. 10 C.F.R. § 2.309(f)(1)(iv) requires a showing by a petitioner that “the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding ....” In this regard, a contention is material only if its resolution would make a difference in the outcome of the proceeding. *See Duke Energy Corp.*, CLI-99-11, 49 NRC at 333-34.

Whether the 196 references are incorporated by reference in the SAR is not material to a finding that the NRC must make because its resolution would not make a difference in the outcome of the proceeding. The NRC Staff can consider information regardless of whether that information is incorporated by reference in the Application. *See Kokajko Letter*; Public Outreach Meeting Presentation. And in proceedings before this Board, DOE (or Nevada or any other party) cannot be precluded from making use of the information in those references for whatever purpose it deems useful, as long as that information is properly qualified. And whether the record of this proceeding will sustain the necessary licensing findings is a matter for issue-

by-issue determination upon the complete record, not dependent on whether these references have been incorporated by reference into the Application.

Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and thus, must be dismissed.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Nevada points vaguely to its “contentions addressed to the SAR” and the expert opinions supporting those contentions to support its assertion that the SAR is insufficient without incorporation of referenced documents. Petition at 1150. Specifically, Nevada asserts that its experts “usually found it impossible to review the safety conclusions in the cited subsections of the SAR, especially those in Chapter 2, without considering scientific facts and analyses in the referenced documents, and sometimes also scientific facts and analyses in documents referenced in the references.” *Id.* But not one affidavit from a Nevada expert supports this statement. Thus, this contention contains hearsay, and unsupported assertions of counsel. This fails to meet the standards of 10 C.F.R. § 2.309(f)(1)(v).

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

This contention fails to present a genuine dispute on a material issue of law or fact because failure to incorporate by reference the 196 documents does not violate any statutory or regulatory provision. Nevada asserts that the SAR is insufficient because it does not incorporate by reference 196 general references discussed in the SAR. Petition at 1149, 1151. Nevada does not point to any authority requiring the incorporation of those references. *See id.* There is none; the only reference in 10 C.F.R. Part 63 to incorporation by reference is in § 63.23, entitled “Elimination of Repetition,” which provides broad authority to incorporate material by reference

but does not require doing so. Nor has research disclosed any case law supporting the proposition that information, to be available to support a decision, must be either in the application itself or formally incorporated into it by reference.

And there is clearly no regulatory requirement to submit every drawing, calculation, specification, report, analysis, plan, model, etc. as part of the license application, so there can be no genuine dispute to litigate in this proceeding. 10 C.F.R. § 63.21, “Content of Application,” uses words such as description, discussion, explanation, assessment, and evaluation. And the Yucca Mountain Review Plan (YMRP) acknowledges that there are materials relevant to the licensing process that may not be in the license application. YMRP, A1.1.1, Licensing Review Philosophy, at A-4 (NUREG-1804). It states that “[t]he U.S. Nuclear Regulatory Commission should evaluate whether a license application meets the applicable regulations based upon a review of what is in the application and *supporting* materials.” *Id.* (emphasis added). The inclusion of “supporting” materials is clear evidence that not all of the information for technical review of the license application must be contained within the application itself. Thus, whether particular documents must be incorporated by reference in the Application does not raise a genuine dispute on a material issue of law or fact.

Similarly, to the extent that the contention attempts to preclude the NRC Staff from making use of information in the unincorporated references in its completeness and subsequent substantive review of the License Application, it raises matters beyond the jurisdiction of this Board. To that effect, the NRC Staff informed Nevada’s counsel that it would not require the DOE to incorporate the 196 general references that DOE provided when it submitted the LA. *See Kokajko Letter*. Moreover, the documents referenced in the LA are available for public review as evidenced by the contention itself and the NRC Staff have stated it considers

supporting information regardless of whether these references are incorporated in the LA. *See* Public Outreach Meeting Presentation.

Finally, with respect to Petitioner's complaint, albeit unsubstantiated, about its alleged need to review all of the unincorporated references, that complaint, even if it were accurate, is beside the point.<sup>130</sup> If Nevada believes that the application is not properly supported without material in these references, Nevada should have demonstrated that fact on an issue-by-issue basis, rather than attempting to assert, categorically, that the application must be preemptively rejected because not all references listed in it have been formally incorporated into it.

Consequently, this contention presents no genuine dispute on a material issue of law or fact and must be dismissed.

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<sup>130</sup> Petitioners complain about the amount of work entailed by review of all the unincorporated references but do not allege it as a legal defect in the application. The references, of course, have all been available to Petitioners for at least the better part of a year, and most for far longer, via the LSN. Thus the complaint has little but rhetorical value and will not be treated further here.

**205. NEV-MISC-04 - Aging Facility Role Under NWPA**

DOE's plan to have up to 21,000 metric tons of heavy metal sitting on "aging pads" for decades violates the Nuclear Waste Policy Act, as amended, by making Nevada the site of both a repository and a retrievable storage facility.

**RESPONSE**

This contention raises two purely legal issues. Nevada claims that DOE's proposed surface Aging Facility at Yucca Mountain constitutes either (1) a federal interim storage installation or (2) a monitored retrievable storage facility as defined under the NWPA and NRC regulations set forth in 10 C.F.R. Part 72. Petition at 1153. In Nevada's view, because the NWPA and NRC regulations prohibit co-locating these types of facilities and the proposed repository, DOE's Aging Facility "violates the law." *Id.* at 1154. This contention fails to establish that a genuine dispute exists with DOE on a material issue of law or fact. The Licensing Board must dismiss this contention, which isolates a limited aspect of the proposed Aging Facility's overall function; ignores other necessary and important functions to overall repository operation; and then offers a flawed argument alleging that the Aging Facility is something that it is not.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The NWPA and associated regulations contemplate that a proposed geologic repository design may include a surface aging facility. The NWPA defines the "repository" to include "both surface and subsurface areas at which [HLW and SNF] handling activities are conducted." 42 U.S.C. § 10101(18). Similarly, 10 C.F.R. Part 63, defines the GROA as a HLW facility that is part of a geologic repository, including both surface and subsurface facilities, where waste handling activities are conducted and contemplates that a proposed repository design may include *important to safety* structures, systems and components for receiving, handling, packaging, *storing*, emplacing and retrieving the SNF and HLW. 10 C.F.R. § 63.2.

Nevertheless, Nevada overlooks these principles and, instead, alleges that the Aging Facility "violates the law." This is not the first time this flawed analysis has surfaced. In 2004, during a public meeting between the NRC and DOE, Judy Treichel, Nevada Nuclear Waste Task Force, asked the NRC Staff whether it would review the proposed Aging Facility as part of the

application for a geologic repository at Yucca Mountain or, alternatively, as a waste storage facility licensed under 10 C.F.R. Part 72. Additionally, it was requested that the NRC Staff provide its criteria for making that decision.

In a letter dated April 19, 2004, the NRC Staff responded, setting forth its approach to addressing this issue. The NRC Staff first recognized that DOE's geologic design may include surface facilities for receiving, handling, packaging and storing waste:

It is our understanding that DOE intends to seek construction authorization and a license to receive and possess source, special nuclear, or byproduct material at a proposed geologic repository at Yucca Mountain, in accordance with NRC's regulations in 10 CFR Part 63. Part 63 contemplates that a proposed repository design may include surface facilities for the receipt, handling, packaging, and storage of waste. NRC would evaluate a surface aging facility incident to waste handling activities, if included in the proposed repository design.

Letter from C. William Reamer, Director, Division of High-Level Waste Repository Safety, to Judy Treichel, "Subject: Review of Yucca Mountain Geologic Repository Operations Area Facilities," Apr. 19, 2004, *available at* ADAMS Accession # ML041070038 at 1.

The NRC Staff then made a point directly applicable to and supportive of rejecting this contention; it acknowledged that the planned Aging Facility is incidental to repository operations and will serve important functions *other* than waste storage:

A surface aging facility, incident to waste handling activities is different than a facility licensed and regulated under Part 72. Interim storage facilities, licensed under Part 72, provide safe, temporary storage of waste. A surface aging facility will likely not be designed merely for temporary storage, but will serve other functions, which are integral to the logistics of waste handling for the purposes of permanent storage in the repository. The NRC will review the proposed [Application], in its entirety, in accordance with the requirements of 10 C.F.R. Part 63.

*Id.* at 2.

The NRC Staff's understanding of the several necessary functions of the Aging Facility to overall repository operation is precisely what is set forth in DOE's Application. As demonstrated in the Application, DOE's proposed Aging Facility is not intended merely for storing waste; it is necessary for, and designed to serve, other critical functions that are integral to the logistics of waste handling for the purposes of permanent storage in the repository. SAR § 1.2.7. At its core, the Aging Facility is designed to be a buffer facility, to "uncouple waste receipts from waste emplacement operations to accommodate repository temperature and thermal limits, operations workflow (differences in acceptance and emplacement rates), and maintenance outages." *Id.* at 1.2.7-1. This and its other specific functions outlined in the Application include:

- Providing up to 21,000 MTHM of aging capability for the Repository in 2,500 aging spaces;
- Protecting TADs and Dual Purpose Canisters from external hazards;
- Providing the capability to place commercial spent fuel in a location where it can be aged to appropriate thermal power levels and providing passive heat removal to preclude exceeding waste form temperature limits;
- Providing the capability to uncouple receipt of commercial spent fuel from emplacement of commercial spent fuel by creating a location to temporarily place commercial spent fuel until the waste emplacement process can accommodate it;
- Providing the capability to move commercial spent fuel between the Aging Facility and the handling facilities; and
- Protecting the workers and the public from radiation.

*Id.* at 1.2.7-3 to -4. Unquestionably, the Aging Facility is intended to serve important functions—beyond temporary waste storage—that are essential to the concept of surface waste handling operations for the repository. Nevada's interpretation would require that the GROA's surface facility be designed so that the incoming waste is immediately placed underground when it arrives on-site. This is clearly not a practical interpretation, and it is inconsistent with the regulatory structure of these types of facilities.

Furthermore, it is beyond dispute that the Aging Facility does not constitute either (1) a federal interim storage installation or (2) a monitored retrievable storage facility, as defined in the NWPA and NRC regulations.

With respect to interim storage, the NWPA sought to help nuclear power reactor owners and operators manage spent fuel while waiting for its permanent disposal. In Subtitle B, the NWPA specified that for the period from 1983 to 1990, DOE had the authority to provide for the interim *storage* of up to 1900 tons of private spent fuel not otherwise accounted for, and for which storage was necessary to ensure a reactor's continued operations. *See* 42 U.S.C. §§ 10155–10157 (setting forth requirements for federal interim storage). No reactor owners or operators ever made use of the federal interim storage program before it expired in 1990, nor has the NRC ever determined that a reactor was in danger of having to shut down for lack of storage capacity. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-02-29, 56 NRC 390, 395 (2002).<sup>131</sup>

Put simply, the Aging Facility does not meet any of the characteristics of the NWPA's federal interim storage program. As noted above, no reactor owner or operator ever took

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<sup>131</sup> Department of Energy Final Interpretation of Nuclear Waste Acceptance Issues, Nuclear Waste Acceptance Issues, 60 Fed. Reg. 21,793, 21,797 (May 3, 1995) (“Under the Act [NWPA], DOE had authority to offer a limited interim storage option. However, that authority has, by its express terms, expired.”) (citation omitted).

advantage of this program before it expired in 1990. And, most importantly, the proposed Aging Facility is not intended merely for storing waste; it is necessary for, and designed to serve, other functions that are integral to the logistics of waste handling for the purposes of permanent storage in the repository. As such, the Licensing Board must dismiss this contention to the extent it argues that the Aging Facility represents a federal interim storage facility.

Likewise, the Licensing Board must dismiss this contention to the extent it argues that DOE's proposed Aging Facility represents a monitored retrievable storage facility. Subtitle C of the NWSA authorized DOE to study the need for, site, construct and operate a monitored retrievable storage facility for spent fuel. 42 U.S.C. § 10161. In two separate places, the NWSA specifies that monitored retrievable storage should provide for the *long-term* storage of spent fuel. 42 U.S.C. § 10161(a)(1)–(2). According to the statute's legislative history, the monitored retrievable storage system, if approved by Congress, "would serve as a 'back-up' to the repository program." *Tennessee v. Herrington*, 806 F.2d 642, 644 (6th Cir. 1986) (discussing NWSA legislative history) (quoting H.R. Rep. No. 491, *reprinted in* 1982 U.S. Code Cong. & Ad. News at 3810). The NRC promulgated regulations in 10 C.F.R. Part 72 that govern licensing a monitored retrievable storage facility. There, the NRC defines a monitored retrievable storage facility as a "complex . . . for the receipt, transfer, handling, packaging, possession, safeguarding, and storage . . . *pending shipment to a HLW repository. . . .*" 10 C.F.R. § 72.3 (emphasis added).

For two reasons, the Aging Facility does not meet the definition of a monitored retrievable storage facility (a complex for storing waste *pending shipment to a geologic repository*). First, the Aging Facility is located *inside* the GROA. *See* SAR at 1.2.7-3 *citing* SAR at 1.2.1-33 (Figure 1.2.1-1 (GROA site plan)). Thus, the spent fuel that the Aging Facility

will receive will already have been shipped to the repository (in other words, the waste is not pending shipment to the repository). And second, as discussed above in detail, the Aging Facility is not intended merely for storing waste and, in any event, is not intended to be used for long-term storage. Rather than constituting a monitored retrievable storage complex, DOE's proposed Aging Facility clearly falls within the definition of "repository" under the NWPA and 10 C.F.R. Part 63.

Accordingly, the proposed Aging Facility is not a federal interim storage facility *or* a monitored retrievable storage facility as defined by the NWPA and 10 C.F.R. Part 72. As such, the Licensing Board must dismiss this contention because it does not establish a genuine dispute on a material issue of law or fact.

## 206. NEV-MISC-05 - Role Of Aging Facility

SAR Subsections 1.1.2.1 and 1.2.7, and various similar and related subsections, which describe DOE's plan to construct and operate an Aging Facility at the GROA is neither necessary for nor integral to the safe operation of the repository, and cannot be justified under the NWPA.

### RESPONSE

This contention challenges DOE's proposed surface Aging Facility at Yucca Mountain. To support this contention, Nevada raises two principal bases. The first basis—recycled from a previous contention as discussed below—states that the Aging Facility constitutes either a monitored retrievable storage (MRS) facility or federal independent spent fuel storage installation (ISFSI) as defined under the NWPA and NRC regulations set forth in 10 C.F.R. Part 72. Petition at 1157. In Nevada's view, because the NWPA and NRC regulations prohibit co-locating these types of facilities and the proposed repository, DOE's Aging Facility violates the law. *Id.* at 1155–57, 1159. The second basis states that, even if the NWPA and NRC regulations permit the construction of a surface aging facility, “DOE's explanation for *this* aging pad is pretextual.” *Id.* at 1157 (emphasis added). According to Nevada, “[t]he real reason for having an aging pad . . . is . . . to *provide a means of providing what the law prohibits*: interim storage away from the generation sites.” *Id.* at 1158 (emphasis added).

For the reasons explained below, this contention is inadmissible. The Licensing Board must dismiss the first basis of the contention because it isolates a limited aspect of the proposed Aging Facility's overall purpose; ignores other necessary and important functions to overall repository operation; and then offers a flawed argument alleging that the Aging Facility is something that it is not. As a result, this first basis lacks adequate support and fails to raise a

material issue. Similarly, the Licensing Board must dismiss the second basis because Nevada's speculation about the Aging Facility does not raise a material issue or create a genuine dispute on a material issue of law or fact.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

For the reasons discussed below, Nevada has not proffered any credible factual basis for its assertions that the Application's descriptions are "pretextual."

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

As mentioned at the outset, this contention relies upon two distinct bases. For the reasons discussed below, these bases fail to raise a material issue relative to this proceeding.

Nevada first raises the legal argument that the proposed Aging Facility "is both a monitored retrievable storage installation and an independent spent fuel storage installation" as defined under the NWPA and 10 C.F.R. Part 72. *Id.* at 1159. Nevada raises precisely the same issues in a different contention—NEV-MISC-04. DOE's response to NEV-MISC-04 fully addresses why the Aging Facility is neither a MRS installation nor an ISFSI. Because the Board that will review that contention is likely to be the Board that reviews this one, DOE incorporates by reference its response to NEV-MISC-04 into this response.

The second basis for the contention states that “[e]ven if the NWSA and Commission’s regulations . . . permitted the construction of an on-site aging facility . . . , DOE’s explanation for this aging pad is pretextual.” Petition at 1157. Nevada proffers three factual averments—which are fully addressed in section f. below—to support its claim that DOE’s explanation is pretextual. Specifically, Nevada claims that:

- DOE “does not actually need the cooling it claims to require[;]”
- “[E]ven if cooling were required, there is no reason, nor apparent explanation in the license application, for why cooling must take place at the repository instead of the generation sites as Congress contemplated[;]” and
- The “capacity of the aging pad vastly exceeds any that could be necessary for cooling, in any event.”

Petition at 1157–58.

These factual allegations ignore the fact that the Aging Facility represents an integral component of the proposed geologic repository, and has independent utility in the efficient conduct of the GROA’s surface operations, as described in SAR § 1.2.7 (Aging Facility). None of the three factual arguments set forth in this contention establish that the Aging Facility is either a MRS facility or federal ISFSI. Nor do the factual averments allege a proposition—even if sustained—that would demonstrate a violation of the NRC’s requirements.

With respect to the need of the Aging Facility for thermal management, DOE has set forth its rationale at length in an analysis in SAR §§ 1.2 and 1.3, none of which is controverted by Nevada. Even if the Nuclear Waste Technical Review Board were to believe that the Aging Facility is not essential for a particular function, that fact alone does not strip the Aging Facility of its independent utility, nor does it convert the facility into an MRS or ISFSI, or establish any other violation of statute or NRC requirements. And Nevada does not directly argue that it does.

The same is true of a design determination to provide the capability of cooling fuel at the repository rather than solely at reactor sites, and of the selection of any particular cooling capacity.

In short, the only legal requirement that Nevada alleges is violated by the Aging Facility is the proscription against an MRS or an ISFSI; but Nevada does not allege *any* discernible link between *any* of these three factual averments to *any* specific provision of the NWPA or NRC regulations, which would tend to establish that the Aging Facility is either an MRS or an ISFSI. In short, even conceding all of Nevada's arguments, which DOE does not do, they do not allege a violation of law or regulatory requirement.

Contentions alleging an error or omission in an application must establish some significant link between the claimed deficiency and protection of the health and safety of the public or environment, or some other violation of legal requirements. *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), LBP-04-15, 60 NRC 81, 89 (2004), *aff'd*, CLI-04-6, 60 NRC 631 (2004). This contention does not do so. Accordingly, this contention fails to raise an issue that is material to the findings that the NRC must make in this proceeding, and, thus, the Licensing Board must dismiss it.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

The Licensing Board must also reject this contention because it fails to create a genuine dispute on a material issue of law or fact. As discussed above, Nevada first claims that the

Aging Facility “is both a monitored retrievable storage installation and an independent spent fuel storage installation” as defined under the NWPA and 10 C.F.R. Part 72. *Id.* at 1159. For the same reasons that this argument fails to raise an issue material to the findings the NRC must make in this proceeding, discussed in section d. above, it also fails to raise a genuine dispute on a material issue of law or fact and must be dismissed.

As the second basis, Nevada states that DOE’s explanation for the Aging Facility is “pretextual[.]” presumably for a desire to build a forbidden MRS or ISFSI. *Id.* at 1157. The contention then advances the three factual assertions outlined above, apparently in support of this argument. For the same reasons that these three arguments fail to raise issues material to the findings the NRC must make in this proceeding, discussed in section d. above, they also fail to raise a genuine dispute on a material issue of law or fact and must be dismissed. In this regard, DOE has good-faith, valid technical bases on each of the factual “pretext” issues raised by this contention.

With respect to Nevada’s first “pretext” claim—DOE “does not actually need the cooling it claims to require”—Nevada cites an NWTRB evaluation opining that “[s]urface aging of the hotter Commercial Spent Nuclear Fuel (CSNF), as opposed to subsurface aging, has limited benefit on the postclosure thermal response. DOE should reevaluate the need to surface-age the CSNF at the repository.” *Id.* (quoting “Thermal-Response Evaluation of Yucca Mountain During the Preclosure and Postclosure Phases,” NWTRB (July 2008) (LSN# NEV000005151)).

Contrary to Nevada’s assertion, the Aging Facility’s cooling capability is integral to repository operations. The Aging Facility is designed “to accommodate repository temperature and thermal limits[.]” SAR at 1.2.7-1. SAR Section 1.3.1 describes these temperature and thermal limits. Some of the waste canisters that arrive at Yucca Mountain will require cooling

(aging) before being emplaced in the repository to ensure that emplacement heat loads are not exceeded. The Application's thermal analyses were performed under certain parameters, including:

- TAD canisters can be shipped to the GROA with a thermal output as high as 22.0 kW, which corresponds to the current limit on licensed transportation casks of similar capacity;
- No waste package emplaced in the repository could exceed a thermal output of 18.0 kW;
- A maximum linear heat load at emplacement, over the length of a seven-waste-package segment of 2.0 kW/m; and
- Calculated thermal energy density of any seven adjacent as-emplaced waste packages “not to result in exceeding a thermal-energy-density index (temperature) of 96°C at the midpillar (between adjacent emplacement drifts), adjusted to account for host-rock thermal conductivity and hydrologic conditions in the host rock[.]”

*Id.* at 1.3.1-16, -20, and -47. Therefore, to ensure that the repository does not exceed temperature and thermal limits, at a minimum, waste packages received at the GROA with a thermal output greater than 18.0 kW must be cooled before being emplaced into the repository. Accordingly, the repository requires the capability to cool waste canisters above-ground before emplacement.

With respect to Nevada's second “pretext” claim—“even if cooling were required, there is no reason, nor apparent explanation in the license application, for why cooling must take place at the repository instead of the generation sites as Congress contemplated”—there is also no genuine dispute. Petition at 1158.

As a threshold matter, Nevada does not actually discuss any authorities suggesting that Congress contemplated all cooling would take place at generation sites, nor does it provide any

citation to these authorities. The Licensing Board should not make assumptions of fact that favor the petitioner or supply information that is lacking. *See Ariz. Pub. Serv. Co.* (Palo Verde Nuclear Generating Station, Unit Nos. 1, 2 and 3), CLI-91-12, 34 NRC 149, 155 (1991). Again, such generalities, unsupported by fact, do not suffice for purposes of admissibility in this proceeding.

Moreover, contrary to this allegation, the Application explains why the capability to cool SNF must be built into the repository. The Application describes a representative waste stream, which demonstrates the flexibility of the repository to receive and emplace waste. SAR at 1.3.1-17. The Application further identifies that there is a wide variability in the waste stream. *Id.* at 1.3.1-18. This variability is based upon several factors, including the availability of waste at the generator site, availability of waste that conforms to the acceptance criteria, availability of the allocated quantity of waste from each site, and the availability of the transportation cask fleet to transport the waste. *Id.* The estimated limiting waste stream also utilizes waste deliveries in conformance with the commercial utility contracts. 10 C.F.R. Part 961—Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste—does not specify a maximum thermal limit on the waste to be received from the utilities, other than SNF having been out of the reactor for at least 5 years. Thus, the estimated limiting waste stream developed in the Application is a representative case since the actual waste receipt is yet to be determined. *Id.* at 1.3.1-20. Accordingly, this contention is incorrect when it states that there is no reason nor apparent explanation in the Application for why cooling should take place at the repository.

With respect to Nevada's third "pretext" argument—the "capacity of the aging pad vastly exceeds any that could be necessary for cooling"—Nevada ignores the actual explanation set forth in the Application and supporting references. Petition at 1158.

The proposed Aging Facility provides up to 21,000 MTHM of aging capability for the repository in 2,500 aging spaces. SAR at 1.2.7-3. DOE analyzed a range of possible thermal loadings in the Engineering Study, Total System Model Analysis for Repository Postclosure Thermal Envelope Study, Phase 2 (000-00R-G000-01000-000-000, LSN# : DN2002501778). This study concluded (on pages 29–30) that the required aging pad capacity varied, depending on preclosure and postclosure thermal requirements, and thermal content of the waste stream. In addition, on page 26, the study concluded that aging capacity was needed for thermal blending even at the least restrictive preclosure and postclosure thermal limits examined (96° C midpillar temperature limit, 30 kW waste package limit, and 2.2 kW/m line load). The postclosure thermal study was a demonstration of the approach to thermal management, not the actual implementation proposed for repository operations. The actual implementation will occur on a drift-by-drift basis when a specific waste stream and resulting waste packages can be identified and each emplacement drift analyzed for loading. SAR at 1.3.1-20. Therefore, above-ground cooling at the repository of 21,000 MTHM does not, contrary to Nevada’s allegation, “vastly exceed . . . what is necessary for cooling[.]” Petition at 1158. Rather, the current Aging Facility capacity (21,000 MTHM of commercial SNF) was chosen to suggest a reasonable range of possible requirements.

In short, the Licensing Board must reject this basis of the contention. The Application sufficiently describes the Aging Facility, including its functions, operational processes, design bases and criteria, and design methodologies. The Application and its supporting references also explicitly address each of Nevada’s pretextual criticisms—why the repository requires the above-ground capability to cool; why cooling cannot take place entirely at the individual utility sites; and why the total capacity of the planned Aging Facility is for 2,500 aging spaces.

Nevada’s allegations do not allege a specific authority, much less establish any violation of the NWPA or 10 C.F.R. Part 63, from any or all of these assertions.

Finally, to the extent that Nevada’s allegation of “pretext” adds a further dimension to this contention—implicitly, an allegation that DOE has not acted in good faith in describing the purposes and functions of the proposed Aging Facility, or that DOE has covertly tried to characterize an MRS or ISFSI in other terms—Nevada is again in error. Nevada’s Petition provides in relevant part:

The real reason for having an aging pad, is instead, *to provide a means of providing what the law prohibits*: interim storage away from the generation sites, for which there is no statutory or regulatory authorization.

Petition at 1158 (emphasis added).

The three factual assertions raised in this contention do not establish that the Aging Facility is an MRS or ISFSI, much less that DOE “pretextually” characterized the Aging Facility in other, regulatory acceptable terms. There is no evidence for this accusation, and the contention fails to allege any.

It is well settled that government officials are presumed to act conscientiously and in good faith in the discharge of their duties. *See, e.g., Libertatia Assocs., Inc. v. United States*, 46 Fed. Cl. 702, 706 (2000). To overcome this presumption, a party must allege *and prove*, by clear and strong evidence, specific acts of bad faith on the part of the government. *Id.* The level of proof to overcome this presumption is high. *Id.* The Commission recognized these well-settled principles in a related proceeding earlier this year:

A presumption of regularity attaches to the actions of Government agencies. Absent clear evidence to the contrary, we presume that public officers will properly discharge their official duties.

*U.S. Dep't of Energy* (High Level Waste Repository: Pre-Application Matters), CLI-08-11, slip op. at 7–8 (June 5, 2008) (brackets and internal citations omitted) (quoting *U.S. Postal Serv. v. Gregory*, 534 U.S. 1, 10 (2001); *Pub. Serv. Co. of N.H.*, LBP-89-04, 29 NRC 62, 73 (1989)).

DOE has not, in any manner, engaged in bad faith with respect to the proposed Aging Facility. As demonstrated above, Nevada has not suggested any credible factual basis for its assertions that the Application's description is "pretextual." Nor does Nevada's contention provide any showing of actual or likely bad faith by DOE, or any concrete basis for the Licensing Board to assume that DOE would take actions in violation of law. Accordingly, this basis of the contention does not create a genuine dispute on a material issue of law or fact.

For all these reasons, the Licensing Board must dismiss this contention in its entirety.

## **207. NEV-NEPA-01 - Transportation Sabotage Scenarios**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) (“FSEIS”) Subsection 6.3.4.2 and Appendix G.8, regarding transportation sabotage events, fail to evaluate reasonably foreseeable attack scenarios that could result in significantly greater consequences than the scenarios considered by DOE. This deficiency is significant because, without considering reasonably foreseeable attack scenarios, there is no adequate disclosure of environmental impacts under NEPA. If reasonably foreseeable attack scenarios were added, the disclosure of radiological impacts could be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, the State of Nevada asserts that DOE’s analysis of potential sabotage events is inadequate because DOE allegedly failed to evaluate reasonable attack scenarios that could result in significantly greater consequences than the scenarios considered by DOE.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R.

§ 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. First, Nevada does not, in its experts’ affidavits or anywhere in its Petition, separately address the criteria for §§ 51.109 and 2.326(a) or demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s two experts’ affidavits simply adopt paragraphs in the Petition. Thorne Affidavit at 1; Halstead Affidavit at 1. Neither of Nevada’s two experts make any representation that they have conducted any study or investigation regarding the matters discussed in the adopted paragraphs. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s two experts, Mr. Thorne and Mr. Halstead, simply point to reports prepared by others, such as the RWMA report, Petition at 1046, and note that these reports suggest additional sabotage scenarios that were not considered in the discussion of the environmental impacts due to transportation. Neither Mr. Thorne nor Mr. Halstead claims that he has assured himself through independent study and analysis that the reports to which he refers (principally the RWMA report) have any scientific validity. Instead, the experts simply report what the reports say – a practice that has been held to be inappropriate in the federal courts unless the person who actually prepared the report is available to testify, *Weaver v. Phoenix Home Life Ins. Co.*, 990 F.2d 154, 159 (4th Cir. 1993) – and make the conclusory statement that “[i]f reasonably foreseeable attack scenarios

were added, the disclosure of radiological impacts *could* be materially different, thus the FEIS and Repository SEIS cannot be adopted by the NRC.” Petition at 1046 (emphasis added). This is nothing more than a statement that something might be possible. The standard that must be met is not what “could be materially different,” but what would be or would likely be materially different. As to that standard, the affidavits of Mr. Thorne and Mr. Halstead are silent.

Neither of Nevada’s two experts is an expert on sabotage events. Mr. Thorne’s training and experience is in the area of health physics, and there is nothing in his background which would qualify him to provide expert testimony on possible sabotage events involving two weapons (of a type never explained by either Mr. Halstead). *See* Thorne Affidavit, Attach. A. Similarly, Mr. Halstead has nothing in his training or experience that would qualify him to offer expert opinions on a sabotage event involving two weapons. *See* Halstead Affidavit, Attach. A. By education, Mr. Halstead is an historian with a Masters degree in American History. He has worked on transportation issues involving spent nuclear fuel, but he has no discernable background in weapons, ballistics, or sabotage events. Given the lack of qualifications of its two experts to provide expert opinions on sabotage events, the affidavits of Nevada’s two experts fail to meet the NRC’s admissibility standards and this contention should be rejected. *See Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, LBP-98-13, 47 NRC 360, 367-68 (1998).

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of potential sabotage events is objectionable on all three grounds.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any

challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

Nevada has failed to identify any issue relating to transportation sabotage for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of potential sabotage events, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Department of Energy*, 457 F.3d 78 (D.C.Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In addition to being outside the scope of this proceeding and instead within the exclusive jurisdiction of the court of appeals, as well as being barred under res judicata and finality principles, the contention does not present an issue material to the findings the NRC must make. Nevada's contention fails as a matter of law to raise a litigable issue under NEPA, and thus does not present an issue material to the findings the NRC must make. Even if the Board were to conclude that this contention involved disputed expert opinions, it is well-settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts. In *Price Road Neighborhood Ass'n, Inc. v. Dep't of Transportation*, 113 F.3d 1505 (9th Cir.

1997), the Court of Appeals affirmed a district court's grant of summary judgment to the agency.

The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies to contradict those of the agencies. We have consistently rejected such attempts, noting that "when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts...."

*Id.* at 1511, citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992) (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)) accord *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because "disagreement among experts does not invalidate an EIS" (citation omitted)).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts "even if, as an original matter, a court might find contrary views more persuasive." *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), "[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions." The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE's EISs. Specifically, in promulgating 10 C.F.R. § 51.109, the NRC stated that "[t]he adoption of the [DOE] statement does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy." NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed. Reg. 16,131, 16,142 (May 5, 1988). Accordingly, a NEPA contention that is premised on a disagreement between a potential intervenor's expert and DOE's expert analysis in an EIS does not create a litigable issue and should not be admitted.

Similarly, an agency is entitled to rely on reasonable assumptions in its environmental analyses. *Inland Empire Pub. Lands Council v. U.S. Forest Serv.*, 88 F.3d 754, 761 (9th Cir. 1996), citing *Sierra Club v. Marita*, 845 F. Supp. 1317, 1331 (E.D. Wis. 1994), *aff'd*, 46 F.3d 606 (7th Cir. 1995); *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1335-36 (9th Cir. 1992). As in the case of a reviewing court, it is not the role of the NRC “to decide what assumptions ... we would make were we in the Secretary’s position, but rather to scrutinize the record to ensure that the Secretary has provided a reasoned explanation for his policy assumptions ....” *Wyo. Lodging and Rest. Ass’n v. Dep’t of the Interior*, 398 F. Supp. 2d 1197, 1214 (D. Wyo. 2005), citing *Am. Iron & Steel Inst. v. OSHA*, 939 F.2d 975, 982 (D.C. Cir. 1991); *S.F. Baykeeper v. U.S. Army Corps of Eng’rs*, 219 F. Supp. 2d 1001, 1015 (N.D. Cal. 2002) (holding that an agency’s reasonable assumptions were entitled to deference). DOE has provided reasonable explanations for the assumptions it has made in its NEPA analyses regarding potential sabotage events, Repository SEIS, Vol. I at 6-24 to -31, and it is not the Commission’s duty to “second guess” those assumptions. *Wyo. Lodging and Rest. Ass’n*, 398 F. Supp. 2d at 1214.

Nevada contends that DOE’s NEPA analysis of potential sabotage events does not sufficiently consider the possible ways in which a terrorist attack could be mounted against a train or truck carrying SNF or HLW. However, DOE evaluated events in which a military jet or commercial airliner would crash into a cask or a modern weapon would penetrate a cask, and recognized the uncertainty inherent in the analysis of potential sabotage events, noting that the possibilities are infinite. *See, e.g.*, Repository SEIS, Vol. I at 6-24 to 6-31. Recognizing these same difficulties, in *Pacific Gas & Electric Co.*, the Commission recently rejected as inadmissible a contention that the NRC Staff’s environmental assessment had failed to consider alternate threat scenarios. The Commission held that “[a]djudicating alternate terrorist scenarios

is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity.” *Pac. Gas & Elec. Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, 67 NRC \_\_\_ (slip op. at 24) (Jan. 15, 2008). Moreover, DOE’s analysis fully meets the requirements that an agency take a “hard look” at environmental consequences. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n. 21 (1976).

As DOE recognized in the Repository SEIS, it is always possible to postulate scenarios that could produce higher consequences than previous estimates. Repository SEIS, Vol. I at 6-24 to -31. However, NEPA does not require DOE to conduct a “worst-case” analysis. In eliminating the requirement to conduct such an analysis from its regulations in 1985, the Council on Environmental Quality noted that “one can always conjure up a worse ‘worst case’” by adding more variables to a hypothetical event, National Environmental Policy Act Regulations, 50 Fed. Reg. 32,234, 32,236 (Aug. 9, 1985), and that “‘worst case analysis’ is an unproductive and ineffective method . . . one which can breed endless hypothesis and speculation.” 51 Fed. Reg. at 15,624-5 (Apr. 25, 1986). In *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 356 (1989), the Supreme Court held that the CEQ acted reasonably in eliminating the requirement that an agency conduct a worst-case analysis. The Court noted that CEQ regulations are “entitled to substantial deference,” and that the “worst case analysis” requirement had been abandoned for the well-considered reason that it had “distort[ed] the decisionmaking process by overemphasizing highly speculative harms.” *Id.*; *Edwardsen v. U.S. Dep’t of Interior*, 268 F.3d 781, 785 (9th Cir. 2001) (“an EIS need not include a worst case scenario”). Accordingly, an EIS “need not discuss in detail every possible negative effect” of an action in order for an agency to

fulfill its NEPA obligations. *County of San Diego v. Babbitt*, 847 F.Supp. 768, 775 (S.D. Cal. 1994).

Nevada's alternate threat scenario involving two warheads, in which the second is somehow placed precisely in the entry hole of the first thereby resulting in an exit hole on the opposite side of the cask, *see* Petition at 1044-45, is exactly the kind of highly speculative, worst-case terrorist scenario that both the Commission and the courts have held agencies need not consider in an EIS.

Contrary to the State's assertion that DOE failed to evaluate reasonably foreseeable attack scenarios, to ensure that it took a 'hard look,' DOE considered the scenarios postulated by the State and presented them in the Repository SEIS, together with DOE's own evaluation. *See* Repository SEIS, at S-23 to -24, and Vol. I at 6-28 to 31.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because Nevada's claim is barred by res judicata and finality, and because the contention is of a type that courts and the Commission have rejected as impermissible under NEPA.

## **208. NEV-NEPA-02 - Transportation Sabotage Cleanup Costs**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) (“FSEIS”) Subsection 6.3.4.2 and Appendix G.8 regarding transportation sabotage events, and FSEIS Appendix G.9.7 regarding cost of cleanup after accidents, fail to provide an estimate of the cost of cleanup and other economic impacts following a sabotage event that resulted in release of radioactive materials, even though DOE assumes that cleanup would occur. This deficiency is significant because, without considering the cleanup costs of reasonably foreseeable attack scenarios, there is no adequate disclosure of environmental impacts under NEPA. If the cleanup costs of reasonably foreseeable attack scenarios were added, the disclosure of radiological impacts could be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada asserts that DOE failed to provide an estimate of the cost of cleanup and other economic impacts following a transportation sabotage event, and that if cleanup costs were added, “the disclosure of radiological impacts could be materially different.” Nevada asserts that for these reasons, the 2002 FEIS and Repository SEIS cannot be adopted by the NRC.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4 Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if

proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. First, Nevada does not, in its experts’ affidavits or anywhere in its Petition, separately address the criteria for §§ 51.109 and 2.326(a) or demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s two experts’ affidavits simply adopt paragraphs in the Petition. Halstead Affidavit at 1; Frishman Affidavit at 1. Neither of Nevada’s experts make any representation that they have conducted any study or investigation regarding the matters discussed in the adopted paragraphs. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s two experts, Mr. Halstead and Mr. Frishman, simply point to reports prepared by others, such as the RWMA report, *see* Petition at 1050, and note that these reports discuss a range of cleanup costs following sabotage events. Neither Mr. Halstead nor Mr. Frishman claims that they have assured themselves through independent study and analysis that the reports to which they refer (principally the RWMA report) have any scientific validity. Instead the experts simply report

what the reports say – a practice that has been held to be inappropriate by the federal courts unless the person who actually prepared the report is available to testify. *Weaver v. Phoenix Home Life Mut. Ins. Co.*, 990 F.2d 154, 159 (4th Cir. 1993). Nevada’s experts then make the conclusory statement that “[i]f the cleanup costs of reasonably foreseeable attack scenarios were added, the disclosure of radiological impacts *could* be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.” Petition at 1048 (emphasis added). This conclusion is nothing more than a statement that something might be possible. The standard that must be met is not what “could be materially different,” but what would be or would likely be materially different. As to that standard, the affidavits of Mr. Halstead and Mr. Frishman are silent.

Neither of Nevada’s two experts is an expert on sabotage events. Mr. Frishman is a geologist, and there is nothing identified in his background which would qualify him to provide expert testimony on possible sabotage events involving two weapons (of a type never explained by either Mr. Frishman or Mr. Halstead) or the cleanup costs following such events. Frishman Affidavit, Attach. A. Similarly, Mr. Halstead has nothing in his training or experience that would qualify him to offer expert opinions on a sabotage event involving two weapons or cleanup costs. Halstead Affidavit, Attach. A. By education, Mr. Halstead is an historian with a Masters degree in American History. He has worked on transportation issues involving spent nuclear fuel, but he has no discernable background in weapons, ballistics, or sabotage events. Given the lack of qualifications to provide expert opinions on sabotage events, the affidavits of Nevada’s two experts fail to meet NRC admissibility standards and this contention should be rejected. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360, 367-68 (1998).

There are a number of additional flaws in the contention and Nevada's experts' affidavits. Paragraph 5 references, without any detailed factual or technical discussion, computer software which DOE allegedly could have used to calculate costs.<sup>132</sup> Even if the software did include the ability to address cleanup costs, its application for the hypothetical accident and sabotage scenarios evaluated in the Repository SEIS would be inappropriate. For example, the Department of Homeland Security has stated that "cleanup criteria should be derived through a site-specific optimization process" and lists a large number of such site-specific factors. Notice of Final Guidance: Planning Guidance for Protection and Recovery Following Radiological Disposal Device (RDD) and Improvised Nuclear Device (IND) Incidents, 73 Fed. Reg. 45,029, 45,036 (Aug. 1, 2008). DOE reasonably concluded in the 2002 FEIS that "[t]he restoration that would be necessary following an accident cannot be predicted. It would depend on the environmental factors involved – 1) the levels of contamination from the accident, 2) cleanup levels and decontamination methods used, and 3) location and ecology of the affected land areas – and the restoration goal that was used." *See* 2002 FEIS, Vol. II, App. J at J-73. Nowhere in the discussion in Paragraph 5 do Nevada's experts explain why the studies and estimates of cleanup costs in the event of an accidental release of radioactive material that DOE did present in the 2002 FEIS and Repository SEIS are inaccurate and do not reasonably reflect the possible cleanup costs. *See* 2002 FEIS, Vol. II., App. J at J-72 to -74; Repository SEIS, Vol. II, App. G at G-55 to -57. Under such circumstances, Nevada's experts do not demonstrate that DOE's

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<sup>132</sup> In fact, the reference upon which Nevada's experts rely is to a superseded version of RADTRAN. Petition at 1050. DOE used RADTRAN 5.5, not RADTRAN 5 as Section 5 states. *See* "Calculation Package for the Transportation Impacts for the [Repository SEIS]," Attachment 07B (June 5, 2008) Special Instruction Sheet for Calculation Package For the Transportation Impacts for the Final SEIS (LSN DEN001598031). This version of RADTRAN 5 does not contain an economic model.

approach was unreasonable or that any different approach would lead or would be likely to lead to a different result.

DOE also explained in detail in the Repository SEIS why Nevada's assertion of higher consequences is unrealistic. Repository SEIS, Vol. I at 6-28 to -31; Vol. II, App. G at G-55 to -57. Nevada's experts do not address the Repository SEIS's response to Nevada's assertions regarding cleanup costs, much less demonstrate that DOE was erroneous. Ultimately, all that Nevada's experts have done in their affidavits is show that the RWMA estimates of costs are different from those DOE discusses in the 2002 FEIS and Repository SEIS. Thus, the affidavits do not meet the standards of 10 C.F.R. §§ 51.109 and 2.326 and do not provide any support for admissibility of the contention. Absent adequate affidavits, 10 C.F.R. §§ 51.109 and 2.326 require that the contention be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of cleanup costs from a potential sabotage event is objectionable on all three grounds.

First, as addressed in Section V.A.5(a)(1) above, under the AEA and the ERA, the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to transportation sabotage for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of potential sabotage events, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's

2006 decision in *Nevada v. Department of Energy*, 457 F.3d 78 (D.C.Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In addition to being outside the scope of this proceeding and instead within the exclusive jurisdiction of a federal court of appeals, as well as being barred under res judicata and finality principles, the contention does not present an issue material to the findings that the NRC must make. As a threshold matter, as demonstrated above, Nevada's allegation that radiological impacts "*could* be materially different," if cleanup costs were added, Petition at 1048, 1051, does not allege a material issue. Moreover, Nevada cites no authority for the proposition that inclusion of financial costs of cleanup following a sabotage event was necessary for a proper "disclosure of radiological impacts." *Id.* at 1048. The accepted methodology to quantify the radiological impacts of a transportation accident or sabotage event involving the release of radioactivity is by estimating the number of latent cancer fatalities that could result if the accident occurred. ("Recommendations for Analyzing Accidents Under the National Environmental Policy Act," (July 2002) (LSN#DN2001714520, Section 4.1 at 10)). In the Repository SEIS, estimates of latent cancer fatalities that could result from the maximum reasonably foreseeable transportation accident and transportation sabotage events are presented in Table 6-7 at 6-24 and Table 6-8 at 6-27. The costs of cleanup have no effect on the number of latent cancer fatalities (*i.e.*, the radiological impacts) and consequently, the radiological impacts would not be materially different irrespective of the costs of cleanup.

In any event, DOE did examine cleanup costs resulting from an accident or sabotage event during the transport of SNF and HLW to the repository. *See* Repository SEIS, App. G at G-55. DOE provided estimates of the costs of cleanup of the release of radioactive materials resulting from accidents during transport of SNF and HLW. DOE considered a wide range of potential cleanup costs that it could expect for severe accidents during the transport of SNF to the Yucca Mountain repository in the unlikely event such an event were to occur. *See* 2002 FEIS, Vol. II, App. J at J-72 to -73; *see also* Repository SEIS, Vol. II at G-55 to -57. In the 2002 FEIS, DOE estimated such costs could range from \$200,000 to \$10 billion. DOE also expressly considered estimates prepared by the State of Nevada. Repository SEIS, Vol. II at G-57. DOE discussed the methodology for Nevada's estimates and expressly explained why those estimates yield unrealistically high results. *See id.* DOE's analysis fully meets the requirement that an agency take a "hard look" at environmental consequences. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976).

It is settled law under NEPA that an agency is entitled to deference in determining which methodologies to use in making decisions. *See, e.g., Wyo. Lodging & Rest. Ass'n v. U.S. Dep't of Interior*, 398 F. Supp. 2d 1197, 1213 (D. Wyo. 2005) (citing cases). NEPA does not require that an EIS be "based on the best scientific methodology available," *Lands Council v. McNair*, 537 F.3d 981, 1003 (9th Cir. 2008); (quoting *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 986 (9th Cir. 1985)), as long as the agency acted reasonably, as DOE did here. Given DOE's acknowledgement that costs could be as high as \$10 billion (albeit under very unlikely circumstances), it cannot be said that DOE has failed to consider the costs of a transportation accident. The NRC is not required "to resolve disagreements among various scientists as to methodology," *see Friends of Endangered Species, Inc.*, 760 F.2d at 986, let alone a

disagreement about the speculative economic effects of environmental cleanup alleged by a non-economist “expert.” Accordingly, Nevada’s experts’ preference that a different methodology for estimating accident costs be used, involving a superseded version of a computer program, does not raise a material issue.

Similarly, although Mr. Frishman and Mr. Halstead are not qualified experts, and even if the Board were to conclude that this contention involved disputed expert opinions, it is well-settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts. In *Price Road Neighborhood Ass’n, Inc. v. Department of Transportation*, 113 F. 3d 1505 (9th Cir. 1997), the Court of Appeals affirmed a district court’s grant of summary judgment to the agency. The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies to contradict those of the agencies. We have consistently rejected such attempts, noting that “when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts....”

*Id.* at 1511, citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)) accord *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because “disagreement among experts does not invalidate an EIS” (citation omitted)).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts “even if, as an original matter, a court might find contrary views more persuasive.” *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), “[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency

as to the environmental consequences of its actions.” The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE’s EIS. Accordingly, this contention, which is premised on a disagreement between an intervenor’s expert and DOE’s expert analysis in an EIS does not create a litigable issue and therefore should not be admitted.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE’s transportation decisions and supporting NEPA analysis are outside the scope of this proceeding, because the contention is barred by res judicata and by Nevada’s failure to raise its claim within 180 days of issuance of the April 2004 ROD, and because the contention does not raise a claim under NEPA.

### **209. NEV-NEPA-03 - Transportation Accident Cleanup Costs**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Appendix G.9.7, regarding the cost of cleanup from transportation accidents, fails to provide verifiable estimates of the costs of cleanup following severe transportation accidents that resulted in release of radioactive materials. This deficiency is significant because, without considering reasonably foreseeable transportation accidents and their effects including cleanup costs, there is no adequate disclosure of environmental impacts under NEPA. If reasonably foreseeable transportation accidents and their effects including cleanup costs were properly considered, the disclosure of radiological impacts could be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

#### **RESPONSE**

In this contention, the State of Nevada asserts that DOE failed to provide an estimate of the cost of cleanup following a transportation accident and that if cleanup costs were considered, "the disclosure of radiological impacts could be materially different." Nevada asserts that for these reasons, the 2002 FEIS and Repository SEIS cannot be adopted by the NRC.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4 Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a

qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. First, Nevada does not in its experts’ affidavits or anywhere in its Petition separately address the criteria for §§ 51.109 and 2.326(a) or demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s two experts’ affidavits simply adopt paragraphs in the Petition. Halstead Affidavit at 1; Frishman Affidavit at 1. Neither of Nevada’s experts make any representation that they have conducted any study or investigation regarding the matters discussed in the adopted paragraphs. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s two experts, Mr. Halstead and Mr. Frishman, simply point to reports prepared by others, such as the RWMA reports, Petition at 1055, and note that these reports discuss a range of cleanup costs following accidents. Neither Mr. Halstead nor Mr. Frishman claim that they have assured themselves through independent study and analysis that the documents to which they refer (principally the RWMA reports) have any scientific validity. Instead, the experts simply report what the reports say – a practice that has been held to be inappropriate in the federal courts unless the person who actually prepared the report is available to testify. *Weaver v. Phoenix Home Life Mut. Ins. Co.*,

990 F.2d 154, 159 (4th Cir. 1993). Nevada's experts then make the conclusory statement that "[i]f reasonably foreseeable transportation accidents and their effects including cleanup costs were properly considered, the disclosure of radiological impacts *could* be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC." Petition at 1055 (emphasis added). This conclusion is nothing more than a statement that something might be possible. The standard that must be met is not what "could be materially different," but what would be or would likely be materially different. As to that standard, the affidavits of Mr. Halstead and Mr. Frishman are silent.

Neither of Nevada's two experts is an expert on transportation accidents involving SNF or HLW. Mr. Frishman is a geologist, and there is nothing identified in his background which would qualify him to provide expert testimony on the risk of transportation accidents, the radiological impacts thereof, or the cleanup costs following such events. Frishman Affidavit, Attach. A. Similarly, Mr. Halstead has nothing in his training or experience that would qualify him to offer such expert opinions. Halstead Affidavit, Attach. A. By education, Mr. Halstead is an historian with a Masters degree in American History. He has worked on transportation issues involving spent nuclear fuel, but he has no discernable background which would enable him to address the accuracy and adequacy of DOE's analysis of the impacts of transportation accidents. Given the lack of qualifications to provide expert opinions on transportation accidents and impacts thereof, the affidavits of Nevada's two experts fail to meet the NRC's admissibility standards and this contention should be rejected. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360, 367-68 (1998).

There are a number of additional flaws in the contention and Nevada's experts' affidavits, including their discussion of computer software which DOE allegedly could have used to

calculate costs.<sup>133</sup> Even if the software did include the ability to address cleanup costs, its application for the hypothetical accident scenarios evaluated in the Repository SEIS would be inappropriate. For example, the Department of Homeland Security has stated that “cleanup criteria should be derived through a site-specific optimization process” and lists a large number of such site-specific factors. Notice of Final Guidance: Planning Guidance for Protection and Recovery Following Radiological Disposal Device (RDD) and Improvised Nuclear Device (IND) Incidents, 73 Fed. Reg. 45,029, 45,036 (Aug. 1, 2008). DOE reasonably concluded in the 2002 FEIS that “[t]he restoration that would be necessary following an accident cannot be predicted. It would depend on the environmental factors involved – 1) the levels of contamination from the accident, 2) cleanup levels and decontamination methods used, and 3) location and ecology of the affected land areas – and the restoration goal that was used.” *See* 2002 FEIS, Vol. II, App. J at J-73. Nowhere in the discussion in Paragraph 5 do Nevada’s experts explain why the estimates of cleanup costs in the event of an accidental release of radioactive material that DOE did present in the 2002 FEIS and Repository SEIS are inaccurate and do not reasonably reflect the possible cleanup costs. *See* 2002 FEIS, Vol. II, App. J at J-72 to -74; Repository SEIS, Vol. II, App. G at G-55 to -57. Under such circumstances, Nevada’s experts do not demonstrate that DOE’s approach was unreasonable or that any different approach would lead or would be likely to lead to a different result.

DOE also explained in the Repository SEIS why Nevada’s assertion of higher consequences is unrealistic:

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<sup>133</sup> In fact, the reference upon which Nevada’s experts rely is to a superseded version of RADTRAN. Petition at 1054-55. DOE used RADTRAN 5.5, not RADTRAN 5 as Section 5 states. *See* Special Instruction Sheet For Calculation Package For The Transportation Impacts For The Final SEIS (LSN# DEN00159031). This version of RADTRAN 5 does not contain an economic model.

[T]he State's analysis used values for parameters that would be at or near their maximum values. DOE guidance for the evaluation of accidents in environmental impact statements [LSN# DN2001714520] specifically cautions against the evaluation of scenarios for which conservative (or bounding) values are selected for multiple parameters because the approach yields unrealistically high results.

Repository SEIS, Vol. I at 6-23. Nevada's experts do not address the Repository SEIS's analysis of Nevada's assertions regarding consequences, much less demonstrate that DOE was erroneous. Ultimately, all that Nevada's experts have done in their affidavits is show that the RWMA estimates of costs are different from those DOE discussed in the 2002 FEIS and Repository SEIS. Thus, the affidavits do not meet the standards of 10 C.F.R. §§ 51.109 and 2.326 and do not provide any support for admissibility of the contention. Absent adequate affidavits, 10 C.F.R. §§ 51.109 and 2.326 require that this contention be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of transportation accidents is objectionable on all three grounds.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to transportation accidents for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of potential transportation accidents, are no longer subject to review in any forum, both as a result of the expiration of the

180 day period to challenge that ROD set forth in Section 119 of the NWPAA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Department of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In addition to being outside the scope of this proceeding and instead within the exclusive jurisdiction of the court of appeals, as well as being barred under res judicata and finality principles, the contention does not present an issue material to a finding the NRC must make. As a threshold matter, as demonstrated above, Nevada's allegation that "radiological impacts *could* be materially different," if cleanup costs were considered, Petition at 1052, 1055, does not allege a material issue. Moreover, Nevada cites no authority for the proposition that inclusion of financial costs of cleanup following an accident was necessary for a proper "disclosure of radiological impacts." Petition at 1052. The accepted methodology to quantify the radiological impacts of a transportation accident event involving the release of radioactivity is by estimating the number of latent cancer fatalities that could result if the accident occurred. ("Recommendations for Analyzing Accidents Under the National Environmental Policy Act," (July 2002) (LSN#DN2001714520, Section 4.1, at 10)). In the Repository SEIS, estimates of latent cancer fatalities that could result from the maximum reasonably foreseeable transportation accident and transportation sabotage events are presented in Table 6-7, at 6-24, and Table 6-8 at 6-27. The costs of cleanup have no effect on the number of latent cancer fatalities (*i.e.*, the radiological impacts) and consequently, the radiological impacts would not be materially different irrespective of the costs of cleanup.

In any event, DOE did examine cleanup costs resulting from an accident during the transport of SNF and HLW to the repository. *See* Repository SEIS, Vol. II, App. G at G-55. DOE provided estimates of the costs of cleanup of the release of radioactive materials resulting from the maximum reasonably foreseeable accident during transport of SNF and HLW. DOE considered a wide range of potential cleanup costs that it could expect for severe accidents during the transport of SNF to the Yucca Mountain repository in the unlikely event such an event were to occur. *See* 2002 FEIS, Vol. II, App. J at J-72 to -73; *see also* Repository SEIS Vol. II, App. G at G-55 to -57. In the 2002 FEIS, DOE estimated such costs could range from \$200,000 to \$10 billion. DOE also expressly considered estimates prepared by the State of Nevada. *See id.* DOE discussed the methodology for Nevada's estimates and expressly explained why those estimates yield unrealistically high results. *See* Repository SEIS, Vol. II, App. G at G-57.

It is settled law under NEPA that an agency is entitled to deference in determining which methodologies to use in making decisions. *See, e.g., Wyo. Lodging & Rest. Ass'n v. U.S. Dep't of Interior*, 398 F. Supp. 2d 1197, 1213 (D. Wyo. 2005) (citing cases). NEPA does not require that an EIS be "based on the best scientific methodology available," *Lands Council v. McNair*, 537 F.3d 981, 1003 (9th Cir. 2008) (quoting *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 986 (9th Cir. 1985)), as long as the agency acted reasonably, as DOE did here. Given DOE's acknowledgement that costs could be as high as \$10 billion (albeit under very unlikely circumstances), it cannot be said that DOE has failed to consider the costs of a transportation accident. The NRC is not required "to resolve disagreements among various scientists as to methodology," *see Friends of Endangered Species, Inc.*, 760 F.2d at 986. Accordingly, Nevada's experts' preference that a different methodology for estimating accident costs be used, involving a superseded version of a computer program, does not raise a material issue.

Similarly, although Mr. Frishman and Mr. Halstead are not qualified experts, and even if the Board were to conclude that this contention involved disputed expert opinions, the well-settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts, still applies. In *Price Road Neighborhood Ass'n, Inc. v. Department of Transportation*, 113 F. 3d 1505 (9th Cir. 1997), the Court of Appeals affirmed a district court's grant of summary judgment to the agency. The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies to contradict those of the agencies. We have consistently rejected such attempts, noting that "when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts...."

*Id* at 1511, citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)); accord *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because "disagreement among experts does not invalidate an EIS" (citation omitted)).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts "even if, as an original matter, a court might find contrary views more persuasive." *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), "[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions." The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE's EIS. Accordingly, this contention, which is premised on a disagreement between an intervenor's expert and DOE's expert analysis in an EIS does not create a litigable issue and therefore should not be admitted.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analysis are outside the scope of this proceeding, because the contention is barred by res judicata and by Nevada's failure to raise its claim within 180 days of issuance of the April 2004 ROD, and because the contention does not raise a claim under NEPA.

## **210. NEV-NEPA-04 - Shared Use Option**

Final Environmental Impact Statement for a Rail Alignment, DOE/EIS 0369 (06/2008) ("Rail Alignment FEIS" or "RA FEIS") Subsections 4.2.1 and 4.2.10, incorporated by reference in Section 6.4 of the Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") (*see* FSEIS at 6-1), fail to adequately evaluate operational impacts of the shared use option generally, and specifically fail to evaluate the potential operational impacts of induced traffic growth. This deficiency is significant because, without fully considering the operational impacts of shared use under common carrier obligations, there is no adequate disclosure under NEPA. If a reasonable discussion of the operational impacts of the shared use option was included, the disclosure of shared use operational impacts could be materially different. Therefore, the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada asserts that DOE's Rail Alignment EIS and the Repository SEIS are inadequate because they "fail to adequately evaluate operational impacts of the shared use option generally, and specifically fail to evaluate the potential operational impacts of induced traffic growth." Petition at 1057.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if

proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.* to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to meet any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. With regard to the most difficult and important showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s petition and the affidavit of its expert, Mr. Robert Halstead, are silent. Halstead Affidavit at 1. Equally important, Nevada’s expert never provides the analysis that is explicitly called for by the terms of §§ 51.109 and 2.326. In his affidavit, Mr. Halstead does not set forth factual and/or technical bases in support of the contention, nor does he provide a specific explanation of why the requirements of § 2.326 have been met. Nevada has ignored the requirements of §§ 51.109 and 2.236 and its contention should, therefore, be rejected.

Mr. Halstead’s affidavit is flawed in several other respects. Mr. Halstead adopts Paragraph 5 of the contention as the substance of his affidavit. Paragraph 5 misstates the analysis conducted by DOE in the Rail Alignment EIS, stating that the DOE’s analysis of “shared use” was limited to “interviews with existing businesses.” Petition at 1059. Paragraph 5 then quotes from Nevada’s comments on the Rail Alignment EIS and speculates that operation of

the Caliente line “could result in large-scale rail shipments to coal-fired power plants, bio-fuels or other energy production facilities, and/or solid waste recycling and disposal facilities.” *Id.* In support of that assertion, Mr. Halstead offers no evidence other than a 2005 slide presentation by a railroad executive promoting the use of coal. The presentation does not provide any basis for the contention’s speculative assumption that the Caliente line as a common carriage rail line would result in large-scale rail shipments to coal fired power plants, bio-fuels or other energy production facilities and/or solid waste recycling and disposal facilities. Mr. Halstead offers no evidence or fact of any kind to support his speculation that the Caliente line could be used to transport 2 million tons of coal to an unplanned power plant which could possibly be located somewhere along the Caliente line. Mr. Halstead also claims that DOE’s consideration of “induced traffic growth” was inadequate but provides no evidence of any such growth or its magnitude. Mr. Halstead’s affidavit thus lacks a factual basis and therefore has no evidentiary value and cannot be the basis for the admission of this contention. The contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention, which challenges DOE’s transportation decisions and the environmental impact statements upon which those decisions are based, is beyond the scope of this proceeding.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have authority over DOE's transportation facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not present an issue material to the findings that the NRC must make because challenges to DOE's transportation decisions are outside the scope of this proceeding. In addition, this contention does not present a material issue because DOE adequately addressed "shared use" in the Rail Alignment EIS.

As required by NEPA, DOE took a "hard look" at environmental impacts of the proposed Nevada rail line, including those from shared use of the Caliente line. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). In response to Nevada's comment quoted in its contention, Petition at 1059, DOE explained that its analysis of shared-use was a conservative estimate of the

types of commodities and potential shipments that could operate along the proposed rail line. Rail Alignment EIS, Vol. VI at CRD 3-57. As explained in the Rail Alignment EIS, DOE used a study conducted by Nye County, and also conducted its own analysis, to project commercial freight demand along the Caliente route. Rail Alignment EIS, Vol. I at 2-111 to -113. Nye County developed low-to-high range estimates of commercial freight shipments by interviewing “stakeholders throughout the three counties traversed by the Caliente Corridor, including elected officials, agency employees, representatives of corridor businesses, and consultants and academics who have performed related studies.” (DIRS 185244-Wilbur Smith Associates 2007 at 7). LSN# DN2002213277 That study also considered potential new markets and opportunities for economic development that could result from operation of the railroad. *Id.* at 16). DOE also interviewed potential shippers along the route. Rail Alignment EIS, Vol. I at 2-112. The persons interviewed in these studies were located primarily in areas along the route where industry and infrastructure exist (*e.g.*, existing mining districts and population centers) and were therefore the most likely individuals to identify potential growth in the region that would be induced by construction of the railroad. The remainder of the route crosses rural, remote areas of Nevada with little or no infrastructure.

Based on these interviews and as described in § 2.2.6.1 at 2-112 of the Rail Alignment EIS, DOE developed reasonable projections of commercial freight demand that could occur along the Caliente rail alignment for purposes of analysis under NEPA. DOE estimated there could be about 223 carloads per week, which is similar to the mid-range demand scenario in the Nye County study, and about twice the low-range estimate in the Nye County study. DOE did not include in its projection shipments from additional, unplanned facilities or industries, such as a coal-fired power plant suggested by Nevada, because there were no indications that other

industries would be planning such facilities. For this reason, DOE determined that to assume unplanned facilities or industries would be speculative and unreasonable.

Nevada provides no evidence or alternative analytical method to support its contention that induced growth would be greater than that analyzed in the shared-used alternative of the Rail Alignment EIS, and offers only speculation that facilities such as a coal-fired power plant or other industry could be induced by the rail line. As reflected in the very decisions Nevada cites in support of its contention, environmental impact statements need not discuss matters which are “only remote and speculative possibilities.” *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Station, Units 3 and 4), LBP-81-14, 13 NRC 677, 688 (1981); *Pub. Ser. Elec. & Gas Co.* (Hope Creek Generating Station, Units 1 and 2), ALAB-518, 9 NRC 14, 17 (1979), citing *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 551 (1978) and *Natural Res. Def. Council v. Morton*, 458 F.2d 827, 837-38 (D.C. Cir. 1972). “A reasonably thorough discussion of the significant aspects of the probable environmental consequences is all that is required by an EIS.” *Pub. Ser. Elec. & Gas Co.*, ALAB-518, 9 NRC at 17, quoting *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974). DOE fully complied with this obligation in its discussion of possible shared use of the railroad.

For example, the analysis of shared-use impacts in § 4.2.1 considered the potential environmental consequences on the physical setting of the construction of additional railroad facilities (*e.g.*, sidings) required to support commercial shipments. DOE concluded that implementation of the shared-use option as analyzed would increase the area of surface disturbance required to construct the railroad by less than 0.1%. *See* Rail Alignment EIS, Vol. III at 4-32. Even doubling the number of additional railroad facilities needed to support additional commercial enterprises not considered by DOE would result in an increase of less than

0.2% in the amount of land disturbed, which is by no means a materially different result from that considered in the Rail Alignment EIS. Additional analyses of new railroad spurs, branch lines, or other facilities to support the types of unplanned projects suggested by Nevada would require speculation.

Similarly, to analyze the environmental consequences of the shared-use alternative on human health and safety, DOE evaluated the potential impacts of eight commercial trains per week, in addition to the 17 trains per week associated with operation of the repository and railroad. *See* Rail Alignment EIS, Vol. III at 4-356 to -358. DOE concluded that the eight additional commercial trains per week would have a small impact on the potential for an accident involving a cask car, that the overall density of trains on the rail line would still be considered low, and that a total of about three additional fatalities and 13 additional accidents would be expected to occur for the entire set of estimated railcar movements associated with commercial shipments. *Id.*

In sum, DOE has provided a “reasonably complete” analysis of possible environmental impacts from shared use of the Caliente line in the Rail Alignment EIS sufficient to satisfy NEPA’s requirement that an agency take a “hard look” at potential environmental effects. *Kleppe*, 427 U.S. at 410 n.21. Nevada’s assertion that DOE failed to meet NEPA’s requirements to evaluate shared-use impacts is entirely unsupported by the facts and relevant caselaw. The contention should, therefore, be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R.

§ 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

## **211. NEV-NEPA-05 - Radiological Regions Of Influence For Transportation**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsections 3.2.2 and 6.4.1, and Final Environmental Impact Statement for a Rail Alignment, DOE/EIS 0369 (06/2008) ("Rail Alignment FEIS" or "RA FEIS") (incorporated by reference in the FSEIS at 6-1) Subsection 3.2.10, which address the radiological regions of influence for transportation, fail to apply the preferred method of analysis consistently for transportation impacts in Nevada and nationally. This failure is significant because without consistently evaluating the radiological regions of influence for transportation DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the RA FEIS, neither document can be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada argues that DOE failed to consistently apply the preferred method of analysis in evaluating the radiological regions of influence to assess transportation impacts within the Caliente and Mina rail corridors in relation to transportation impacts in other parts of Nevada and in relation to transportation impacts nationally.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R §§ 51.109 and 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its

environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners....” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address the mandatory requirements of §§ 51.109 and 2.326. With regard to the most important and difficult showing, a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true, Nevada’s Petition and the affidavit of its expert, Mr. Robert Halstead, are silent. Halstead Affidavit at 1. Equally important, Nevada’s expert never provides the analysis that is explicitly called for by the terms of § 2.326(b). This regulation requires Nevada’s expert to “set forth the factual and/or technical bases for the movant’s claim that the criteria of paragraph (a) of this section have been satisfied.” Section 2.326(b) goes on to state that “[e]ach of the criteria must be separately addressed, with a specific explanation of why it has been met.” Mr. Halstead’s affidavit says nothing about any of these criteria and merely adopts the words of Paragraph 5 of the Petition. Paragraph 5, in turn, provides none of the analyses or explanations required by the Commission’s regulations. Petition at 1063. The affidavit and this contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of transportation routes is objectionable for all three reasons. First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), NRC does not have authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail

Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

Nevada has failed to identify any issue relating to this contention for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of radiological regions of influence, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPAA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Dep't of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding, and may only be challenged through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in Section c. above, this issue is not material to the findings the NRC must make because Nevada's challenges to DOE's transportation decisions are outside the scope of this proceeding and because the contention is barred under res judicata and finality principles. Additionally, this issue is not material because Nevada has not established any inadequacy under NEPA. As required by NEPA, a potential intervenor must demonstrate that DOE has failed to take a "hard look" at environmental consequences. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). An EIS is adequate under this standard if it "contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences." *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir. 2001) (citation omitted); *Idaho*

*Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir. 1992). DOE's analysis fully meets the requirement that an agency take a "hard look" at environmental consequences.

Contrary to Nevada's assertion, DOE has analyzed radiological regions of influence along routes other than the Caliente and Mina rail alignments, including in the Las Vegas metropolitan area. DOE selected representative routes in its NEPA documents to analyze the potential impacts of transportation of SNF and HLW to Yucca Mountain. 2002 FEIS, Vol. I at 2-43, 2-45, 3-120. These representative routes included potential routes through the Las Vegas region. *Id.* at 2-49. For all of its representative transportation routes, DOE evaluated radiation doses using *the same* region of influence that Nevada is seeking – 0.5 miles for incident-free radiation doses and 50 miles for transportation accidents. Repository SEIS, Vol. I at 3-95, 6-16. DOE also specifically analyzed impacts to the Las Vegas area, even evaluating scenarios unique to Las Vegas based on potential distances to rail lines and population densities. *Id.*, Vol. II. App. G at G-39, G-44. Accordingly, DOE did provide "population and dose information," contrary to Nevada's claim, Petition at 1063, for the routes it analyzed. *Id.* at G-5 to -50 and Attach. 03A, 03B "Special Instruction Sheet for Calculation Package for the Transportation Impacts for the Final SEIS," (June 5, 2008) (LSN#DEN001598031). Thus, Nevada is simply incorrect that DOE does not apply consistent radiological region of influence analysis in other parts of Nevada or for transportation impacts nationally, and it has failed to show that DOE has not taken a "hard look" at the radiological consequences of transportation to Yucca Mountain.

Further, to the extent Nevada is arguing that radiological regions of influence need to be analyzed for the actual routes DOE will use for transportation of SNF and HLW to Yucca Mountain, DOE has no obligation to identify its actual routes at this point in the process. As stated in the Repository SEIS, "[a]t this time, many years before shipments could begin, it is

premature to predict the highway routes or rail lines DOE might use.” Repository SEIS, Vol. III at CR-185.

The policies and procedures of DOE and the CEQ that implement the requirements of NEPA call for agencies to “integrate the NEPA process with other planning at the earliest possible time” in the development of a proposed federal project. 40 C.F.R. § 1501.2. In particular, CEQ regulations 40 C.F.R. §§ 1500.5, 1501.2, 1502.5 and 1508.23 all stress the need to prepare an EIS early in the process. NEPA analysis of environmental consequences must be made “as soon as it can reasonably be done.” *Kern v. U.S. Bur. of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002) (citing *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9th Cir. 1984)). Nevada does not cite a single case in which an environmental impact statement was found invalid because it was prepared too early in the process. It is simply too soon to require DOE to identify the specific routes it will use, including radiological regions of influence along those routes, many years before a possible first shipment.

In addition, there are processes for determining if there is a need for further NEPA analyses after an EIS is finalized if an agency proposes substantial changes to a proposed action that are relevant to environmental concerns, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. 40 C.F.R. § 1502.9(c); 10 C.F.R. § 1021.314(a). DOE would conduct supplemental NEPA review if DOE makes substantial changes in the proposed action relevant to environmental concerns or there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because the contention is barred by res judicata, because Nevada failed to raise its claim within 180 days of the issuance of the 2004 ROD, and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

## **212. NEV-NEPA-06 - Caliente Rail Alignment Plan And Profile Information**

The Final Environmental Impact Statement for a Rail Alignment, DOE/EIS 0369 (06/2008) ("Rail Alignment FEIS" or "RA FEIS") Subsection 2.2.1, and the supporting references therein, fail to provide sufficiently detailed plan and profile information about the proposed Caliente rail alignment to support the impact findings reported in RA FEIS Chapter 4 and incorporated by reference in the Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") at FSEIS at 6-1 and 6-32. This deficiency is significant because, without sufficiently detailed rail alignment plan and profile information, the impact findings reported in RA FEIS Chapter 4, incorporated by reference in FSEIS Chapter 6, cannot be verified, and thus the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada argues that DOE provided insufficiently detailed plan and profile information about the proposed Caliente rail alignment.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these

two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address the mandatory requirements of §§ 51.109 and 2.326. With regard to the most important and difficult showing, a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true, Nevada’s Petition and the affidavit of its expert, Mr. Robert Halstead, are silent. Halstead Affidavit at 1. Equally important, Nevada’s expert does not provide the analysis that is explicitly called for by the terms of § 2.326(b). This regulation requires Nevada’s expert to “set forth the factual and/or technical bases for the movant’s claim that the criteria of paragraph (a) of this section have been satisfied.” Section 2.326(b) goes on to state that “[e]ach of the criteria must be separately addressed, with a specific explanation of why it has been met.” Mr. Halstead’s affidavit says nothing about any of these criteria and merely adopts the words of Paragraph 5 of the Petition. Paragraph 5, in turn, provides none of the analyses or explanations required by the Commission’s regulations. Petition at 1067-69. The affidavit and this contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's inclusion of rail alignment design maps and plan views is objectionable on jurisdictional and finality grounds. First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to this contention for which the approach specified in Section 119 was or is not available.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in Section c. above, this issue is not material to the findings the NRC must make because Nevada's challenges to DOE's transportation decisions are outside the scope of this proceeding and are instead within the exclusive jurisdiction of the courts of appeals. Additionally, this issue is not material because Nevada has not established any inadequacy under NEPA. A potential intervenor must demonstrate that DOE has failed to take a "hard look" at potential environmental consequences. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). An EIS is adequate under this standard if it "contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences." *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir. 2001) (citation omitted); *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir. 1992). DOE's analysis fully meets the requirement that an agency take a "hard look" at environmental consequences.

Contrary to Nevada's assertions, DOE has provided sufficient information to demonstrate that it has performed an adequate and meaningful evaluation of the Caliente rail alignment. DOE made clear the information on which it relied in response to Nevada's earlier comment: "Detailed vertical profile drawings are provided in the Plan and Profile Drawings (DIRS 182674-Nevada Rail Partners 2007, all; DIRS 180871-Nevada Rail Partners 2007, all). Detailed map view drawings of the entire rail alignments are provided in the Caliente Map Atlas (DIRS 185492-DOE 2008, all). . . ." Rail Alignment EIS, Vol. VI at CRD 3-12. The descriptions of impact evaluation methods in the Rail Alignment EIS specifically cited detailed alignment parameters, such as proposed structures and road crossings, and engineering parameters, such as total rise and fall and total earthworks. *Id.*, Vol. III at 4-7 to -13. DOE's plan and profile drawings and map views provided detailed information to assess the impacts of the Caliente rail

alignment, and Nevada has failed to demonstrate that they do not represent a “hard look” at these impacts.

To present an admissible contention, a petitioner cannot simply repeat the comment it made to DOE on the draft, but must demonstrate, through affidavits that comply with the requirements of 10 C.F.R. §§ 51.109 and 2.326, why the NEPA documents, including DOE’s response to the comment, fail to comply with NEPA. *City of Los Angeles v. Nat’l Highway Traffic Safety Admin.*, 912 F.2d 478, 488 (D.C. Cir. 1990) (finding that simple disagreement with an agency’s findings or its methods is not sufficient to render an EA or EIS inadequate under NEPA). The contention does not show why DOE’s response to its comments is incorrect. Nevada’s contention consists simply of unsupported assertions that DOE’s plan and profile documentation, including drawings, are not “sufficiently” detailed or are inaccurate. Moreover, Nevada did not attach any of the documentatation, contrary to the direction of the Advisory PAPO Board in its Case Management Order. The volume of the material in question, consisting of many gigabytes of electronic data, disproves Nevada’s contention that DOE’s analysis lacked adequate detail. It was incumbent on Nevada to demonstrate that, despite this large volume of material regarding the alignment of the Nevada railroad, DOE’s analysis of the rail alignment was insufficiently detailed. Nevada did not do so, and this fact alone requires that Nevada’s contention be rejected. *See U.S. Dep’t of Energy*, (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_\_\_ (June 20, 2008) (Case Management Order).

Nevada argues that DOE failed to post the Plan and Profile Document on the Draft Rail Alignment EIS reference website, or to provide it to Nevada and other stakeholders in time for review of the Draft Rail Alignment EIS, and did not post the document on its website until June

2008. Petition at 1067. However, detailed map view drawings of the entire rail alignments were provided in the Caliente Map Atlas (DIRS 182843-DOE 2007, all) for the Draft Rail Alignment EIS, which was made available in DOE Reading Rooms during the Draft Review period. Also provided was the alignment summary document, with detailed alignment parameters. Rail Alignment EIS, Attach. E. Moreover, Nevada has failed to show that the absence of the Plan and Profile Document left it unable to make known its environmental concerns about the Caliente rail alignment. And even if Nevada could make such a showing – which is highly doubtful – courts have found that a Draft EIS satisfies the regulatory requirements “even if the public was unable to analyze each aspect of the project.” *Nat’l Comm. for the New River, Inc. v. F.E.R.C.*, 373 F.3d 1323, 1329 (D.C. Cir. 2004) (upholding Draft EIS where applicant had not filed a site-specific crossing plan of a waterway for a natural gas pipeline extension).<sup>134</sup>

As to Nevada’s critique that certain documentation is marked “conceptual,” this is irrelevant, as is Nevada’s argument that “[n]umerous design issues remain unresolved. Petition at 1068-69. The policies and procedures of DOE and the CEQ that implement the requirements of NEPA call for agencies to “integrate NEPA process with other planning at the earliest possible time” in the development of a proposed federal project. 40 C.F.R. § 1501.2. In particular, CEQ regulations 40 C.F.R. §§ 1500.5, 1501.2, 1502.5 and 1508.23 all stress the need to prepare an EIS early in the process. NEPA analysis of environmental consequences must be made “as soon as it can reasonably be done.” *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d

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<sup>134</sup> Nevada argues that the Plan and Profile Document’s technical acceptance date of May 15, 2007 raises concerns about whether it was used for the Draft Rail Alignment EIS. Petition at 1067. Nowhere does Nevada explain why this would be relevant, even if true. Regardless, this report and the corresponding profile data were originally prepared in 2005 for use in the Rail Alignment EIS impact analyses and were used to assess the potential environmental impacts presented in Chapter 4 of the Draft Rail Alignment EIS. The report was then revised in 2007 to remove “Privileged” markings that were included on the documents during the agency’s deliberative process, without changing the technical content therein, leading to the 2007 acceptance date. This is therefore a non-issue.

1062, 1072 (9th Cir. 2002) (citing *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9th Cir. 1984)). Nevada does not cite a single case in which an environmental impact statement was found invalid because it was prepared too early in the process. DOE has provided detailed plan and profile information for the Caliente rail alignment appropriate for this point in the process. In addition, there are processes for determining if there is a need for further NEPA analyses after an EIS is finalized if an agency proposes substantial changes to a proposed action, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. 40 C.F.R. § 1502.9(c); 10 C.F.R. § 1021.314(a).

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, the contention is barred by res judicate on finality or inappropriate jurisdiction and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

### **213. NEV-NEPA-07 - Overweight Trucks**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsection 6.1.6, regarding use of overweight trucks for shipment of legal-weight truck casks, fails to systematically assess the impacts of using overweight trucks for spent fuel shipments to Yucca Mountain, nationally and in Nevada. This failure is significant because without assessing the impacts of using overweight trucks for spent fuel shipments DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the "Final Environmental Impact Statement for a Rail Alignment," DOE/EIS 0369 (06/2008), LSN# DEN001593557 ("FEIS"), neither document can be adopted by the NRC.

#### **RESPONSE**

In this contention, Nevada alleges that DOE's NEPA documents are inadequate because they fail "to systematically assess the impacts of using overweight trucks for spent fuel shipments to Yucca Mountain, nationally and in Nevada." Petition at 1070.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. §§ 51.109 and 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Nevada's environmental contention must also be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these

two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to meet any of the mandatory requirements of §§ 51.109 and 2.326. With regard to the most difficult and important showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – the Petition and the affidavit of its expert are silent. Equally important, Nevada’s expert does not provide the analysis that is explicitly called for by the terms of §§ 51.109 and 2.326. Nevada’s witness, Mr. Robert Halstead, does not set forth the factual and/or technical bases in support of the contention, nor does he provide a specific explanation of why the requirements of § 2.326 have been met. Halstead Affidavit at 1. Nevada has ignored the requirements of §§ 51.109 and 2.326 and its contention should therefore be rejected.

There are a number of additional flaws in Mr. Halstead’s affidavit. Mr. Halstead simply adopts the two paragraphs of Paragraph 5 of the contention as the substance of his affidavit. The first part of Paragraph 5 merely lists earlier documents in which it is alleged that it was assumed that only “legal weight trucks” would be used to transport SNF. Petition at 1072. The first part of Paragraph 5 provides no support for this contention and is largely irrelevant. The second part of Paragraph 5 merely lists alleged omissions in the discussion of overweight trucks in the Repository SEIS, Petition at 1072-73, but fails to provide any analysis of the significance of any of these alleged omissions or why any of them would have a material impact on the outcome of

this proceeding – the very burden Nevada must meet before this contention can be admitted. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE’s transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding. Nevada’s challenge to the use of overweight trucks to transport SNF is objectionable on jurisdiction grounds for the following reasons.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE’s transportation facilities and activities, and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE’s decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC’s lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of

environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in section c. above, this issue is not material to the findings the NRC must make because challenges to DOE's transportation decisions are outside the scope of this proceeding. In addition, it does not present a material issue because DOE did not impermissibly fail to evaluate adequately the environmental impacts relating to the use of overweight trucks. In fact, DOE has already prepared two detailed EISs providing extensive analysis of the project, including transportation involving overweight trucks, according to NEPA's requirements. The EISs examine the project as a whole, including detailed discussion of transportation alternatives in the vicinity of the repository as well as broader analysis of regional and national transportation options and their potential environmental effects. *See, e.g.*, 2002 FEIS, Vol. I, at 6-10 to -232; Repository SEIS, Vol. I at 6-2 to -10, 6-15 to -60. The transportation analysis was an exacting one in which representative routes nationwide were thoroughly examined for environmental impacts.

In the Repository SEIS, the analysis of overweight trucks acknowledged that DOE had decided after the initial FEIS had been issued that trucks used to transport SNF in truck casks would likely be somewhat heavier than "legal-weight" trucks and that the overweight trucks would be subject to permitting requirements in the states through which they traveled. Repository SEIS, Vol. I at 6-5. The Repository SEIS also noted that permit requirements in each

state typically “address such matters as the time of day when overweight trucks can travel and whether they can travel on holidays and weekends.” *Id.* Moreover, DOE relied on two studies which considered worker radiation exposure. *Id.* at 6-5 to -8. The first found that there would be a 13% decrease in dose using overweight trucks, but did not consider the impact of increased restrictions on travel that slightly increased travel times and dose. *Id.* at 6-8. A second study found that with increased travel times due to permit restrictions, there would be a 12% increase in dose. *Id.* From this DOE concluded that “radiation doses from overweight truck shipments would be similar to the radiation doses for legal-weight trucks.” *Id.* Finally, the Repository SEIS addressed accidents using overweight trucks and concluded that because overweight trucks carried the same casks as legal-weight trucks, there would be no impact on the consequences of an accident. *Id.* at 6-8. At this early stage of the development of a transportation plan that will not be in place for many years, DOE’s evaluation meets its obligation to take a “hard look” at the impact of overweight trucks. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). An EIS is adequate under this standard if it “contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences.” *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir. 2001) (citation omitted); *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir. 1992).

Nevada complains that the analysis of overweight trucks did not take into account estimated stop time and shipment times likely to result from state permit requirements and did not address doses to state safety inspectors or the general public. In fact, as described above, DOE did take into account state permit requirements generally. The premise of Nevada’s claim is that DOE did not specifically look at each of the states through which SNF might be transported, the length of the transport, and the permit requirements applicable in each state that

would deal with issues such as safety inspections, or stop and start times. That is, Nevada's complaint is that DOE should have analyzed specific routes (necessary to determine the affected states) and modes of transportation rather than representative transportation routes.

It was entirely reasonable for DOE to use representative routes at this stage in the process. As stated in the Repository SEIS, "[A]t this time, many years before shipments could begin, it is premature to predict the highway routes or rail lines DOE might use." Repository SEIS, Vol. III at CR-185. DOE appropriately decided to use representative routes that reflect typical industry practices. Repository SEIS, Vol. II, App. G, at G-5; App. A, at A-5 to -8. To identify these representative routes, DOE used the TRAGIS computer model, which is a regularly updated information system containing thousands of miles of rail lines and highways and allowing users to calculate routes by simulating historical rail and freight routing practices. *Id.*, Vol. II, App. G at G-5 to -13. The highway routes were selected in accordance with Department of Transportation highway routing regulations (49 C.F.R. § 397.101). *Id.*, Vol. II, App. G at G-13. This methodology is entirely reasonable at this stage of the process and identifies routes that could be used in the shipment of SNF and HLW to Yucca Mountain. "[F]ederal agencies are assigned the primary task of defining the scope of NEPA review and their determination is given considerable discretion . . . ." *Wetlands Action Network v. U.S. Army Corps of Eng'rs*, 222 F.3d 1105, 1118 (9th Cir. 2000) (citation omitted); *see also Benton County v. Dep't of Energy*, 256 F. Supp. 2d 1195, 1200 (E.D. Wa. 2003) ("DOE's determination of the appropriate scope of the environmental process . . . is entitled to deference, unless it is arbitrary and capricious."). The record demonstrates that DOE's decision to use representative routes to analyze environmental impacts, including the impact of overweight trucks, was appropriate.

In addition, DOE's use of representative routes in evaluating impacts due to transportation is entirely consistent with CEQ regulations and NEPA caselaw and thus does not raise a material issue. The policies and procedures of DOE and the CEQ that implement the requirements of NEPA call for agencies to "integrate the NEPA process with other planning at the earliest possible time" in the development of a proposed federal project. 40 C.F.R. § 1501.2. In particular, CEQ regulations 40 C.F.R. §§ 1500.5, 1501.2, 1502.5 and 1508.23 all stress the need to prepare an EIS early in the process. Moreover, with respect to situations in which only preliminary design plans had been prepared, courts have held that "the lack of final design plans does not excuse an agency from conducting the most thorough analysis possible of a proposed action." *Crouse Corp. v. ICC*, 781 F.2d 1176, 1194 (6th Cir. 1986). Nevada has not cited a single case in which an environmental impact statement was found invalid because it was prepared too early in the process. Therefore, the fact that DOE provided "the most thorough analysis possible" of transportation issues associated with the project as a whole, including discussion of representative national, regional, and local transportation routes is sufficient to satisfy NEPA's requirements.

It is settled law under NEPA that an agency is entitled to deference in determining which methodologies to use in making decisions. *See, e.g., Wyo. Lodging & Rest. Ass'n v. U.S. Dep't of Interior*, 398 F. Supp. 2d 1197, 1213 (D. Wyo. 2005) (citing cases). NEPA does not require that an EIS be "based on the best scientific methodology available," *Lands Council v. McNair*, 537 F.3d 981, 1003 (9th Cir. 2008) (quoting *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 986, (9th Cir. 1985)) as long as the agency acted reasonably, as DOE did here.

Accordingly, this contention does not present a material issue because DOE was not required to evaluate environmental impacts of the use of overweight trucks using specifically

identified routes. Rather, DOE's analysis of such impacts using representative routes met its obligations under NEPA and the CEQ regulations.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3, regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, and the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

#### **214. NEV-NEPA-08 - Impacts On Aesthetic Resources**

Final Environmental Impact Statement for a Rail Alignment, DOE/EIS 0369 (06/2008) ("Rail Alignment FEIS" or "RA FEIS") Subsections 4.2.3, C.4.1.3, and D.1, regarding Caliente rail alignment aesthetic resources, fail to acknowledge unacceptable adverse impacts on a cultural resource of national and international significance, and fail to apply avoidance as the appropriate method of eliminating an unacceptable adverse impact that cannot be mitigated. The impact findings reported in Rail Alignment FEIS, Chapter 4, are incorporated by reference in Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Chapter 6. This deficiency is significant because without appropriately considering rail alignment impacts on aesthetic resources DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the RA FEIS, neither document can be adopted by the NRC.

#### **RESPONSE**

In this contention, Nevada alleges that DOE inadequately analyzed and failed to mitigate the impact of DOE's choice of the Caliente rail alignment on the "City" landscape sculpture.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R §§ 51.109 and 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its

environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. Its supporting affidavit is submitted by a witness without any qualifications to render expert opinions on aesthetic resources. Mr. Robert J. Halstead submits an affidavit on the cultural significance of a land sculpture located in Garden Valley. Halstead Affidavit at 1. Mr. Halstead by academic training is an historian with a Master’s degree in American History. By experience, he has worked on transportation issues for several states. Nothing in his background, however, qualifies him to provide opinions about the aesthetic resources in Nevada, the United States, or anywhere else. His affidavit is no more valid or reliable than the rejected testimony of a mathematician who tried to provide expert opinions on engineering matters, *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-86-23, 24 NRC 108 (1986), or the environmental health expert who tried to provide expert evidence on physical security matters. *Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360 (1998).

This contention is not supported by a credible qualified expert and ignores all of the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. It should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is directed at the location of the Nevada railroad and therefore challenges DOE's transportation decisions and the environmental impact statements upon which those decisions are based. For the reasons which follow, it is beyond the scope of this proceeding and barred under res judicata and finality principles.

First, as addressed in Section V.A.5(a)(1) above, under the AEA and the ERA, the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on

which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to aesthetic resources for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of the effect of the Caliente rail alignment on the "City" sculpture, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Dep't of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in section c. above, this issue is not material to the findings the NRC must make because Nevada's challenges to DOE's transportation decisions are outside the scope of this proceeding and because the contention is barred under res judicata and finality principles. This contention also is not material because it fails to demonstrate any inadequacy under NEPA. It is a well-settled principle of administrative law that review of agency action is to be based on the administrative record made before the agency. *Fla. Power & Light Co. v. Lorion*, 470 U.S. 729, 743-44 (1985). This standard is applicable to review of agency action

under NEPA. *Animal Def. Council v. Hodel*, 840 F.2d 1432, 1436 (9th Cir. 1988). Thus, except under exceptional circumstances not present here, the adequacy of an EIS must be determined based on the administrative record made before DOE, not a new record made in this proceeding. *See, e.g., Friends of the Earth v. Hintz*, 800 F.2d 822, 828-29 (9th Cir. 1986). The administrative record here includes, among other documents, the draft and final 2002 FEIS and Repository SEIS, the comments, and the responses to comments.

To present an admissible contention, a petitioner cannot simply repeat the comment it made to DOE on the draft, but must demonstrate, through affidavits that comply with the requirements of 10 C.F.R. §§ 51.109 and 2.326, why the NEPA documents, including DOE's response to the comment, fail to comply with NEPA. *City of Los Angeles v. Nat'l Highway Traffic Safety Admin.*, 912 F.2d 478, 488 (D.C. Cir. 1990) (stating that simple disagreement with an agency's findings or its methods is not sufficient to render a NEPA document inadequate under NEPA). Accordingly, a potential intervenor must demonstrate that DOE has failed to take a "hard look" at environmental consequences. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). An EIS is adequate under this standard if it "contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences." *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir. 2001) (citation omitted); *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir. 1992).

The thorough discussion of the "City" sculpture in DOE's Rail Alignment EIS meets NEPA requirements. Although Nevada contends that DOE "fail[s] to acknowledge" the "existence" of the "City" land sculpture, Petition at 1074, this is plainly false. DOE explicitly discusses the "City" sculpture and engages in a careful study of the potential aesthetic and noise impacts of the Caliente Rail Corridor on the sculpture. *See Rail Alignment EIS, Vol. III at 4-87*

to -88, 4-95 to -97, Vol. V , App. D. at Figures D-29 to -50 at D-17 to -27. DOE used standard accepted methods developed by the Bureau of Land Management (BLM) to evaluate impacts to aesthetics and viewsheds. *See id.*, Vol. III at 3-106 to -107. Nevada provides no basis for its argument that the visual or noise impact analyses were inadequate, except that DOE’s conclusions conflicted with “comments to the contrary.” Petition at 1077.<sup>135</sup> A simple disagreement with the agency’s findings is insufficient. *See City of Los Angeles*, 912 F.2d at 488. It is also not material that DOE does not identify the “City” sculpture as a cultural resource, given that it undertook a detailed analysis of the impacts of the Caliente Corridor on the “City.”

Nevada is also incorrect in its position that NEPA requires DOE to adopt alternative segments to avoid alleged impacts to the “City” sculpture. Petition at 1074-75. NEPA “does not impose any substantive requirements on federal agencies – it exists to ensure a process.” *Lands Council v. McNair*, 537 F.3d 981, 1000 (9th Cir. 2008) (internal citations and quotations omitted). Thus, simply finding that a project will have an impact does not require DOE to select Nevada’s preferred rail route. DOE evaluated the technical feasibility of route segments that would avoid Garden Valley, proposed by Nevada and others as alternatives, and determined that those alternatives would not be feasible because of engineering and design constraints. *See Rail Alignment EIS*, Vol. V at Table C-5 at C-21. On this basis, DOE concluded these alternative alignments were not reasonable.

NEPA likewise does not require DOE to implement specific mitigation measures. The Supreme Court has rejected the notion that NEPA contains a “substantive requirement” that “action be taken to mitigate the adverse effects of major federal actions” or “that a complete

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<sup>135</sup> Nor is it relevant that DOE did not measure noise at potential viewing platforms from “City.” DOE reasonably decided to measure noise levels by following relevant noise measurement guidelines. *Rail Alignment EIS*, Vol. VI, at CRD3-222. Further, changing the location of the analysis would not have affected the conclusions of the noise studies. *See id.*, Vol. III at 4-267 to -286; Figures 4-15 at 4-274, 4-19 at 4-280, and 4-20 at 4-281.

mitigation plan be actually formulated and adopted.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352-3 (1989). DOE has more than satisfied its NEPA burden to provide “a reasonably complete discussion of possible mitigation measures.” *Id.* at 333. It has identified measures to mitigate the noise and aesthetic impacts on the “City” sculpture, selecting a route that would have the least impact of the alternative segments analyzed in detail in the Rail Alignment EIS. Record of Decision and Floodplain Statement of Findings-Nevada Rail Alignment for the Disposal of [SNF] and [HLW] at Yucca Mountain, Nye County, Nevada, 73 Fed. Reg. 60,247, 60,256 (Oct. 10, 2008). DOE has also proposed mitigating the visual impact of the rail line by constructing “low, rolling earthwork berms with soils and vegetation that match the surroundings.” Rail Alignment EIS, Vol III at 4-95.

Accordingly, this contention does not present a material issue and should therefore be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE’s transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because the contention is

barred on res judicata and finality grounds, and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention should therefore be rejected.

**215. NEV-NEPA-09 - Transportation Sabotage Risk Vs. At-Reactor Storage**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsection 6.3.4 and Appendix G.8, regarding transportation sabotage events, describe what DOE considers to be reasonably foreseeable sabotage events involving repository shipments in urban areas that could result in radiological consequences. FSEIS Subsection 2.2, the No-Action Alternative, fails to consider reasonably foreseeable sabotage events at one or more of the 76 identified commercial reactor or DOE storage sites. This deficiency is significant because, without equally considering reasonably foreseeable sabotage events under both the Proposed Action and the No-Action Alternative, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS the document cannot be adopted by the NRC.

**RESPONSE**

In this contention, the State of Nevada contends that the Repository SEIS cannot be adopted by the NRC because the No-Action Alternative fails to consider foreseeable sabotage events at one or more of the 76 identified commercial reactor or DOE storage sites. Petition at 1079.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R §§ 51.109 and 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true,

would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavit. First, Nevada does not in its expert’s affidavit or anywhere in its Petition separately address the criteria for §§ 51.109 and 2.326(a) or demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Indeed, Nevada merely asserts that because environmental impacts of sabotage at reactor sites “*could* be materially different from that presented in the FSEIS the document cannot be adopted.” Petition at 1079 (emphasis added). This conclusion is nothing more than a statement that something might be possible. The standard that must be met is not what “could be materially different,” but what would be or would likely be materially different.

Nevada’s expert’s affidavit simply adopts Paragraph 5 in the Petition. In fact, Nevada’s expert, Robert J. Halstead, does not make any representation that he has conducted any study or investigation regarding the matters discussed in the adopted paragraph. Halstead Affidavit at 1. Mr. Halstead and Paragraph 5 of the contention refer to just two documents. The first is characterized as “a detailed estimate of the radiological consequences of a successful sabotage

event at a commercial reactor storage site.” Petition at 1081. In fact, this “detailed estimate” is a two-and-one-half page memorandum from Marvin Resnikoff of RWMA to Mr. Halstead. (“Diablo Canyon Environmental Assessment Supplement” (June 27, 2007) (LSN# NEV000005457)). As to the validity of its conclusions, the memorandum itself makes clear their hypothetical and contingent nature. For example, the memorandum states that “[w]ithout knowing what design basis threats (DBT) for which PG&E must plan, we cannot know whether a hypothesized sabotage scenario would be successful.” *Id.* at 1.

The other document is a report Mr. Halstead and three other individuals prepared for the State of Nevada. Nowhere in his affidavit does Mr. Halstead indicate that he contributed the statements from the report that are paraphrased in Paragraph 5. Statements relating to matters such as what SNF is thermally hotter and more radioactive and the amount of a surface dose that is capable of producing an unshielded lethal exposure do not appear to fall within the expertise of Mr. Halstead. By education, Mr. Halstead is an historian with a Masters degree in American History. Halstead Affidavit, Attach. A. He has worked on transportation issues involving spent nuclear fuel, but he has no discernable background that would enable him to address the dose rates, nuclear fuel cooling rates or the radiological consequences of sabotage events. Given the lack of qualifications to provide expert opinions on transportation accidents and impacts thereof, Mr. Halstead’s affidavit fails to meet NRC admissibility standards and this contention should be rejected. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360, 367-68 (1998).

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Although the 2002 FEIS and the Repository SEIS do discuss a No-Action Alternative, no challenge to the adequacy of DOE's discussion of such alternative is within the scope of this proceeding because the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. § 10101 *et seq.*, expressly provides that an environmental impact statement prepared for the Yucca Mountain Site need not "consider the need for a repository, the alternatives to geological disposal, or alternative sites to the Yucca Mountain Site." 42 U.S.C. § 10134(a)(1)(D).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons stated in section c. above, there is no issue material to the findings that the NRC must make regarding this contention because the NWPA expressly forecloses the need to consider alternatives to the Yucca Mountain Site, which includes "No-Action Alternatives." 42 U.S.C. § 10134(a)(1)(D). Second, the contention also does not present a material issue because, as demonstrated above, Nevada's allegation that impacts "*could* be materially different from that presented" in the Repository SEIS, Petition at 1079 (emphasis added), does not even allege a material issue. Third, the contention does not raise a material issue because, even if DOE had to consider alternatives to the Yucca Mountain site, DOE's analysis of alternatives was reasonable.

DOE selected two No-Action Alternatives: Scenario 1, where long-term storage of SNF and HLW would occur at the current storage sites with effective institutional control for at least 10,000 years; and Scenario 2, where storage would occur at the current sites with no effective

institutional control after about 100 years. Repository SEIS, Vol. I at 2-56, 4-77. DOE selected these two Scenarios to illustrate the range of potential environmental impacts that would be possible if the Yucca Mountain repository is not completed. *Id.* As DOE explained, it recognizes that “the future course Congress, DOE, and the commercial utilities would take, if Yucca Mountain was not approved, is uncertain.” *Id.* Faced with this uncertainty, DOE selected bounding scenarios.

Nevada has not shown that DOE’s selection of No-Action Alternative scenarios was unreasonable. As DOE stressed, the No-Action scenario in this case is by no means clear. There are a number of plausible outcomes, including “the continued storage of spent nuclear fuel and high-level radioactive waste at each generator site in expanded onsite storage facilities, storage of these materials at one or more centralized locations, study and selection of another location for a deep geologic repository . . . , development of new technologies, or reconsideration of alternatives to geologic disposal.” Repository SEIS, Vol. I at 7-2.

The courts have held that the rule of reason applicable to preparation of an EIS also “govern both *which* alternatives the agency must discuss, and the *extent* to which it must discuss them.” *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 195 (D.C. Cir. 1991) (internal quotations omitted), quoting *Alaska v. Andrus*, 580 F.2d 465, 475 (D.C. Cir. 1978), *vacated in part as moot sub. nom W. Oil & Gas Ass’n v. Alaska*, 439 U.S. 922 (1978). An agency “need not examine an infinite number of alternatives in infinite detail.” *Allison v. Dep’t of Transp.*, 908 F.2d 1024, 1031 (D.C. Cir. 1990). Consideration of alternatives must be “bounded by some notion of feasibility.” *Id.* at 1031.

Nevada’s argument that DOE was required as part of its analysis of a No-Action Alternative to conduct an analysis of “reasonably foreseeable sabotage events at one or more of

the 76 identified commercial reactor or DOE storage sites,” Petition at 1079, would significantly expand the extent of DOE’s discussion of the No-Action Alternative, and Nevada does not demonstrate its feasibility. As DOE recognized in the Repository SEIS, there is no “reasonably foreseeable sabotage event.” Repository SEIS, Vol. I at 6-26 (“the exact nature and location of the events or the magnitude of the consequences of such acts if they were to occur, is inherently uncertain - the possibilities are infinite”). Recognizing these same difficulties regarding analysis of sabotage events, in *Pacific Gas & Electric Co.*, the Commission recently rejected as inadmissible a contention that the NRC Staff’s environmental assessment had failed to consider alternate threat scenarios. The Commission held that “[a]djudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity.” *Pac. Gas. & Elec. Co.*, (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, 67 NRC \_\_\_\_, (slip op. at 24) (Jan. 15, 2008). DOE nonetheless took a “hard look” at the issue of sabotage. DOE evaluated events in which a military jet or commercial airliner would crash into a cask or a modern weapon would penetrate a cask, as discussed in detail in its environmental analyses. *See, e.g.*, Repository SEIS, Vol. I at 6-24 to -31. There is no NEPA requirement that DOE must expand that effort to an unspecified number of reactor sites in order to adequately analyze a no-action alternative.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because the contention raises an issue that is outside the scope of the proceedings and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

## **216. NEV-NEPA-10 - Long-Term Radiation Exposure Following Sabotage**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsection 6.3.4.2 and Appendix G.8 regarding transportation sabotage events, and Appendix G.9.7 regarding cost of cleanup after accidents, fail to provide a realistic estimate of population radiation doses and the cost of cleanup following a sabotage event. Since insurance coverage available under the Price-Anderson Act (Section 170 of the Atomic Energy Act of 1954, as amended) would be inadequate, Congress would have to supplement the cleanup costs. Also, the period of cleanup could be greater than one year, implying an increase in radiation exposure over that assessed by DOE. This deficiency is significant because, without considering a reasonable cost of cleanup following a sabotage event, DOE has failed to adequately assess its environmental impact, and because that environmental impact could be materially different from that presented in the FSEIS, the document cannot be adopted by the NRC.

### **RESPONSE**

In this contention, the State of Nevada asserts that DOE failed to provide a realistic estimate of population radiation doses and the cost of cleanup following a transportation sabotage event. In addition, Nevada states that the period of cleanup could be greater than one year and that without considering a reasonable cost of cleanup the "environmental impact could be materially different." Petition at 1083. Nevada asserts that for these reasons, DOE's NEPA documents cannot be adopted by the NRC.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R §§ 51.109 and 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to

meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.* to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavit. Nevada does not in its expert’s affidavit or anywhere in its Petition separately address the criteria for §§ 51.109 and 2.326(a) and to demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s expert affidavit simply adopts Paragraph 5 in the Petition. In fact, Nevada’s expert makes no representation that he has conducted any study or investigation regarding the matters discussed in the adopted paragraph. Halstead Affidavit at 1. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s expert, Robert J. Halstead, simply points to reports prepared by others, such as the RWMA report, Petition at 1085, and notes that these reports discuss a range of cleanup costs following sabotage events. Mr. Halstead never claims that he

has assured himself through independent study and analysis that the reports to which he refers (principally the RWMA report) have any scientific validity. Instead, he simply reports what the reports say – a practice that has been held to be inappropriate in the federal courts unless the person who actually prepared the report is available to testify. *Weaver v. Phoenix Home Life Mut. Ins. Co.*, 990 F.2d 154, 159 (4th Cir. 1993). Mr. Halstead asserts that DOE “acknowledges the vulnerability of truck and rail shipping casks to various sabotage event scenarios.” Petition at 1085. To the contrary, DOE stated that “[f]or the reasons stated above, DOE believes that under general credible threat conditions, the probability of a sabotage event that would result in a major radiological release would be low.” Respository SEIS, Vol. I at 6-50.

The contention makes the conclusory statement that “without considering a reasonable cost of cleanup following a sabotage event, DOE has failed to adequately assess its environmental impact, and because that environmental impact *could* be materially different from that presented in the FSEIS, the document cannot be adopted by the NRC.” Petition at 1083 (emphasis added). This conclusion is nothing more than a statement that something might be possible. The standard that must be met is not what “could be materially different,” but what would be or would likely be materially different. As to that standard, the affidavit of Mr. Halstead is silent.

Nevada’s expert is not an expert in sabotage events or the costs of cleanup. By education, Mr. Halstead is an historian with a Masters degree in American History. Halstead Affidavit, Attach. A. He has worked on transportation issues involving spent nuclear fuel, but he has no discernable background in weapons, ballistics, sabotage events, or the cleanup costs following such events. Given the lack of qualifications to provide expert opinions on sabotage events, his affidavit fails to meet the NRC’s admissibility standards and this contention should be

rejected. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360, 367-68 (1998).

There are a number of additional flaws in the contention. Paragraph 2 of the contention references, without any detailed factual or technical discussion, computer software which DOE allegedly could have used to calculate costs.<sup>136</sup> Even if the software did include the ability to address cleanup costs, its application for the hypothetical accident and sabotage scenarios evaluated in the Repository SEIS would be inappropriate. For example, the Department of Homeland Security has stated that “cleanup criteria should be derived through a site-specific optimization process” and lists a large number of such site-specific factors. Notice of Final Guidance: Planning Guidance for Protection and Recovery Following Radiological Disposal Device (RDD) and Improvised Nuclear Device (IND) Incidents, 73 Fed. Reg. 45,029, 45,036 (Aug. 1, 2008). DOE reasonably concluded in the 2002 FEIS that “the restoration that would be necessary following an accident cannot be predicted. It would depend on the environmental factors involved – 1) the levels of contamination from the accident, 2) cleanup levels and decontamination methods used, and 3) location and ecology of the affected land areas – and the restoration goal that was used.” *See* 2002 FEIS, Vol. II, App. J at J-73. Nowhere in the discussion in Paragraph 5, Petition at 1085-86, does Nevada’s expert explain why the studies and estimates of cleanup costs in the event of an accidental release of radioactive material that DOE did present in the 2002 FEIS and Repository SEIS are inaccurate and do not reasonably reflect the possible cleanup costs. *See* 2002 FEIS, Vol. II, App. J at J-72 to -74; Repository SEIS, Vol. II, App. G at G-55 to -57. Under such circumstances, Nevada’s expert does not demonstrate that

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<sup>136</sup> In fact, the reference upon which Nevada’s experts rely is to a superseded version of RADTRAN. DOE used RADTRAN 5.5, not RADTRAN 5 as Paragraph 5 states. *See* Calculation Package for Transportation Impacts, Attachment 07B (LSN#DEN001600380). This version of RADTRAN 5 does not contain an economic model.

DOE's approach was unreasonable or that any different approach would lead or would be likely to lead to a different result.

DOE also explained in detail in the Repository SEIS why Nevada's assertion of higher consequences is unrealistic. Repository SEIS, Vol. I at 6-28 to -31. Nevada's expert does not address the Repository SEIS's analysis of Nevada's assertions regarding consequences, much less demonstrate that DOE was erroneous. Ultimately, all that Nevada's expert has done in his affidavit is show that the RWMA estimates of costs are different from those DOE discusses in the 2002 FEIS and Repository SEIS. Thus, his affidavit does not meet the standards of 10 C.F.R. §§ 51.109 and 2.326 and does not provide any support for admissibility of the contention. Absent an adequate affidavit, 10 C.F.R. §§ 51.109 and 2.326 require that a contention be rejected.

Finally, in the first sentence of the contention Nevada states that DOE failed to provide a "realistic estimate of population radiation doses." Petition at 1083. This assertion, however, is never revisited in either the contention or Mr. Halstead's affidavit, and therefore is totally lacking in evidentiary support and does not meet the requirements of 10 C.F.R. §§ 51.109 and 2.326.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of a potential sabotage event is objectionable on all three grounds.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

In addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

Nevada has failed to identify any issue relating to transportation sabotage for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Dep't of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding, and may only be challenged through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In addition to being outside the scope of this proceeding and instead within the exclusive jurisdiction of the court of appeals, as well as being barred under *res judicata* and finality principles, the contention does not present an issue material to a finding the NRC must make. As a threshold matter, as demonstrated above, Nevada's allegation that "radiological impacts *could* be materially different" if cleanup costs were added, Petition at 1083, does not allege a material issue.

In any event, DOE did examine cleanup costs resulting from an accident during the transport of SNF and HLW to the repository. *See* Repository SEIS, Vol. II, App. G at G-55. DOE provided estimates of the costs of cleanup of the release of radioactive materials resulting from accidents during transport of SNF and HLW. DOE considered a wide range of potential cleanup costs that it could expect for severe accidents during the transport of SNF to the Yucca Mountain repository in the unlikely event such an event were to occur. *See* 2002 FEIS, Vol. II, App. J at J-72 to -73; *see also* Repository SEIS, Vol. II, App. G at G-55 to -57. In the 2002

FEIS, DOE estimated such costs could range from \$200,000 to \$10 billion. DOE also expressly considered estimates prepared by the State of Nevada. *See* Repository SEIS, Vol. II, App. G at G-57. DOE discussed the methodology for Nevada's estimates and expressly explained why those estimates yield unrealistically high results. *See id.*

It is settled law under NEPA that an agency is entitled to deference in determining which methodologies to use in making decisions. *See, e.g., Wyo. Lodging & Rest. Ass'n v. U.S. Dep't of Interior*, 398 F. Supp. 2d 1197, 1213 (D. Wyo. 2005) (citing cases). NEPA does not require that an EIS be "based on the best scientific methodology available," *Lands Council v. McNair*, 537 F.3d 981, 1003 (9th Cir. 2008) (quoting *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 97, 986 (9th Cir. 1985)), as long as the agency acted reasonably, as DOE did here. Given DOE's acknowledgement that costs could be as high as \$10 billion (albeit under very unlikely circumstances), it cannot be said that DOE has failed to consider the costs of a transportation accident. The NRC is not required "to resolve disagreements among various scientists as to methodology," *see Friends of Endangered Species, Inc.*, 760 F.2d at 986. Accordingly, Nevada's expert's preference that a different methodology for estimating accident costs be used does not raise a material issue.

Similarly, although Mr. Halstead is not a qualified expert, even if the Board were to conclude that this contention involved disputed expert opinions, the well-settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts, still applies. In *Price Road Neighborhood Ass'n, Inc. v. Dep't of Transp.*, 113 F. 3d 1505 (9th Cir. 1997), the Court of Appeals affirmed a district court's grant of summary judgment to the agency. The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies

to contradict those of the agencies. We have consistently rejected such attempts, noting that “when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts”....

*Id.* at 1511 (citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)); accord, *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because “disagreement among experts does not invalidate an EIS” (citation omitted)).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts “even if, as an original matter, a court might find contrary views more persuasive.” *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), “[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions.” The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE’s EIS. Accordingly, this contention, which is premised on a disagreement between an intervenor’s expert and DOE’s expert analysis in an EIS does not create a litigable issue and therefore should not be admitted.

Finally, Nevada alleges that if the costs of cleanup exceed the insurance limits covered under the Price-Anderson Act, a possible delay in congressional action to cover the remaining costs would extend the cleanup time and, conceivably, increase long-term radiation doses beyond DOE’s one-year exposure period. Petition at 1085-86. As reflected in the very decisions Nevada cites in support of its contention, environmental impact statements need not discuss matters which are “only remote and speculative possibilities.” *Fla. Power & Light Co.*, (Turkey Point Nuclear Generating Station, Units 3 and 4), LBP-81-14, 13 NRC 677, 688 (1981); *Pub.*

*Serv. Elec. & Gas Co.*, (Hope Creek Generating Station, Units 1 and 2), ALAB-518, 9 NRC 14, 17 (1979), citing *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 551 (1978) and *Natural Res. Def. Council v. Morton*, 458 F.2d 827, 837-38 (D.C. Cir. 1972). “A reasonably thorough discussion of the significant aspects of the probable environmental consequences is all that is required by an EIS.” *Pub. Serv. Elec. & Gas Co.*, ALAB-518, 9 NRC at 17, quoting *Trout Unlimited v. Morton*, 509 F.2d 1276, 1283 (9th Cir. 1974). Here, Nevada provides no analysis or underlying basis as to *why* there would be such a delay in congressional action. Without any facts, expert opinion, or references to support this assertion it amounts to nothing more than pure speculation.

Moreover, Nevada’s speculation regarding a delay in cleanup is predicated on incorrect facts. In order to assess potential radiological consequences, the Repository SEIS *assumes* there would be no cleanup for one year after an accident or sabotage event. Repository SEIS at 6-24. The Repository SEIS also states, however, that “DOE anticipates that for any significant release emergency response, interdiction, and cleanup actions would be initiated. Therefore, the assumption that no interdiction or cleanup would take place for 1 year after a severe accident or sabotage event would tend to result in overestimation of the impacts of severe accidents and sabotage events.” *Id.* Thus, there is no factual basis for Nevada’s assertion that “the period of cleanup could be greater than one year,” Petition at 1083, 1086, and the contention should also be rejected on this ground.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. §

2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons set forth in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because Nevada's claim is barred by res judicata, because Nevada failed to raise its claim within 180 days of the issuance of the 2004 ROD, and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

**217. NEV-NEPA-11 - Sabotage Risk, Pressurized Cask**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 250S-F1 (07/2008) ("FSEIS"), Subsections 2.1 and 2.2 compare the preferred alternative of disposing spent nuclear fuel at the proposed Yucca Mountain repository to the no-action alternative of storing spent nuclear fuel at commercial reactor sites, however, FSEIS Subsections 6.1.11 and 6.3.4.2 fail to properly account for cask pressurization in a sabotage event during transportation. The cost/benefit ratio is therefore biased towards the preferred alternative. This deficiency is significant because without appropriately considering a sabotage event during transportation, DOE has failed to adequately assess its environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS, the document cannot be adopted by the NRC.

**RESPONSE**

In this contention, the State of Nevada asserts that DOE allegedly failed to properly account for cask pressurization in a transportation sabotage event and as a result the environmental impacts could be materially different from that presented in the Repository SEIS.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R §§ 51.109 and 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4 Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth

the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. First, Nevada makes the conclusory statement that the “FSEIS [Repository SEIS] Subsections 6.1.11 and 6.3.4.2 fail to properly account for cask pressurization in a sabotage event during transportation” and therefore the “environmental impacts *could* be materially different from that presented in the FSEIS....” Petition at 1087 (emphasis added). This conclusion is nothing more than a statement that something might be possible. The standard that must be met is not what “could be materially different,” but what would be or would likely be materially different. As to that standard, the affidavits of Dr. Thorne and Mr. Halstead are silent. Thorne Affidavit at 1; Halstead Affidavit at 1.

Nevada does not in its experts’ affidavits or anywhere in its Petition separately address the criteria for §§ 51.109 and 2.326(a) or demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s two experts’ affidavits simply adopt paragraphs in the Petition. Neither of Nevada’s experts makes any representation that they have conducted any study or investigation regarding the matters discussed in the adopted paragraphs. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s two experts,

Dr. Thorne and Mr. Halstead, simply point to reports prepared by others. Neither Dr. Thorne nor Mr. Halstead claims that he has assured himself through independent study and analysis that the reports to which he refers have any scientific validity. Instead the experts simply report what the reports say.

Dr. Thorne and Mr. Halstead refer to a one-page excerpt of a report of Holtec International to the effect that storage casks in use at reactor sites are pressurized with helium. Petition at 1089. Nevada's experts then argue in Paragraph 5, without citing to any supporting references that "[w]hen punctured by an explosion, the blowdown effect would be far greater with a pressurized cask." *Id.*

Dr. Thorne also adopts paragraph 6 of the contention, Thorne Affidavit, Attach. C., and relies on a RWMA report for the proposition that "in a potential sabotage event, the consequences would be greater for a pressurized cask." Petition at 1090. However, that report expressly states that it "has not carried out the calculations" to support such a conclusion, but states only that pressurization to 100 psig "impl[ies] the blowdown effect would be much greater." "Potential Consequences of a Successful Sabotage Attack on a Spent Fuel Shipping Container: Updated Analysis Revised Final Version," RWMA (Nov. 1, 2008) (LSN# NEV000005444). Neither Dr. Thorne nor Mr. Halstead has the necessary expertise to offer an expert opinion to this effect. Dr. Thorne's training and experience is in the area of health physics and there is nothing in his background which would qualify him to provide expert testimony on possible sabotage events or SNF release fractions from a pressurized or un-pressurized cask. *See* Thorne Affidavit, Attach. A. Similarly, Mr. Halstead has nothing in his training or experience that would permit him to offer expert opinions on these subjects. *See* Halstead Affidavit, Attach. A. By education, Mr. Halstead is an historian with a Masters degree in American History. He

has worked on transportation issues involving spent nuclear fuel, but he has no discernable background in weapons, ballistics, or sabotage events. Given the lack of any qualifications to provide expert opinions, the affidavits of Nevada's two experts fail to meet the NRC's admissibility standards and contention should be rejected. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360, 367-68 (1998).

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of a potential sabotage event and the consequences associated with a punctured pressurized cask is objectionable on all three grounds. First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities

and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE's transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to transportation sabotage for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of potential sabotage events, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Dep't of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In addition to being outside the scope of this proceeding and instead within the exclusive jurisdiction of the court of appeals, as well as being barred under res judicata and finality principles, the contention does not present an issue material to a finding the NRC must make. As a threshold matter, as demonstrated above, Nevada's allegation that "environmental impacts *could* be materially different," if cask pressurization were considered, Petition at 1087 (emphasis added), does not allege a material issue. In any event, DOE did evaluate events in which a military jet or commercial airliner would crash into a cask or a modern weapon would penetrate a cask, and recognized the uncertainty inherent in the analysis of potential sabotage events, noting that the possibilities are infinite. *See, e.g.*, Repository SEIS, Vol. I at 6-24 to -31. Recognizing these same difficulties, in *Pacific Gas & Electric Co.*, the Commission recently rejected as inadmissible a contention that the NRC Staff's environmental assessment had failed to consider alternate threat scenarios. The Commission held that "[a]djudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity." *Pac. Gas & Elec. Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, 67 NRC \_\_\_ (slip op. at 24) (Jan. 15, 2008). Nevada has not demonstrated that adding cask pressurization to the analysis would or would be likely to materially change the result.

Even if the Board were to conclude that this contention involved disputed expert opinions, it is well-settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts. In *Price Road Neighborhood Ass'n, Inc. v. Dep't of Transp.*, 113 F. 3d 1505 (9th Cir. 1997), the Court of Appeals affirmed a district court's grant of summary judgment to the agency. The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies to contradict those of the agencies. We have consistently rejected such attempts, noting that “when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts....”

*Id.* at 1511, citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992) (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989); accord *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because “disagreement among experts does not invalidate an EIS”) (citation omitted).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts “even if, as an original matter, a court might find contrary views more persuasive.” *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), “[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions.” The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE’s EIS. Specifically, in promulgating 10 C.F.R. § 51.109, the NRC stated that “the adoption of the [DOE] statement does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy.” NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed. Reg. 16,131, 16,142 (May 5, 1988). Accordingly, a NEPA contention that is premised on a disagreement between an intervenor’s expert and DOE’s expert analysis in an EIS does not create a litigable issue and should not be admitted.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in section c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because Nevada's claim is barred by res judicata, because Nevada failed to raise its claim within 180 days of the issuance of the 2004 ROD, and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

## **218. NEV-NEPA-12 - Transportation Risk Assumptions**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsection 6.3 regarding national transportation events, and Appendices G.6 through G.8, specifically regarding transportation event assumptions, fail to use the consistent application of weather and release fraction assumptions to all reasonably foreseeable accident and sabotage scenarios. This deficiency is significant because, without the consistent application of weather and release fraction assumptions to transportation accident or sabotage events, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the "Final Environmental Impact Statement for a Rail Alignment," DOE/EIS 0369 (06/2008), LSN# DEN001593557 ("Rail Alignment FEIS" or "RA FEIS"), neither document can be adopted by the NRC.

### **RESPONSE**

In this contention, the State of Nevada asserts that DOE failed to consistently apply the same weather and release fraction assumptions to all reasonably foreseeable transportation accident and sabotage scenarios, thus the environmental impacts could be materially different from that presented in the Repository SEIS and Rail Alignment FEIS.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if

proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. Nevada does not in its experts’ affidavits or anywhere in its Petition separately address the criteria for §§ 51.109 and 2.326(a) or demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s two experts’ affidavits simply adopt paragraphs in the Petition. Neither of Nevada’s experts, Mr. Halstead and Mr. Frishman, makes any representation that he has conducted any study or investigation regarding the matters discussed in the adopted paragraphs. Nevada simply makes the conclusory statement that “without the consistent application of weather and release fraction assumptions to transportation accident or sabotage events, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts *could* be materially different from ... [the Repository SEIS and Rail Alignment EIS], neither document can be adopted by the NRC.” Petition at 1091 (emphasis added). This conclusion is nothing more than a statement that something might be possible. The standard that must be met is not what “*could* be materially

different,” but what would be or would likely be materially different. As to that standard, the affidavits of Mr. Halstead and Mr. Frishman are silent.

Neither of Nevada’s two experts is an expert on weather and release fraction assumptions for potential transportation accident and sabotage scenarios. Mr. Frishman is a geologist and there is nothing identified in his background to suggest that he is qualified to provide expertise on these matters. Frishment Affidavit, Attach. A. Similarly, Mr. Halstead has nothing in his training or experience that qualifies him to offer expert opinions on these topics. Halstead Affidavit, Attach. A. By education, Mr. Halstead is an historian with a Masters degree in American History. He has worked on transportation issues involving spent nuclear fuel, but he has no discernable background in atmospheric, more specifically, dispersion of contaminants, or the calculation of release fraction assumptions that might be incurred in the event of an accidental release of radiation during transportation of SNF. Given the lack of qualifications to provide expert opinions on weather and release fractions, the affidavits of Nevada’s two experts fail to meet the NRC’s admissibility standards and this contention should be rejected. *See Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, LBP-98-13, 47 NRC 360, 367-68 (1998).

Nevada’s two experts rely solely on a report prepared by someone else (the RWMA Report, LSN# NEV000005444), and a spreadsheet submitted by Nevada to the LSN. Petition at 1094. The spreadsheet, which provides two tables of Pasquill Stability Categories, provides no analysis, references, or the underlying assumptions used to support the various Pasquill Category F and D values. *See* “Halstead Spreadsheet Calculating Population Exposures When Meteorology is Changed from Pasquill Category D to Pasquill Category F,” (Nov. 21, 2008) (LSN# NEV000005464). Although entitled “Halstead Spreadsheet,” Mr. Halstead does not state

in his affidavit that he prepared this spreadsheet or that it was prepared under his direction. Halstead Affidavit at 1. Indeed, the subject matter of the spreadsheet regarding calculation of radiation dose and the expected number of cancer fatalities and non-cancer fatalities would appear to be beyond his area of expertise. *Id.* at Attach. A.

Furthermore, neither Mr. Frishman nor Mr. Halstead claims that he has assured himself through independent study and analysis that the reports to which he refers have at least some scientific validity. Instead, the experts simply adopt what the reports say and make the conclusory statement that DOE's "use of different weather and release fractions between these evaluations [DOE's Pasquill Stability classes] is an inconsistent application of assumptions," and that therefore DOE did not consider the maximum reasonably foreseeable transportation accident scenario. Petition at 1093. Even if there is an inconsistency in an assumption, that does not establish that DOE did not consider the maximum reasonably foreseeable transportation accident scenario.

Finally, Nevada's experts contend that "DOE did not consider the maximum reasonably foreseeable sabotage scenario in the [Repository SEIS]." Petition 1094. However, as DOE explained in the Repository SEIS, "[w]hether acts of sabotage or terrorism would occur, and the exact nature and location of the events or the magnitude of the consequences of such acts if they were to occur, is inherently uncertain – the possibilities are infinite." Repository SEIS, Vol. I at 6-26. Nevada's experts do not even address DOE's conclusion, much less demonstrate that it is incorrect.

In sum, this contention is not supported by evidence or analysis provided by a credible qualified expert witness and ignores all of the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's analysis of potential transportation accident or sabotage events is objectionable on all three grounds.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are

within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to transportation sabotage for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's analysis of potential sabotage events, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Dep't of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

In addition to being outside the scope of this proceeding and instead within the exclusive jurisdiction of the court of appeals, as well as being barred under *res judicata* and finality principles, the contention does not present an issue material to a finding the NRC must make. As a threshold matter, as demonstrated above, Nevada's allegation that environmental impacts "could" be materially different does not allege a material issue. Indeed, neither Nevada nor its

experts explain how DOE's application of Pasquill Stability Class F for a transportation accident versus Class D for a sabotage event has any bearing on the overall environmental impacts.

Petition at 1093-94. Nevada merely asserts that DOE's use of Class F (assuming "stable conditions") for the reasonably foreseeable transportation accident is somehow inconsistent with the use of Class D (assuming "neutral conditions") for a sabotage event. *Id.*

With respect to the reasonably foreseeable transportation accident, in the FEIS, DOE reported the results using a Pasquill Class F status. (2002 FEIS, Vol. II, App. J. at Table J-22 at J-61; Table J-23 at J-62. While Stability Class D consequences were analyzed, the 2002 FEIS stated that "because the consequences are smaller than those of class F stability conditions, they are not presented." 2002 FEIS, Vol. II, App. J at J-61. In an effort to compare the results with the 2002 FEIS, in the Repository SEIS, the consequences of the maximum reasonably foreseeable transportation accident were again estimated using Class F stability and a wind speed of 0.89 m/s. Repository SEIS, Vol. II, App. G at, G-47. If the Repository SEIS had presented the consequences based on Class D stability, the consequences would again be less than those already included in the Repository SEIS. With respect to sabotage events, as DOE explained in the Repository SEIS, "because it is not possible to forecast the environmental conditions that might exist during an act of sabotage, DOE used neutral atmospheric conditions (Class D stability) which represent plume concentrations that would not be exceeded 50 percent of the time." Repository SEIS, Vol. I at 6-30. Nevada fails to demonstrate why these were not reasonable assumptions.

Nevada also complains about the use of 21 fuel assemblies per cask in DOE's maximum reasonably foreseeable accident analysis versus 26 fuel assemblies in its sabotage analysis. In the accident analysis, DOE used 21 assemblies because this is the number that would be

contained in a TAD which did not become a part of the project until after completion of the 2002 FEIS. Repository SEIS at S-8. However, DOE used 26 fuel assemblies for transportation sabotage events because the original release fractions were based on a cask containing 26 fuel assemblies. *Id.*, Vol. II, App. G at G-49. DOE chose to estimate the consequences of a rail sabotage event based on the radionuclide inventory in 26 spent fuel assemblies – recognizing that this would overestimate consequences by approximately 24 percent – rather than re-estimate the release fractions for a 21 spent nuclear fuel assembly cask. Nevada similarly fails to demonstrate that this approach was unreasonable.

An agency is entitled to rely on reasonable assumptions in its environmental analyses. *Inland Empire Pub. Lands Council v. U.S. Forest Serv.*, 88 F.3d 754, 761 (9th Cir. 1996), citing *Sierra Club v. Marita*, 845 F. Supp. 1317, 1331 (E.D. Wis. 1994) *aff'd*, 46 F.3d 606 (7th Cir. 1995); *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1335-36 (9th Cir. 1992). As in the case of a reviewing court, it is not the role of the NRC “to decide what assumptions ... we would make were we in the Secretary’s position, but rather to scrutinize the record to ensure that the Secretary has provided a reasoned explanation for his policy assumptions ....” *Wyo. Lodging and Rest. Ass’n v. Dept. of Interior*, 398 F. Supp. 2d 1197, 1214 (D. Wyo. 2005), citing *Am. Iron & Steel Inst. v. OSHA.*, 939 F.2d 975, 982 (D.C. Cir. 1991)); *S.F. Baykeeper v. U.S. Army Corps of Eng’rs*, 219 F. Supp. 2d 1001, 1015 (N.D. Cal. 2002) (agency’s reasonable assumptions entitled to deference).

The NRC has already made clear that the decision to adopt DOE’s environmental analyses “does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy.” NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed Reg. 16,131, 16,142 (May 5, 1988). DOE has provided

reasonable explanations for the assumptions it has made in its NEPA analyses and it is not the Commission's duty to "second guess" assumptions such as the use of Class D weather conditions for a sabotage event. *Wyo. Lodging and Rest. Ass'n*, 398 F. Supp. 2d at 1214.

Nevada alleges in Paragraph 5 that "DOE did not consider the maximum reasonably foreseeable sabotage scenario in the FSEIS and does not comply with NEPA requirements." Petition at 1094. However, as described above, there is no "maximum reasonably foreseeable sabotage scenario," given the infinite number of possibilities. Recognizing these same difficulties regarding analysis of sabotage events, in *Pacific Gas & Electric Co.*, the Commission recently rejected as inadmissible a contention that the NRC Staff's environmental assessment had failed to consider alternate threat scenarios. The Commission held that "[a]djudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity." *Pacific Gas & Electric Co. (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation)*, CLI-08-01, 67 NRC \_\_\_, (slip op. at 24 (Jan. 15, 2008)). DOE nonetheless took a "hard look" at the issue of sabotage. DOE evaluated events in which a military jet or commercial airliner would crash into a cask or a modern weapon would penetrate a cask as discussed in detail in its environmental analyses. *See, e.g.*, Repository SEIS, Vol. I at 6-24 to -31.

NEPA does not require DOE to conduct a "worst-case" analysis. In eliminating the requirement to conduct such an analysis from its regulations in 1985, the Council on Environmental Quality (CEQ) pointed out that "one can always conjure up a worse 'worst case'" by adding more variables to a hypothetical event (quoting 50 Fed. Reg. 32,234, 32,236 (Aug. 8, 1985)), and that "'worst case analysis' is an unproductive and ineffective method . . . one which can breed endless hypothesis and speculation" (quoting 51 Fed. Reg. 15,620, 15,624-5 (Apr. 25,

1986)). In *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 356 (1989), the Supreme Court held that the CEQ acted reasonably in eliminating the requirement that an agency conduct a worst-case analysis. The Court noted that CEQ regulations are “entitled to substantial deference,” and that the “worst case analysis” requirement had been abandoned for the well-considered reason that it had “distort[ed] the decision-making process by overemphasizing highly speculative harms.” *Id*; *Edwardsen v. U.S. Dep’t of Interior*, 268 F.3d 781, 785 (9th Cir. 2001) (“an EIS need not include a worst case scenario”). Accordingly, EISs “need not discuss in detail every possible negative effect” of an action in order for an agency to fulfill its NEPA obligations. *County of San Diego v. Babbitt*, 847 F. Supp. 768, 775 (S.D. Cal. 1994).

DOE – as acknowledged by Nevada in this contention (Petition at 1091, 1093-94) – and as discussed above, did examine weather and release fraction assumptions and took a hard look at the issue of sabotage. *See* Petition at 1091, 1093-94. It is settled law under NEPA that an agency is entitled to deference in determining which methodologies to use in making decisions. *See, e.g., Wyo. Lodging & Rest. Ass’n*, 398 F. Supp. 2d at 1213 (citing cases). NEPA does not require that an EIS be “based on the best scientific methodology available,” *Lands Council v. McNair*, 537 F.3d 981, 1003 (9th Cir. 2008) (quoting *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d at 986), as long as the agency acted reasonably, as DOE did here. The NRC is not required “to resolve disagreements among various scientists as to methodology.” *Friends of Endangered Species, Inc.*, 760 F.2d at 976, 986 (9th Cir. 1985). Accordingly, Nevada’s experts’ preference that a different methodology for estimating weather and release fraction assumptions be utilized does not raise a material issue.

Finally, although Mr. Frishman and Mr. Halstead are not qualified experts, and even if the Board were to conclude that this contention involved disputed expert opinions, the well-

settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts still applies. In *Price Road Neighborhood Ass'n Inc. v. Dep't of Transp.*, 113 F.3d 1505 (9th Cir. 1997), the Court of Appeals affirmed a district court's grant of summary judgment to the agency. The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies to contradict those of the agencies. We have consistently rejected such attempts, noting that "when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts"....

*Id.* at 1511 citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992) (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989); accord, *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because "disagreement among experts does not invalidate an EIS") (citation omitted).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts "even if, as an original matter, a court might find contrary views more persuasive." *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), "[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions." The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE's EIS. Accordingly, this contention, which is premised on a disagreement between an intervenor's expert and DOE's expert analysis in an EIS, does not create a litigable issue and therefore should not be admitted.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons set forth in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because Nevada's claim is barred by res judicata, because Nevada failed to raise its claim within 180 days of the issuance of the 2004 ROD, and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention should therefore be rejected.

## **219. NEV-NEPA-13 - Grazing Impacts**

Final Environmental Impact Statement for a Rail Alignment, DOE/EIS 0369 (06/2008) ("Rail Alignment FEIS" or "RA FEIS") Subsections 4.2.2.2.3.2 and 4.3.2.2.3.2, incorporated by reference in Section 6.4 of the Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") (*see* FSEIS at 6-1), acknowledge that DOE failed to apply the appropriate methodology in assessing the impacts of railroad construction on up to 32 active Bureau of Land Management (BLM) grazing allotments. This deficiency is significant because, without accurately assessing impacts of railroad construction on grazing allotments, there is no adequate disclosure of alternatives under NEPA. If reasonable alternative corridors, alignments, and segments were assessed, the disclosure of impacts on grazing allotments could be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada alleges that DOE has failed to adequately address the impacts of railroad construction on grazing allotments.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Nevada's environmental contention must also be supported by the affidavit of a

qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met 10 C.F.R. § 2.326(b).” As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting affidavits. Its supporting affidavits are submitted by witnesses without any qualifications to render expert opinions on grazing impacts. Mr. Robert J. Halstead submits an affidavit on grazing impacts. Halstead Affidavit at 1, Attach. B. Mr. Halstead by academic training is an historian with a Master’s degree in American History. *Id.*, Attach. A. By experience, he has worked on transportation issues for several states. Nothing in his background, however, qualifies him to provide opinions about grazing in Nevada, the United States or anywhere else. His affidavit is no more valid or reliable than the rejected testimony of a mathematician who tried to provide expert opinions on engineering matters, *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-86-23, 24 N.R.C. 108 (1986), or the environmental health expert who tried to provide expert evidence on physical security matters. *Private Fuel Storage, L.L.C.*, (Independent Spent Fuel Storage Installation), LBP 98-13, 47 NRC 360 (1998). The background of Mr. Steven A. Frishman is also insufficient to qualify him to provide expert opinions about issues of grazing in Nevada. Frishman Affidavit at 1, Attach. B. Mr. Frishman’s education and professional experience is in the area of geology, particularly oceanography and coastal resource management in Texas. *See* Frishman Affidavit,

Attach. A. Nothing in Mr. Frishman's background suggests that he is qualified to provide expertise on issues of grazing.

Apart from the failure to provide an affidavit from a qualified expert, the affidavits provided in support of this contention largely ignore the criteria of 10 C.F.R. §§ 2.326 and 51.109. The affidavits do not separately address each of the criteria of § 2.326 nor do they provide a "specific explanation" of why each requirement has been met. Mr. Halstead and Mr. Frishman merely adopt the allegations set forth in Paragraph 5 of this contention. Neither Mr. Halstead nor Mr. Frishman provides any evidence, explanation, or analysis to support the allegations set forth by this contention.

Paragraph 5, in turn, simply quotes a series of unsupported statements previously submitted as comments to DOE on behalf of Nevada by "Richard Moore, P.E." Petition at 1097-98. Mr. Halstead and Mr. Frishman do not even claim to have reviewed or analyzed the work of Mr. Moore beyond the quote set forth in Paragraph 5. Paragraph 5 is repeating, out of context, what another has reported – a practice that has been found to be inappropriate in the federal courts unless the person who actually prepared the report is available to testify. *Weaver v. Phoenix Home Life Mut. Ins. Co.*, 990 F.2d 154, 159 (4th Cir. 1993). In addition, to present an admissible contention, a petitioner cannot simply repeat the comment it made to DOE on the draft, but must demonstrate, through affidavits that comply with the requirements of 10 C.F.R. §§ 51.109 and 2.326, why the NEPA documents, including DOE's response to the comment, fails to comply with NEPA. *City of Los Angeles v. Nat'l Highway Traffic Safety Admin.*, 912 F.2d 478, 488 (D.C. Cir. 1990) (simple disagreement with an agency's findings or its methods is not, however, sufficient to render an EA or EIS inadequate under NEPA).

With regard to the most important requirement of § 2.326 – whether a materially different result would be likely – Paragraph 5 of the contention and the affidavits of Mr. Halstead and Mr. Frishman are silent. This contention is not supported by a credible qualified expert and ignores all of the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE’s transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada’s contention regarding the impacts on grazing of railway construction is objectionable on jurisdictional grounds.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE’s transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE’s decisions concerning transportation facilities and activities as a given in considering

the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in section c. above, this issue is not material to the findings the NRC must make because challenges to DOE's transportation decisions are outside the scope of this proceeding. In addition, this contention does not present a material issue because DOE's NEPA documents adequately analyze potential impacts on grazing allotments.

Nevada alleges that DOE failed to satisfy NEPA's requirements because DOE did not "accurately assess[ ] impacts of railroad construction on grazing allotments." Petition at 1095. Under NEPA, DOE is required to take a "hard look" at potential environmental consequences. *See Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). In its NEPA documents, DOE analyzed the environmental and economic impacts of the proposed railway on grazing, including the potential impacts of construction as well as operation of the railway. *See, e.g., Rail Alignment EIS*, Vol. III at 4-46, 4-62, 4-65 to -70, 4-296 to -298; *id.*, Vol. V at 5-24 to -27, 5-29 to -31, 7-42 to -44. In particular, DOE analyzed the estimated potential loss of animal unit months for grazing allotments that would fall within the rail line construction right-of-way and

support facilities, *id.* at Vol. III at 4-46, the potential effects of railroad operations, *id.*, Vol. III at 4-62 to -65, and possible mitigation measures “to reduce impacts to both grazing operations and existing range improvements,” *id.*, Vol. III at 4-47.

The methods used in the Rail Alignment EIS to evaluate loss of animal unit months were developed in conjunction with the U.S. Bureau of Land Management (BLM), a cooperating agency on the Rail Alignment EIS and the federal agency responsible for managing grazing on public lands crossed by the rail line. *See* Rail Alignment EIS, Vol. I at 1-10 to -11. Using these methods, DOE estimated the potential loss of animal unit months with respect to “the proportion of land within each grazing allotment that would fall within the footprints of the rail line construction right-of-way and support facilities.” *Id.*, Vol. III at 4-62 to -65. For this analysis, DOE assumed “that the entire land area within the rail line construction right-of-way would be unavailable for forage and would no longer support grazing.” *Id.*, Vol. III at 4-46. DOE’s use of the 1,000-foot-wide construction right-of-way as the basis for its analysis provided a conservative estimate of the amount of land that would be disturbed because long-term impacts to grazing would more closely relate to the significantly narrower (“nominally [200 feet] on either side of the centerline of the rail line”) operations right-of-way.<sup>137</sup> *Id.*, Vol. III at 4-7, 4-32. In addition, “[t]he construction phase encompasses the most intensive land use in terms of noise, human activity, and disruptions to land access.” *Id.*, Vol. II at 3-36. DOE concluded that no more than 6.6 percent of animal unit months would be lost for any allotment, and less than two

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<sup>137</sup> DOE noted that “[l]ands formerly inside the construction right-of-way but not included in the operations right-of-way would be reclaimed (restored to natural conditions), as appropriate.” Rail Alignment EIS, Vol. I at 2-5. Nowhere in its NEPA documents does DOE assume, however, that forage lost during construction would be reclaimed and available by the operations phase or that “reclamation will occur quickly,” as alleged by Nevada. Petition at 1098. Instead, DOE described its intent to conduct reclamation activities in accordance with the Best Management Practices set forth in Chapter 7 of the Rail Alignment EIS. *See* Rail Alignment EIS, Vol. III at Table 7-1 at 7-24 to -25.

percent would be lost for most allotments crossed by the rail line construction right-of-way. *Id.*, Vol. III at Tables 4-15 to -22 at 4-49 to -54.

DOE acknowledged the inherent uncertainties in this analysis and noted that the estimation of potential animal unit month losses would not be used to determine actual mitigation or compensation amounts. *See id.*, Vol. III at 4-46 to -47. DOE explained that because the estimation of potential animal unit month losses did not include “allotment-specific characteristics, such as topography and the quality and quantity of grass cover,” the “animal unit month loss estimates would not be appropriate for determining [actual] levels of mitigation or compensation.” *Id.*, Vol. VI at CRD3-96. Nowhere does DOE state, however, that the methods used to estimate grazing impacts were in any way “inappropriate, for the purpose of analyzing potential impacts in accordance with NEPA, as alleged by Nevada. The DOE’s conservative estimate of the amount of affected land would likely account for any site-specific impacts, such as potential impacts on high-quality forage and/or drainage patterns. *See id.*, Vol. III at 4-46. The fact that DOE provided a conservative and reasonably thorough analysis of potential impacts on grazing allotments is sufficient to satisfy NEPA’s requirements.

DOE’s NEPA documents also analyzed possible mitigation measures that could be developed and implemented in conjunction with the BLM “to minimize or compensate for the loss of animal unit months,” as necessary, in accordance with the Best Management Practices set forth in Chapter 7 of the Rail Alignment EIS. Rail Alignment EIS, Vol. III at 4-47; *see also id.*, Vol. IV at 7-24 to -25, 7-42 to -44, 7-46.

Possible mitigation measures analyzed by DOE include: “[r]elocating existing infrastructure and water resources,” “[p]roviding temporary feed, water, and assistance in cattle movement during rail line construction,” and “construction of culverts, bridges, and cattle guards

to facilitate or prevent the movement of livestock” where necessary. *Id.*, Vol. III at 4-47. Once implemented, these measures would address specific effects as determined through coordination with the BLM, Surface Transportation Board, and affected permittees. *Id.* At this early stage, many years before shipments begin, it would be premature to attempt to predict the exact effects to be mitigated or attempt to provide site-specific mitigation plans. *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-03-17, 58 NRC 419, 431 (2003) (finding that NEPA does not demand a “detailed explanation of specific measures which *will* be employed to mitigate adverse environmental effects” (emphasis added)); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989) (holding that NEPA does not require “a fully developed plan that will mitigate environmental harm before an agency can act”).

Nevada’s allegation that DOE’s NEPA documents are inadequate because DOE’s NEPA documents do not address potential effects on a site-specific basis is inconsistent with CEQ regulations and NEPA caselaw and thus does not raise a material issue. *See* Petition at 1098-99. The policies and procedures of DOE and the CEQ that implement the requirements of NEPA call for agencies to “integrate the NEPA process with other planning at the earliest possible time” in the development of a proposed federal project. 40 C.F.R. § 1501.2. In particular, CEQ regulations 40 C.F.R. §§ 1500.5, 1501.2, 1502.5 and 1508.23 all stress the need to prepare an EIS early in the process. NEPA analysis of environmental consequences must be made “as soon as it can reasonably be done.” *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002) (citing *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9th Cir. 1984) (“Reasonable forecasting and speculation is . . . implicit in NEPA.”) (internal citation omitted)). Nevada has not cited a single case in which an environmental impact statement was found

invalid because it was prepared too early in the process. Therefore, the fact that DOE provided a reasonably thorough analysis of transportation issues associated with the project, including a discussion of potential impacts of rail construction and operations on grazing allotments, is sufficient to satisfy NEPA's procedural requirements.

Accordingly, this contention does not present a material issue and should therefore be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the required supporting facts, expert opinions, and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention should therefore be rejected.

**220. NEV-NEPA-14 - Deferred Assessment Of Railroad Construction Impacts On Grazing**

“Final Environmental Impact Statement for a Rail Alignment,” DOE/EIS 0369 (06/2008), LSN# DEN001593557 (“Rail Alignment FEIS” or “RA FEIS”) Subsections 4.2.2.2.3.2 and 4.3.2.2.3.2, incorporated by reference in Section 6.4 of the Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) (“FSEIS”) (*see* FSEIS at 6-1) illegally defer assessment of impacts of railroad construction on individual BLM grazing allotments to a future action by the Bureau of Land Management (BLM). DOE has no authority to transfer its NEPA responsibilities to BLM, and DOE has no authority to assign to BLM the responsibility for mitigation of impacts resulting from DOE’s proposed action. If the appropriate assessment and disclosure of railroad construction impacts on individual grazing allotments is deferred, the FEIS and FSEIS cannot be adopted by the NRC.

**RESPONSE**

In this contention, Nevada alleges that DOE improperly deferred the “assessment, selection of a preferred alternative, and mitigation of impacts” related to grazing. Petition at 1102.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Nevada’s environmental contention must also be supported by the affidavit of a

qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting affidavits. Its supporting affidavits are submitted by witnesses without any qualifications to render expert opinions on grazing impacts. Mr. Robert J. Halstead submits an affidavit on grazing impacts. Halstead Affidavit at 1, Attach. B. Mr. Halstead by academic training is an historian with a Master’s degree in American History. *Id.*, Attach. A. By experience, he has worked on transportation issues for several states. Nothing in his background, however, qualifies him to provide opinions about grazing in Nevada, the United States or anywhere else. His affidavit is no more valid or reliable than the rejected testimony of a mathematician who tried to provide expert opinions on engineering matters, *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-86-23, 24 NRC 108 (1986), or the environmental health expert who tried to provide expert evidence on physical security matters. *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360 (1998).

The background of Mr. Steven A. Frishman is also insufficient to qualify him to provide expert opinions about issues of grazing in Nevada. Mr. Frishman’s education and professional experience is in the area of geology, particularly oceanography and coastal resource management

in Texas. *See* Frishman Affidavit, Attach. A. Nothing in Mr. Frishman’s background suggests that he is qualified to provide expertise on issues of grazing.

Apart from the failure to provide an affidavit from a qualified expert, the affidavits provided in support of this contention largely ignore the criteria of 10 C.F.R. §§ 2.326 and 51.109. The affidavits do not separately address each of the criteria of § 2.326 nor do they provide a “specific explanation” of why each criteria has been met. Mr. Halstead and Mr. Frishman merely adopt the allegations set forth in Paragraph 5 of this contention. Neither Mr. Halstead nor Mr. Frishman provides any evidence, explanation or analysis to support the allegations set forth by this contention. With regard to the most important criteria of § 2.326 – whether a materially different result would be likely – the contention and affidavits of Mr. Halstead and Mr. Frishman are silent.

This contention is not supported by a credible qualified expert and ignores all of the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention, challenging DOE’s transportation decisions, and the environmental impact statements upon which those decisions is based, are beyond the scope of this proceeding.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in section c. above, this issue is not material to the findings the NRC must make because challenges to DOE's transportation decisions are outside the scope of this proceeding. In addition, this contention does not present a material issue because DOE's NEPA documents do not impermissibly defer or delegate DOE's NEPA responsibilities to BLM and adequately address potential impacts on grazing.

Nevada alleges that DOE "illegally defer[red] assessment of impacts of railroad construction on individual BLM grazing allotments to a future action by [BLM]." Petition at

1100. This allegation relies on DOE's statements in the Rail Alignment EIS that "[t]he BLM would work with affected permittees to develop Interim Grazing Management[ ] Plans and revise their allotment management plans to address impacts of the rail alignment," and "[t]he BLM would determine actual loss of animal unit months for each affected allotment . . . in association with the issuance of a right-of-way grant." Rail Alignment EIS, Vol. III at 4-46 to -47.

Nevada's allegation misinterprets DOE's statements, which were simply referring to possible BLM actions in accordance with the Taylor Grazing Act of 1934, 43 U.S.C. § 315, *et seq.*, and the Federal Land Policy and Management Act, 43 U.S.C. § 1701, *et seq.*, and BLM regulations relating to the issuance and modification of grazing permits. *See* Rail Alignment EIS, Vol. I at 1-10 to -11; *id.*, Vol. II at 3-60. DOE's consideration in its NEPA documents of the possible regulatory actions of a cooperating agency does not amount to a deferral or delegation of DOE's NEPA analysis.<sup>138</sup>

In addition, Nevada alleges that DOE failed to satisfy NEPA by relying on BLM for "proper impact assessment and mitigation." Petition at 1103. Under NEPA, DOE is required to take a "hard look" at potential environmental consequences. *See Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). In its NEPA documents, DOE analyzed the environmental and economic impacts of the proposed railway on grazing, including the potential impacts of construction as well as operation of the railway. *See, e.g.*, Rail Alignment EIS, Vol. III at 4-46, 4-62, 4-65 to -70, 4-296 to -298; Vol. V at 5-24 to -27, 5-29 to -31, 7-42 to -44. In particular, DOE analyzed "the proportion of land within each grazing allotment that would fall within the footprints of the rail

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<sup>138</sup> Nevada's allegation that BLM's regulatory assessment amounts to "potentially impermissible segmentation" is also unavailing. Segmentation occurs when an agency "avoid[s] the NEPA requirement that an EIS be prepared for all major federal actions with significant environmental impacts by segmenting an overall plan into smaller parts involving action with less significant environmental effects." *West Chicago v. NRC*, 701 F.2d 632, 650 (7th Cir. 1983). That did not occur here. DOE has not sought to avoid NEPA's requirements by segmenting portions of the project to minimize the environmental effects, nor has it sought to divide the project to avoid preparation of an EIS.

line construction right-of-way and support facilities,” *id.*, Vol. III at 4-46, the potential effects of railroad operations, *id.* at 4-62 to -65, and possible mitigation measures “to reduce impacts to both grazing operations and existing range improvements,” *id.*, Vol. III at 4-47. Although DOE recognized that “additional land and possibly water features” may be affected, nowhere does DOE state that its analysis of potential grazing impacts was “deficient,” as alleged by Nevada, nor does DOE’s analysis of possible uncertainties amount to such an admission. *See* Petition at 1102. The fact that DOE provided a reasonably thorough analysis of potential impacts on grazing, including analysis of any possible uncertainties, is sufficient to satisfy NEPA’s requirements. *See Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9th Cir. 1984) (“Reasonable forecasting and speculation is . . . implicit in NEPA.”) (internal citation omitted)).

Nevada also alleges that DOE failed to adequately address its role in implementing possible mitigation measures and failed to “estimate the costs of providing mitigation.” Petition at 1103. Nevada alleges that “DOE has no authority to ensure that BLM actually implements the mitigation measures described in Chapter 7” of the Rail Alignment EIS. *Id.* In fact, the mitigation measures that DOE analyzed in its NEPA documents are measures that DOE could develop and implement *in conjunction with* BLM. *See, e.g.*, Rail Alignment EIS, Vol. III at 4-47; *id.*, Vol. IV at 7-24 to -25, 7-42 to -44, 7-46. Because BLM has primary responsibility for grazing administration, *see, e.g.*, 43 C.F.R. § 4100, *et seq.*, DOE must work in conjunction with BLM as a cooperating agency to implement mitigation plans, *see, e.g.* Rail Alignment EIS, Vol. I at 1-9 to -11. In its NEPA documents, DOE adequately analyzed possible mitigation measures that would be within the responsibility of DOE, including: “[r]elocating existing infrastructure and water resources,” “[p]roviding temporary feed, water, and assistance in cattle movement during rail line construction,” and “construction of culverts, bridges, and cattle guards to

facilitate or prevent the movement of livestock” where necessary. *Id.*, Vol. III at 4-47; *see also id.* at Vol. IV at 7-24 to -25, 7-42 to -44, 7-46. Once implemented, these measures would address specific effects as determined through coordination with BLM, the Surface Transportation Board, and affected permittees. *Id.* At this early stage, many years before shipments begin, it would be premature to attempt to predict the exact effects to be mitigated, cost of mitigation measures, or site-specific mitigation plans. *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-03-17, 58 NRC 419, 431 (2003) (finding that NEPA does not demand a “detailed explanation of specific measures which *will* be employed to mitigate adverse environmental effects”) (emphasis added); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 353 (1989) (holding that NEPA does not require “a fully developed plan that will mitigate environmental harm before an agency can act”).

Nevada’s allegation that DOE’s NEPA documents are inadequate because site-specific effects have not yet been addressed is inconsistent with CEQ regulations and NEPA caselaw and thus does not raise a material issue. *See* Petition at 1103-04. The policies and procedures of DOE and the CEQ that implement the requirements of NEPA call for agencies to “integrate the NEPA process with other planning at the earliest possible time” in the development of a proposed federal project. 40 C.F.R. § 1501.2. In particular, CEQ regulations 40 C.F.R. §§ 1500.5, 1501.2, 1502.5 and 1508.23 all stress the need to prepare an EIS early in the process. NEPA analysis of environmental consequences must be made “as soon as it can reasonably be done.” *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002) (citing *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n.9 (9th Cir. 1984) (“Reasonable forecasting and speculation is . . . implicit in NEPA.”) (internal citation omitted)). Nevada has not cited a single

case in which an environmental impact statement was found invalid because it was prepared too early in the process. Therefore, the fact that DOE provided a reasonably thorough analysis of transportation issues associated with the project, including analysis of potential impacts of rail construction and operations on grazing, is sufficient to satisfy NEPA's procedural requirements.

Accordingly, this contention does not present a material issue and should therefore be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the required supporting facts, expert opinions, and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention should therefore be rejected.

## **221. NEV-NEPA-15 - TAD Shipment Estimates**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsection 6.1.7 and Appendix G.3, regarding shipment estimates that assume the use of transportation, aging and disposal ("TAD") canisters at commercial reactor sites, fail to consider reasonable shipment estimates based on the existing standard contracts and current modal capabilities of the shipping sites. Thus, the FSEIS fails to provide a sufficient basis for the transportation impacts estimated in Sections 6.3 and 6.4. In addition, the FSEIS fails to provide a basis for determining if DOE can comply with SAR Subsection 1.5.1.1, which presumes 90 percent of commercial spent nuclear fuel will be shipped in TAD canisters. Because DOE failed to consider reasonable shipment estimates, particularly regarding the modal mix between rail and truck, DOE has failed to adequately assess their environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS and the "Final Environmental Impact Statement for a Rail Alignment," DOE/EIS 0369 (06/2008), LSN# DEN001593557 ("Rail Alignment FEIS" or "RA FEIS"), neither document can be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada alleges that DOE failed to adequately consider potential transportation impacts under NEPA because DOE allegedly failed “to provide a basis for determining if [it] can comply with SAR Subsection 1.5.1.1, which presumes 90 percent of commercial spent nuclear fuel will be shipped in TAD [Transportation, Aging and Disposal] canisters,” and “to consider reasonable shipment estimates based on the existing standard contracts and current modal capabilities of the shipping sites.” Petition at 1105.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Nevada's environmental contention must also be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a "specific explanation of why it has been met." 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, "the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners." *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavit. The affidavit submitted by Nevada's witness, Mr. Halstead, in support of this contention never provides the analysis that is explicitly called for by the terms of § 2.326(b). Mr. Halstead's affidavit does not separately address each of the criteria of § 2.326 nor does it provide a "specific explanation" of why each criteria has been met. Mr. Halstead merely adopts the allegations set forth in Paragraph 5 of this contention. Halstead Affidavit at 1. Mr. Halstead does not provide any evidence or analysis to support the allegations set forth by this contention. With regard to the most important criteria of § 2.326 – whether a materially different result would be likely if the contention were proven true – the contention and affidavit of Mr. Halstead are silent.

This contention does not satisfy the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**b. Brief Explanation of Basis**

Without prejudice to the other positions taken by DOE, DOE expresses no legal objection based on this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions relating to the proposal by DOE to accept up to 90% of commercial SNF in TADs is not within the scope of this proceeding. As discussed in section V.A.5(b) above, contentions relating to DOE's proposal to accept a substantial amount of commercial SNF for transportation and disposal in TADs are outside the scope of this proceeding. NRC has no statutory or regulatory authority over how DOE will accept commercial SNF pursuant to the contract between DOE and the generator of the SNF. While NRC can consider the effects of using TADs to accept commercial SNF, it cannot go behind those decisions and, in effect, dictate how much commercial SNF DOE can accept in TADs. Thus, any contention premised on such action is beyond the scope of this proceeding. Put simply, NRC must take DOE's proposal to accept up to as much as 90% of commercial SNF in TADs as a given in deciding whether to issue construction authorization for the repository.

Moreover, contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of

this proceeding. To the extent that Nevada's contention challenges DOE's transportation analysis, it is barred on this jurisdictional ground as well.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals. Nevada has failed to identify any issue relating to DOE's transportation analysis based on the use of TADs for which the approach specified in Section 119 of the NWPA is not available.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in section c. above, because this issue is beyond the scope of this proceeding, it is not material to the findings the NRC must make. The contention also does

not raise a material issue because it does not demonstrate any inadequacy in DOE's environmental analyses.

Nevada alleges that DOE failed to adequately address potential impacts under NEPA because DOE allegedly failed "to provide a basis for determining if [it] can comply with SAR Subsection 1.5.1.1, which presumes 90 percent of commercial spent nuclear fuel will be shipped in TAD canisters," and "to consider reasonable shipment estimates based on the existing standard contracts and current modal capabilities of the shipping sites." Petition at 1105. Under NEPA, DOE is required to take a "hard look" at potential environmental consequences. *See Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976). In its NEPA documents, DOE analyzed the environmental impacts that would result from DOE's receipt of up to 90% of spent nuclear fuel in TADs at the repository, *see, e.g.*, Repository SEIS, Vol. I at 2-5 to -7, 4-64 to -66, 4-71, 4-73 to -75, 4-90, 4-97, 4-100, and during transportation, *see, e.g., id.*, at 6-8, 6-10 to -14, 6-59. In addition, DOE analyzed a scenario in which less than 90% of spent nuclear fuel would be shipped in TADs due to existing utilities contracts and/or modal capabilities at the generator sites. *See, e.g., id.*, Vol. I at 1-15 to -16, 2-5 to -7; Vol. II, App. A at A-2 to -5.

DOE's analysis of impacts under both packaging scenarios incorporated the potential impacts of shipping a certain amount of non-TAD canisters to be placed into TADs once they reach the repository site. *See id.* In addition to its analysis of a scenario in which 90% of commercial spent nuclear fuel would be transported to the repository in TADs, DOE performed a sensitivity analysis, examining the potential impacts of a situation in which utilities shipped only 75% of spent nuclear fuel in TADs. *See id.*, Vol. II, App. A at A-2 to -5. In the sensitivity analysis, DOE analyzed the impacts of placing the remainder of the shipments into TADs once they reach the repository site and determined that "a deviation in the percentage of

implementation of TAD canisters at the reactor site would not measurably affect the transportation impacts.” *Id.*, Vol. II at A-3. The Repository SEIS concluded that, “[i]n summary, the analysis illustrated that the deviations in the percentage implementation of TAD canisters would have little effect on transportation or repository-related estimated impacts.” *Id.* at A-5. Accordingly, Nevada cannot demonstrate that DOE has failed to adequately analyze potential environmental impacts based on shipments of less than 90% of spent nuclear fuel in TADs. *See* Petition at 1105.

DOE’s assumption that 90% of the SNF would be shipped in TADs while also considering the possibility of a smaller amount shipped in TADs was clearly a reasonable one and should not be second-guessed or challenged by potential intervenors. *Inland Empire Pub. Lands Council v. U.S. Forest Serv.*, 88 F.3d 754, 761 (9th Cir. 1996) (citing *Sierra Club v. Marita*, 845 F. Supp. 1317, 1331 (E.D.Wis. 1994) *aff’d*, 46 F.3d 606 (7th Cir. 1995)); *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1335-36 (9th Cir. 1992). As in the case of a reviewing court, it is not the role of the NRC “to decide what assumptions . . . we would make were we in the Secretary’s position, but rather to scrutinize the record to ensure that the Secretary has provided a reasoned explanation for his policy assumptions.” *Wy. Lodging & Rest. Ass’n v. Dep’t. of Interior*, 398 F. Supp. 2d 1197, 1214 (D. Wyo. 2005) (citing *Am. Iron & Steel Inst. v. OSHA*, 939 F.2d 975, 982 (D.C. Cir. 1991)); *S.F. Baykeeper v. U.S. Army Corps of Eng’rs*, 219 F. Supp. 2d 1001, 1015 (N.D.Cal. 2002) (agency’s reasonable assumptions entitled to deference).

The NRC has already made clear that the decision to adopt DOE’s environmental analyses “does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy.” NEPA Review Procedures for Geologic Repositories

for High-Level Waste, 53 Fed. Reg. 16,131, 16,142 (May 5, 1988). DOE has provided reasonable explanations for the assumptions it has made in its NEPA analyses and it is not the Commission's duty to "second guess" those assumptions. *Wy. Lodging & Rest. Ass'n.*, 398 F. Supp. 2d at 1214.

Accordingly, this contention does not present a material issue and should therefore be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, Nevada has failed to provide the required supporting facts, expert opinions, and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's decision to accept spent nuclear fuel in TADs and DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, and because the contention fails to demonstrate inadequacy in DOE's NEPA analyses. The contention should therefore be rejected.

## **222. NEV-NEPA-16 - Representative Routes**

Final Supplemental Environmental Impact Statement for Yucca Mountain, DOE/EIS 0250S-F1 (07/2008) ("FSEIS") Subsection 6.3 and Appendices A.3 and G.2, regarding "representative routes" that DOE could use for shipments of spent nuclear fuel and high-level radioactive waste, fail to identify the affected environment for repository transportation impacts nationally and in Nevada. FSEIS Appendix A3 states that DOE used historic rail industry practices to estimate the representative rail routes that would be used under the Proposed Action. However, DOE's representative rail routes incorporate rail industry practices in only a generic way, and ignore information provided to DOE by potential rail carriers and by affected states about other potential rail routes, different from those identified by DOE, that could be used for repository shipments. This deficiency is significant because without appropriately considering specific impacts from specific rail routes, DOE has failed to adequately assess environmental impacts, and because those environmental impacts could be materially different from that presented in the FSEIS the document cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada asserts that DOE improperly used representative routes in its NEPA analysis, and "ignore[d] information provided to DOE by potential rail carriers and by affected states about other potential rail routes . . . that could be used for repository shipments." Petition at 1110.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its

contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.*, (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. It does not show that its contention raises a significant environmental issue. With regard to the most difficult and important showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true, Nevada’s petition and the affidavit of its expert are silent. Equally important, Nevada’s expert, Robert J. Halstead, never provides the analysis that is explicitly called for by the terms of § 2.326. This regulation requires Nevada’s expert, Mr. Halstead, to “set forth the factual and/or technical bases for the movant’s claim that the criteria of paragraph (a) of this section have been satisfied.” Section 2.326(b) goes on to state that “[e]ach of the criteria must be separately addressed, with a specific explanation of why it has been met.” Here, Nevada has failed to meet these requirements and its contention should be rejected.

Apart from its failure to comply with the requirements of §§ 2.326 and 51.109, Nevada has also failed to submit an affidavit that provides a reasoned explanation of the basis for its expert's opinions and more importantly why the issue raised by the contention is of any significance. Nevada's expert, Mr. Halstead, merely adopts Paragraph 5 of this contention as the entire substance of his testimony. Halstead Affidavit at 1. Mr. Halstead contends that DOE's analysis of rail shipments should have used the actual routes proposed by a railroad and Midwestern States, rather than a model which looks at representative routes.

Mr. Halstead fails to explain why this contention raises a significant concern. Mr. Halstead states, for example, that Union Pacific provided DOE with its preferred routes for shipping SNF in 2005 and these routes should have been used in the analysis. In 2005, at a presentation made by Union Pacific in Pueblo Colorado to the Transportation External Coordination Working Group (TEC), slide 26 of 28 contained a map of the United States roughly showing rail routes to Yucca Mountain.<sup>139</sup> See "Union Pacific Rail Transportation," Rodger Dolson (Sept. 2005) (LSN# NEV000005499). According to the notes for this meeting, Mr. Dolson made two recommendations for routing: that DOE 1) avoid a high volume route across Nebraska; and 2) avoid the Moffat Tunnel in Colorado. DOE, Transp. External Coordination Working Group (TEC) Meeting, Meeting Notes, 19 (Sep. 20-21, 2005) (Attachment NEV-NEPA-16-1). In fact, DOE developed representative routes incorporating both of these recommendations. Repository SEIS, Vol. II, App. A at A-5. Therefore, it is clear that the DOE did not ignore routes suggested by railroads and in fact incorporated the railroad's suggestions into the analyses presented in the Repository SEIS. Mr. Halstead's allegation that DOE purportedly failed to consider the Union Pacific's rail proposals is incorrect.

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<sup>139</sup> Portions of the routes are obscured by arrows and other markings. It is inconceivable that any railroad would propose nationwide routing of hazardous material based on such a map.

In further support of his opinion, Mr. Halstead points to a report by the Council of State Governments' Midwestern Radioactive Materials Transportation Committee. *See* Petition at 1112. Mr. Halstead claims that this report contains one of several "requests for early action on route selection and identification." *Id.* at 1113. In fact, the report does no such thing. Rather, the report specifically states that it was *not* requesting DOE to adopt its routes nor does it ask for DOE to take "early action" on route selection. *See* "The Council of State Governments' Midwestern Radioactive Transportation Committee, Route Identification Project: Final Report to the U.S. Department of Energy's Office of Civilian Radioactive Waste Management," (December 7, 2005) (LSN# NEV000005459 at 3). According to the report, "[a]bove all, the work group members asked the states to emphasize that the region would not recommend that DOE use the proposed routes through the Midwest. Instead, the recommendation would be that DOE use the proposed route maps as a starting point for discussions at the national level." *Id.* at 3.<sup>140</sup>

Mr. Halstead also points to the report of the National Academy of Science (NAS), which according to Mr. Halstead "urged DOE to precisely define the routes used to ship High-Level Radioactive Waste." Petition at 1112-13. Contrary to Mr. Halstead's assertion, the NAS report was not criticizing the 2002 FEIS but only recommending that DOE begin working with the States and Tribes on emergency planning issues as soon as practicable. National Research Council, *Going the Distance?: The Safe Transport of Spent Nuclear Fuel and High-Level*

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<sup>140</sup> Mr. Halstead also cites to Nevada's comments on the Draft Repository SEIS as evidence of another "request[] for early action on route selection and identification." Petition at 1113. Nevada cannot simply repeat the comment it made to DOE on the Draft Repository SEIS, but must demonstrate, through affidavits that comply with the requirements of 10 C.F.R. §§ 51.109 and 2.326, why DOE's response to the comment fails to comply with NEPA. *See City of Los Angeles v. Nat'l Highway Traffic Safety Admin.*, 912 F.2d 478, 488 (D.C. Cir. 1990) (finding that simple disagreement with an agency's findings or its methods is not sufficient to render an EA or EIS inadequate under NEPA). As discussed, Mr. Halstead's affidavit does not meet the requirements of §§ 51.109 and 2.326, much less address any deficiency in DOE's response to this comment.

*Radioactive Waste in the United States* at 228 (The National Academies Press 2006). This course of action is already contained in the Repository SEIS. *See* Repository SEIS, Vol. II, App. H at H-29 to -30, H-31 to -32. NAS never suggested that the 2002 FEIS was inadequate in its treatment of transportation. In fact, much of the report is complimentary of DOE's efforts. *See, e.g., id.* at 210 (finding that "[t]he Department of Energy's procedures for selecting routes within the United States for shipments of foreign research reactor spent fuel appear on the whole to be adequate and reasonable"). For example, the report recommends that DOE follow its foreign research reactor spent fuel transport program of involving states and Tribes in these route selections. *Id.* at 228. The report also endorsed DOE's choice of the "mostly rail" option. *Id.* at 217.

As demonstrated above, none of the documents referenced by Nevada call for the early selection of routes for the evaluation of transportation environmental impacts and none of these reports provides any support for the admission of this contention. Additionally, Mr. Halstead does not explain why the existing transportation analysis using representative routes and analyzing possible risks is not appropriate at this stage of transportation planning. Nor is there any discussion about whether any of these issues is significant or would have any material impact on the outcome. Consequently, Mr. Halstead's affidavit provides no support for this contention and this contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Contentions challenging DOE's transportation decisions, and the environmental impact statements upon which those decisions are based, are beyond the scope of this proceeding and may also be barred under res judicata or finality principles. Nevada's contention regarding DOE's decision to use representative routes is objectionable on all three grounds.

First, as addressed in Section V.A.5(a)(1) above, under the Atomic Energy Act (AEA) and the Energy Reorganization Act (ERA), the NRC does not have regulatory authority over DOE's transportation facilities and activities and thus has no direct NEPA responsibilities with respect to those facilities and activities. To the extent such facilities and activities may contribute to the cumulative impacts of the proposed Yucca Mountain repository, the NRC must take DOE's decisions concerning transportation facilities and activities as a given in considering the cumulative impacts of the proposed repository. *See, e.g., Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004).

Second, in addition to the NRC's lack of regulatory authority over transportation of SNF and HLW, as addressed in Section V.A.5(a)(2) above, any challenges to the analysis of environmental impacts arising from DOE transportation decisions, to the extent reviewable, are within the original and exclusive jurisdiction of the federal courts of appeals. In particular, challenges to the April 2004 ROD and the transportation-related portions of the 2002 FEIS on which it was based, are no longer subject to review in any forum, as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA. Any

challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD and the Rail Alignment EIS on which it was based, are also not appropriately a part of this proceeding; such challenges may be pursued only through a petition for review to a federal court of appeals.

Nevada has failed to identify any issue relating to DOE's use of representative routes for which the approach specified in Section 119 was or is not available.

In summary, challenges to the April 2004 ROD, and the transportation-related portions of the 2002 FEIS on which it was based, including DOE's use of representative routes, are no longer subject to review in any forum, both as a result of the expiration of the 180-day period to challenge that ROD set forth in Section 119 of the NWPA and as a result of the D.C. Circuit's 2006 decision in *Nevada v. Dep't of Energy*, 457 F.3d 78 (D.C. Cir. 2006). Any challenges to DOE's transportation decisions set forth in the October 10, 2008 ROD also are not appropriately a part of this proceeding, and may only be challenged through a petition for review to a federal court of appeals.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons discussed in section c. above, this issue is not material to the findings the NRC must make because challenges to DOE's transportation decisions are outside the scope of this proceeding and the contention is barred on res judicata and finality grounds. In addition, it was reasonable for DOE to use representative routes at this stage in the process. As stated in the Repository SEIS, "[a]t this time, many years before shipments could begin, it is premature to predict the highway routes or rail lines DOE might use." Repository SEIS, Vol. III at CR-185. DOE appropriately decided to use representative routes that reflect typical industry practices. *Id.*, Vol. II, App. G at G-5; App. A at A-5 to -8. To identify these representative routes, DOE used the TRAGIS computer model, which is a regularly updated information system containing

thousands of miles of rail lines and highways and allowing users to calculate routes by simulating historical rail and freight routing practices. *Id.*, Vol. II, App. G at G-5 to -13. DOE assumed routes for rail shipments that would provide expeditious travel, use of high quality track, and the minimum number of interchanges between railroads. *Id.*, Vol. II, App. G at G-5 to -6; 2002 FEIS, Vol. I at 3-120. The highway routes were selected in accordance with Department of Transportation highway routing regulations (49 C.F.R. § 397.101). Repository SEIS, Vol. II, App. G at G-13. This methodology is entirely reasonable at this stage of the process and identifies routes that could be used in the shipment of SNF and HLW to Yucca Mountain.

The policies and procedures of DOE and the CEQ that implement the requirements of NEPA call for agencies to “integrate the NEPA process with other planning at the earliest possible time” in the development of a proposed federal project. 40 C.F.R. § 1501.2. In particular, CEQ regulations 40 C.F.R. §§ 1500.5, 1501.2, 1502.5 and 1508.23 all stress the need to prepare an EIS early in the process. NEPA analysis of environmental consequences must be made “as soon as it can reasonably be done.” *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002) (citing *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n. 9 (9th Cir. 1984) (“Reasonable forecasting and speculation is . . . implicit in NEPA.”) (internal citation omitted)). Nevada has not cited a single case in which an environmental impact statement was found invalid because it was prepared too early in the process.

In addition, there are processes for determining if there is a need for further NEPA analyses after an EIS is finalized if an agency proposes substantial changes to a proposed action, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action relevant to environmental concerns or its impacts. 40 C.F.R.

§ 1502.9(c); 10 C.F.R. § 1021.314(a). DOE would conduct supplemental NEPA review if DOE makes substantial changes in the proposed action that are relevant to environmental concerns, or there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

Nevada argues that DOE should have used the Union Pacific Railroad's preferred routes as the basis for conducting its environmental analysis. As discussed above, the railroads have not indicated to DOE which routes they are likely to choose. To the extent that input has been provided from the railroads, it has been factored into the representative routes analyzed. Further, as described in Appendix H to the Repository SEIS, railroads are privately owned and operated, and shippers and rail carriers determine routes based on a variety of factors. Thus, actual route selection for shipments to Yucca Mountain will involve discussions between DOE and the chosen rail carriers, with consideration of input from other stakeholders. Repository SEIS, Vol. II, App. H at H-4. Federal rules do not prescribe specific routes for SNF and HLW shipments by rail, although certain factors, as described below, must be considered in route selection.

DOT's Pipeline and Hazardous Materials Safety Administration, in coordination with the Federal Railroad Administration and the Transportation Security Administration, has issued a Final Rule revising requirements in the Hazardous Materials Regulations applicable to the safe and secure transportation of certain hazardous materials transported in commerce by rail. *See* Final Rule, Hazardous Materials: Enhancing Rail Transportation Safety and Security for Hazardous Materials Shipments, 73 Fed. Reg. 72,182 (Nov. 26, 2008). The Final Rule requires rail carriers to compile annual data on these shipments, use the data to analyze safety and security risks along rail routes where those materials are transported, assess alternative routing options, and make routing decisions based on those assessments to select the safest and most

secure practicable route. Many factors are to be considered in the safety and security risk analysis of routes, including rail traffic density, time and distance in transit, track class and conditions, environmentally-sensitive or significant areas, population density, emergency response capability, past incidents, availability of practicable alternatives, and other factors. Repository SEIS, Vol. II, App. H at H-4.

Finally, it is settled law under NEPA that an agency is entitled to deference in determining which methodologies to use in making decisions. *See, e.g., Wyo. Lodging & Rest. Ass'n v. U.S. Dep't of Interior*, 398 F. Supp. 2d 1197, 1213 (D. Wyo. 2005) (citing cases). NEPA does not require that an EIS be “based on the best scientific methodology available,” *Lands Council v. McNair*, 537 F.3d 981, 1003 (9th Cir. 2008) (quoting *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 986 (9th Cir. 1985)), as long as the agency acted reasonably, as DOE did here. Nevada argues that DOE should have used the rail routes suggested by railroads and affected states as the basis for conducting its environmental analysis, rather than representative routes. Petition at 1112-13. But the NRC is not required to resolve disagreements regarding methodology, *see Friends of Endangered Species, Inc.*, 760 F.2d at 986, and Nevada’s preference that a different methodology for selecting routes be used accordingly does not raise a material issue.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R. § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because challenges to DOE's transportation decisions and supporting NEPA analyses are outside the scope of this proceeding, because the contention is barred by res judicata, because Nevada failed to raise its claim within 180 days of the issuance of the 2004 ROD, and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

### **223. NEV-NEPA-17 - NRC Staff's NEPA Review**

NRC Staff's adoption determination violates NEPA, and therefore cannot support NRC's proposed action, because NRC Staff stated explicitly that it would not necessarily have arrived at the same NEPA conclusions on matters of fact or policy. This deficiency is significant, and if it were to be addressed in a satisfactory manner, the adoption decision could be materially different. As a result, the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada raises the purely legal issue of whether the Staff's conclusion that the DOE's NEPA documents can be adopted with supplementation is deficient because the NRC Staff also stated that "NRC Staff determination of adoption of these EISs does not necessarily mean that NRC independently would have arrived at the same conclusions as DOE on matters of fact or policy." *See* Petition at 1117 (quoting U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain, (Sept. 5, 2008) (LSN# NRC000029699)).

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a

qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including “a specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 claiming that because this contention raises a purely legal issue, it need not make the showings required by §§ 51.109 and 2.326. Nothing in §§ 51.109 or 2.326 exempts Nevada from demonstrating through an appropriate affidavit that this issue is significant and that if true would or would likely result in a materially different outcome. In its Petition, Nevada states without any explanation or analysis that “[t]he deficiency is clearly significant from a legal perspective, and if it were to be addressed in a satisfactory manner by a more complete NRC Staff review, the adoption decision could be materially different.” Petition at 1117.

In imposing the requirements of 10 C.F.R. §§ 2.326 and 51.109 on all NEPA contentions, the NRC has demanded that intervenors meet a very high threshold burden of showing that the proffered contention presents a “seriously different picture of the environmental landscape,” such that it would “be likely to change the outcome of the proceeding or affect the licensing decision in a material way.” *Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), CLI-06-03, 63 NRC 19, 23 (2006) (internal quotation and citation omitted). That showing cannot be made with the kind of vague and conclusory statements in Nevada’s Petition and the absence of an expert affidavit.

Further, there is nothing at all significant about the NRC Staff's statement that it might have reached different conclusions than DOE. The NRC Staff's statement simply echoes the statements of the Commission when it promulgated 10 C.F.R. § 51.109. In commenting on adoption, the Commission stated: "the adoption of the [DOE] statement does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy." NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed. Reg. 16,131, 16,142 (May 5,1988). Decisions of the U.S. Supreme Court are to the same effect. *See Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976).

Nevada's statement that the "adoption decision could be materially different," Petition at 1117, is meaningless. It says nothing more than that there is a possibility that the Staff might have reached different conclusions than DOE. Yet, the standard under § 2.326 requires a demonstration that there would or would likely be a materially different outcome. Nevada's conclusory speculation cannot support the admission of this contention under the rigorous standards of §§ 51.109 and 2.326.

**a. Statement of Issue of Law or Fact to be Controverted**

The statement of the contention mischaracterizes the Staff's role. The NRC Staff's role as set forth in 10 C.F.R. § 51.109(a)(1) is only to "present its position on whether it is practicable to adopt, without further supplementation, the environmental impact statement (including any supplement thereto) prepared by the Secretary of Energy." The actual adoption determination is made by the presiding officer in the licensing proceeding. 10 C.F.R. § 51.109(c).

**b. Brief Explanation of Basis**

The statement of the basis mischaracterizes the law. Nevada's statement of the basis incorrectly states that the NWPA, 10 C.F.R § 63.31(c), CEQ regulations, and caselaw under

NEPA taken together do “not allow NRC to adopt DOE’s EISs, and therefore use them to satisfy its own NEPA duties, without stating whether it fully agrees with them.” Petition at 1116. In fact, as noted above, the law is directly to the contrary as acknowledged by the Commission itself.

**c. Whether the Issue is Within the Scope of the Proceeding**

The issue raised in this contention is not within the scope of this proceeding and, in effect, is a challenge to 10 C.F.R § 51.109 as interpreted by the Commission at the time it promulgated this regulation.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

The issue raised by this contention is not material to the findings the NRC must make. 10 C.F.R. § 63.31(c) requires the NRC to make environmental findings based on the actions of the presiding officer in adopting the DOE EIS in accordance with 10 C.F.R. § 51.109(c) or the alternative provisions of §§ 51.109(e) and (f) if adoption is not possible.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R § 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

As described above, there is no genuine dispute on a material issue of law or fact. Nevada has mischaracterized the NRC Staff’s role and is wrong as a matter of law in arguing that the NRC Staff may not adopt the DOE EIS unless it independently would have arrived at the

same conclusions as DOE on matters of fact or policy. Nevada's argument is contrary to § 51.109 as interpreted by the Commission.

#### **224. NEV-NEPA-18 - Overlap Between NEPA and AEA**

Certain of Nevada's safety contentions challenging aspects of DOE's TSPA-LA are applicable to DOE's 2008 FSEIS and to NRC Staff's September 5, 2008 adoption decision (U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain (09/05/2008), LSN# NRC000029699). *See* Attachment 3, Affidavit of Michael C. Thorne, Attachment C. These contentions are significant, individually but especially cumulatively, and if they were to be addressed in a satisfactory manner, the disclosure of overall radiological impacts would be materially different. As a result, the FEIS and FSEIS cannot be adopted by the NRC.

#### **RESPONSE**

In this contention, Nevada asserts that if 101 of their safety contentions were addressed cumulatively "the disclosure of overall radiological impacts would be materially different... [and] the FEIS and SEIS [could] not be adopted." Petition at 1118, 1119.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these

two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously –*i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada does not, in its experts’ affidavits or anywhere in its Petition, separately address §§ 51.109 and 2.326 (a) criteria. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true — one of Nevada’s experts, Dr. Thorne, refers to *101 safety-related* contentions.<sup>141</sup> In each of these contentions, he merely adopts the countless number of reports and innumerable documentary materials cited therein. Dr. Thorne, now, in an entirely separate environmental contention and without *any* explanation of its connection to the safety contentions (or this contention), makes the bare assertion that if these 101 contentions were addressed cumulatively the “radiological impacts would be materially different” and, as a result, “the FEIS and FSEIS cannot be adopted by the NRC.” Petition at 1119, Petition, Attachment 3 (Thorne Affidavit at 1, Attach. B).

A petitioner “*may not simply incorporate massive documents by reference as the basis for or a statement of his contention[.]*” *See Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 and 3), LBP-04-15, 60 NRC 81, 89 (2004) (quoting *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-89-03, 29 NRC 234, 240-41 (1989)), *aff’d*, CLI-04-6, 60 NRC 631 (2004) (emphasis added). Petitioners are expected “to clearly identify the matters on which they intend to rely with reference to a specific point.” *Id.* Similarly, Dr. Thorne has

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<sup>141</sup> Furthermore, each of these contentions is inadmissible for the reasons set forth in DOE’s individual responses.

attempted to incorporate a large number of documents and contentions, without any meaningful support or underlying basis. Nevertheless, Dr. Thorne's empty affidavit in which he adopts the entirety of statements and arguments contained in Paragraph 5 of 101 contentions does not somehow save this contention from being rejected for failure to provide any factual or technical basis. Accordingly, the contention should be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

The Licensing Board must dismiss this contention because it fails to present an issue of law or fact to be controverted. Neither Nevada nor its expert alleges a specific regulatory requirement that DOE failed to satisfy, but instead vaguely implies that if the 101 safety contentions were considered cumulatively, then a materially different radiological impact would result. Petition at 1118, 1119. Because Nevada has failed to controvert a position taken by the applicant in the Application or Repository SEIS, the contention must be dismissed. *See Tenn. Valley Auth.* (Bellefonte Nuclear Power Plant Units 3 and 4), LBP08-16, 68 NRC \_\_ (slip op. at 18, 29, 39-40, 42) (Sept. 12, 2008); *Tex. Utils. Elec. Co.* (Comanche Peak Steam Electric Station, Unit 2), LBP-92-37, 36 NRC 370, 384 (1992).

The contention also runs afoul of the Case Management Order governing this proceeding, which requires that petitioners raise a "narrow, single-issue [contention]." *See U.S. Dep't of Energy*, (High-Level Waste Repository: Pre-Application Matters, Advisory PAPO Board), LBP-08-10, 67 NRC \_\_ (slip op. at 6) (June 20, 2008) (Case Management Order). In issuing the Case Management Order, the Advisory PAPO Board stated that "contentions should be sufficiently specific as to define the relevant issues for eventual rulings on the merits, and not require the parties or licensing boards to devote substantial resources to narrow or to clarify them." *Id.*

The Commission has explained that a contention must be “reasonably specific.” *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328, 335 (1999). In *Duke Energy*, a Licensing Board rejected a contention alleging that the application was incomplete, based on the NRC Staff having issued a large number of requests for additional information. In affirming, the Commission stated that, “[p]etitioners seeking to litigate contentions must do more than attach a list of RAIs and declare an application ‘incomplete.’ It is their job to review the application and to identify **what** deficiencies exist and to explain **why** the deficiencies raise material safety concerns.” *Id.* at 337; *see also Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Power Station, Units 2 and 3), LBP-08-13, 68 NRC \_\_ (slip op. at 183-84) (July 30, 2008) (denying contention, which challenged Staff’s docketing decision, “as too broad and that [Petitioner] must deal with each ‘deficiency’ in the [Application] in a separate, specific, and well-supported contention”). Similarly, this contention, by indiscriminately referring to 101 safety-related contentions, constitutes a vague and generalized claim, which Nevada has made no effort to narrow. In addition, Nevada fails to identify the existence of *any* deficiency that raises a material concern.

Furthermore, as clearly stated in 10 C.F.R. § 2.309, Nevada has the burden to set forth adequately supported and well-pled contentions. To adjudicate this contention, however, DOE and the Licensing Board would need to parse through all 101 safety contentions along with their supporting documentation, at which point the same analytical gaps in Nevada’s contention would remain. This contention is merely an attempt to impermissibly shift Nevada’s well-established pleading requirement to the applicant. Such a process undermines the plain language of Section 2.309 and the Case Management Order.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

Nevada asserts that if the 101 safety contentions “were to be addressed” the radiological impacts “would be materially different.” Petition at 1118, 1119. However, both Nevada and Dr. Thorne fail to demonstrate that this position is material to any finding the NRC must make to authorize construction of the repository.

It is Nevada's burden to analyze the impacts of each of the 101 contentions and explain those impacts, and it has not done so. In its responses to Nevada’s safety contentions, DOE has demonstrated that Nevada has failed to offer even a qualitative argument as how its contentions individually or in combination might result in a significant increase in the anticipated dose – much less an increase above the regulatory limit.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner’s Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, Nevada has failed to provide the requisite supporting facts, expert opinions and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons set forth in section a. and d. above, there is no genuine dispute on any material issue of law or fact because a conclusory challenge that attempts to adjudicate countless issues is the type of contention that courts and the Commission have rejected as impermissible and inadmissible.

## **225. NEV-NEPA-19 - Peak Dose Identification**

DOE's 2008 FSEIS and 2002 FEIS are inadequate because neither calculates or discloses the reasonably foreseeable post-closure impacts to human health from releases of radioactive materials after one million years. This deficiency is significant, and if it were to be addressed in a satisfactory manner, the disclosure of overall radiological impacts would be materially different. As a result, the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada alleges that DOE inappropriately failed to analyze impacts from releases of radioactive materials occurring more than one million years after closure.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4 Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a "specific explanation of why it has been met." 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, "the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners." *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. Instead, it submitted an affidavit prepared by Dr. Thorne that says nothing about any of these criteria and merely adopts the words of Paragraph 5 of Nevada's Petition, which contains three brief parts and provides none of the analysis and explanations required by the Commission's regulations. Rather, these short parts simply make conclusory remarks without any meaningful discussion or analysis. Paragraph 5 states, for example, that DOE's decision not to measure doses after one million years is a "significant" deficiency "and if it were to be addressed in a satisfactory manner, the disclosure of overall radiological impacts would be materially different." Petition at 1122. In the face of that kind of unequivocal assertion, one would expect a thorough, scientifically valid analysis showing that there would be a material difference and also addressing the issue of why it is reasonable and necessary to consider environmental impacts beyond one million years. As to those crucial issues and others, the Petition and Dr. Thorne's affidavit are silent.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

The issue raised by this contention is not material to findings the NRC must make because DOE's analysis of peak dose was reasonable. A potential intervenor must demonstrate that DOE has failed to take a "hard look" at environmental consequences. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n 21 (1976). An EIS is adequate under this standard if it "contains a reasonably thorough discussion of the significant aspects of the probable environmental consequences." *Churchill County v. Norton*, 276 F.3d 1060, 1071 (9th Cir. 2001) (citation omitted); *Idaho Conservation League v. Mumma*, 956 F.2d 1508, 1519 (9th Cir. 1992). DOE's analysis fully meets the requirement that an agency take a "hard look" at environmental consequences.

DOE's analysis of peak radiation dose during the period from 10,000 to 1 million years after repository closure was reasonable. DOE thoroughly evaluated environmental impacts to the RMEI up to 1 million years postclosure. Repository SEIS, Vol. I at 5-2; 2002 FEIS, Vol. I at 5-23 to -31. NEPA does not envision analysis of every potential environmental impact on an unlimited time horizon. It requires only a "reasonably thorough" evaluation of consequences. Projecting consequences out 1 million years is "reasonably thorough" for NEPA's purposes.

Further, an agency is entitled to rely on reasonable assumptions in its environmental analyses. *Inland Empire Pub. Lands Council v. U.S. Forest Serv.*, 88 F.3d 754, 761 (9th Cir. 1996), citing *Sierra Club v. Marita*, 845 F. Supp. 1317, 1331 (E.D. Wis. 1994), *aff'd*, 46 F.3d 606 (7th Cir. 1995); *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1335-36 (9th Cir. 1992). As in the case of a reviewing court, it is not the role of the NRC "to decide what assumptions . . . we would make were we in the Secretary's position, but rather to scrutinize the record to ensure that the Secretary has provided a reasoned explanation for his policy assumptions." *Wyo. Lodging*

*and Rest. Ass'n v. Dep't of the Interior*, 398 F. Supp. 2d 1197, 1214 (D. Wyo. 2005), citing *Am. Iron & Steel Inst. v. OSHA.*, 939 F.2d 975, 982 (D.C. Cir. 1991); *S.F. Baykeeper v. U.S. Army Corps of Eng'rs*, 219 F. Supp. 2d 1001, 1015 (N.D. Cal. 2002) (agency's reasonable assumptions entitled to deference). The NRC has already made clear that the decision to adopt DOE's environmental analyses "does not necessarily mean that NRC would independently have arrived at the same conclusions on matters of fact or policy." NEPA Review Procedures for Geologic Repositories for High-Level Waste, 53 Fed Reg. 16,131, 16,142 (May 5, 1988).

DOE has reasonably explained its assumption it made in deciding to analyze peak dose through 1 million years postclosure. DOE explained that it used 1 million years because:

[T]he U.S. Environmental Protection Agency and the U.S. Nuclear Regulatory Commission have proposed dose limits for a maximum annual individual dose [for the 10,000 year and 1 million year time periods]. DOE has compared the results of the postclosure performance assessments with the proposed limits to provide a context in which to consider the potential environmental impacts of the Proposed Action.

Repository SEIS, Vol. I at 5-2. This is a reasonable basis for deciding on a 1 million year time frame for peak dose analysis. Beyond such time, DOE would not have a maximum annual dose limit with which to compare its estimates. Despite Nevada's complaint that "this truncation is arbitrarily based on EPA standards," Petition at 1122, the decision to make a comparison where there is an adequate point of reference for maximum dose is not arbitrary. Also, there is nothing unreasonable about DOE's use of EPA standards to reasonably limit the scope of what could otherwise be a never-ending analysis.<sup>142</sup>

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<sup>142</sup> Nevada also argues, pointing to Figure 2.4-10 of the SAR, that the expected doses are still increasing at one million years. Petition at 1122. DOE has the discretion under NEPA to set a reasonable end point for its analysis, and it has done so. Moreover, the dose level at 1 million years is projected to be only 2 mrem, Repository SEIS, Vol. I at 5-27, well below the individual protection standard of 100 mrem, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 66 Fed. Reg. 32,074, 32,088 (Jun. 13, 2001).

The National Academy of Sciences provides additional support for the reasonableness of DOE's use of the 1 million year time horizon. According to the Academy, "compliance assessment is feasible for most physical and geologic aspects of repository performance on the time scale of the long-term stability of the fundamental geologic regime – a time scale that is on the order of  $10^6$  [one million] years at Yucca Mountain." *See Nuclear Energy Inst., Inc. v. EPA*, 373 F.3d 1251, 1267 (D.C. Cir. 2004) (citing Comm'n on Technical Bases for Yucca Mountain Standards, Nat'l Research Council, Technical Bases for Yucca Mountain Standards (1995)). If geologic stability ceases around 1 million years, this is a reasonable basis for limiting analysis of human health impacts to this timeframe. *See also* EPA, Final Rule, Public Health and Environmental Radiation Protection Standards for Yucca Mountain, NV, 73 Fed. Reg. 61255, 61275-78 (Oct. 15, 2008) (explaining why a 1 million year geologic stability period is appropriate).

It is not the Commission's duty to "second guess" DOE's reasonable assumptions, *Wyo. Lodging and Rest. Ass'n*, 398 F. Supp. 2d at 1214, and Nevada has provided no reason for the Commission to do so. An infinite timeframe is not reasonable under NEPA, and DOE has provided a reasoned explanation for its assumption in selecting a 1 million year timeframe. Therefore, this contention is not material to the findings that the NRC must make.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, Nevada has failed to provide the requisite supporting facts, expert opinions and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons discussed in section d. above, there is no genuine dispute on any material issue of law or fact because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

## **226. NEV-NEPA-20 - Radionuclide Contamination of Aquifer**

The incomplete and inadequate 2002 FEIS and 2008 FSEIS analyses of cumulative impacts on groundwater quality due to contamination by radionuclides and other repository derived contaminants released to the volcanic/alluvial aquifer are significant deficiencies, and were they to be remedied, the disclosure of these impacts would be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada alleges that DOE failed to adequately analyze the cumulative impacts on groundwater quality due to contamination by radionuclides and other contaminants released to the volcanic/alluvial aquifer. This raises essentially the same issue that the NRC Staff raised in its report on the adoption of the DOE NEPA documents, except that the contention proposes that DOE agree at the outset to use specific analytical methods.

Although DOE has agreed to perform an analysis of the cumulative impacts on groundwater quality due to contamination by radionuclides and other contaminants released to the volcanic/alluvial aquifer and supplement its NEPA documents at the request of the NRC Staff, DOE's agreement does not make this an admissible contention unless Nevada makes the threshold showings required by 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326. All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true,

would or would likely result in a materially different outcome in this proceeding. Nevada's environmental contention must also be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a "specific explanation of why it has been met." 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, "the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners." *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting affidavits. Neither of the witnesses who submitted affidavits in support of this contention, Mr. Frishman and Dr. Thorne, is qualified to provide expert opinions about issues of groundwater in Nevada. Mr. Frishman's educational background is in the general area of geology, but much of his professional experience has been in the area of oceanography and coastal resource management in Texas. Frishman Affidavit, Attach. A. Although he has also worked in nuclear waste management, there is nothing in Mr. Frishman's background to suggest that he is qualified to provide expertise on issues of groundwater. Similarly, while Dr. Thorne has a lengthy resume in the areas of climate research, radiological modeling for plants and animals, and soil analysis, he has essentially no experience in the area of hydrology. Thorne Affidavit, Attach. A. Nothing in his background qualifies him to provide expert opinions about groundwater in Nevada. The affidavits submitted by Mr. Frishman and Dr. Thorne are therefore no more valid or reliable than the rejected testimony of a mathematician who tried to provide expert opinions on engineering matters, *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-86-23, 24 NRC 108 (1986), or the environmental health

expert who tried to provide expert evidence on physical security matters. *Private Fuel Storage*, (Independent Spent Fuel Storage Installation), *LLC*, LBP 98-13, 47 NRC 360 (1998).

Apart from the failure to provide an affidavit from a qualified expert, both affidavits provided in support of this contention largely ignore the criteria of 10 C.F.R. §§ 2.326 and 51.109. The affidavits do not separately address each of the criteria of § 2.326 nor do they provide a “specific explanation” of why each criteria has been met. Dr. Thorne and Mr. Frishman merely adopt the allegations set forth in Paragraph 5 of this contention. *See* Thorne Affidavit at 1, Attach. B; Frishman Affidavit at 1, Attach. B. Neither Dr. Thorne nor Mr. Frishman provides any evidence, explanation or analysis to support the allegations set forth by this contention. Paragraph 5 of this contention simply repeats the comments provided by the NRC Staff and does not refer to either of Nevada’s affiants. With regard to the most important criteria of § 2.326 – whether a materially different result would be likely – the contention and affidavits of Dr. Thorne and Mr. Frishman are silent.

This contention is not supported by evidence or analysis provided by a credible qualified expert witness and ignores all of the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

The issue presented by this contention is the subject of a supplement being prepared by DOE. In its evaluation undertaken at the request of the NRC Staff, DOE intends to rely on: (1) radiological and non-radiological contaminant concentrations predicted for groundwater at the RMEI location, and (2) groundwater pathways beyond the RMEI location as simulated by the Death Valley Regional Ground-Water Flow System model (developed by the United States Geological Survey) for current conditions. Groundwater impacts for a future wetter climate will

be based on a scaling factor from the TSPA-LA. The use of the scaling factor is appropriate because the regional modeling shows that the predominant flowpaths continue in the same volcanic-alluvial aquifer and the aquifer beyond the RMEI location is subject to similar changes in hydrologic conditions under the future wetter climate.

In addition, Nevada asserts that DOE's analysis should include descriptions of:

- the extent of the aquifer subject to contamination;
- an analysis of heterogeneities in the alluvial aquifer flow system that could affect radionuclide transport and concentration;
- an analysis of the potential for build-up of radionuclides in the aquifer due to retardation processes;
- an accounting of mass, concentration, and residence time of radionuclides in the affected aquifer throughout the regulatory period; and
- an assessment of potential long-term changes in the alluvial aquifer flow and transport system (including discharge) due to climate variation.

Petition at 1126. In the supplement being prepared by DOE at the request of NRC Staff, DOE intends to utilize radiological contaminant considerations predicted by the TSPA-LA model for groundwater at the RMEI location and groundwater pathways beyond the RMEI location as simulated by the regional model. The volcanic and alluvial aquifers in the Yucca Mountain region have been studied extensively and, as practicable, that information or abstractions of that information have been incorporated into the TSPA-LA and regional flow models. These models were developed using information from extensive field work, and they include heterogeneities appropriate for the scale of the model, and no additional analysis of aquifer heterogeneity is necessary to be included as part of the supplement. A simplified transport model, consistent with the expectations of the NRC Staff, will be implemented to estimate contaminant concentrations

over time along the regional flowpaths. Aquifer characteristics incorporated in the existing models represent the state of existing information. The use of relatively simplified models, based on existing information, will result in a conservative estimate of contaminant flow and transport in the groundwater system.

If the Board finds that the requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326 have been met by Nevada, consideration of this contention should be deferred until DOE issues its supplement. If Nevada disagrees with the resolution of this issue in the supplement, this issue can be raised at that time.

**b. Brief Explanation of Basis**

See section a. above.

**c. Whether the Issue is Within the Scope of the Proceeding**

See section a. above.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

See section a. above.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

See discussion of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326 above.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

See section a. above.

## **227. NEV-NEPA-21 - Contaminated Aquifer Discharges**

The incomplete and inadequate 2002 FEIS and 2008 FSEIS analyses of the cumulative impacts of land surface discharge of groundwater contaminated with radionuclides and other repository derived contaminants are significant deficiencies, and were they to be remedied, the disclosure of these impacts would be materially different, thus the FEIS and FSEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada alleges that DOE failed to adequately analyze the cumulative impacts of the surface discharge of potentially contaminated groundwater. This raises essentially the same issue that the NRC Staff raised in its report on the adoption of the DOE NEPA documents, except that it proposes that DOE agree at the outset to evaluate specific surface discharge locations and use specific analytical methods.

Although DOE has agreed to perform an analysis of the cumulative impacts from the discharge of potentially contaminated groundwater and supplement its NEPA documents at the request of the NRC Staff, DOE's agreement does not make this an admissible contention unless Nevada makes the threshold showings required by 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326. All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Nevada's

environmental contention must also be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting affidavits. Neither of the witnesses who submitted affidavits in support of this contention, Mr. Frishman and Dr. Thorne, is qualified to provide expert opinions about issues of groundwater in Nevada. Mr. Frishman’s educational background is in the general area of geology, but much of his professional experience has been in the area of oceanography and coastal resource management in Texas. Frishman Affidavit, Attach. A. Although he has also worked in nuclear waste management, there is nothing in Mr. Frishman’s background to suggest that he is qualified to provide expertise on issues of groundwater. Similarly, while Dr. Thorne has a lengthy resume in the areas of climate research, radiological modeling for plants and animals, and soil analysis, he has essentially no experience in the area of hydrology. Thorne Affidavit, at Attach. A. Nothing in his background qualifies him to provide expert opinions about groundwater in Nevada. The affidavits submitted by Mr. Frishman and Dr. Thorne are therefore no more valid or reliable than the rejected testimony of a mathematician who tried to provide expert opinions on engineering matters, *Fla. Power & Light Co.*, (Turkey Point Nuclear Generating Plant, Units 3 and 4), LBP-86-23, 24 NRC 108 (1986), or the environmental health

expert who tried to provide expert evidence on physical security matters. *Private Fuel Storage, LLC*, (Independent Spent Fuel Storage Installation), LBP 98-13, 47 NRC 360 (1998).

Both affidavits provided in support of this contention largely ignore the criteria of 10 C.F.R. § 2.326 and 51.109. The affidavits do not separately address each of the criteria of § 2.326 nor do they provide a “specific explanation” of why each criteria has been met. Dr. Thorne and Mr. Frishman merely adopt the allegations set forth in Paragraph 5 of this contention. *See* Thorne Affidavit at 1, Attach. B; Frishman Affidavit at 1, Attach. B. Neither Dr. Thorne nor Mr. Frishman provides any evidence, explanation or analysis to support the allegations set forth by this contention. Paragraph 5 of this contention simply repeats the comments provided by the NRC Staff, and does not refer to either of Nevada’s witnesses. With regard to the most important criteria of § 2.326 – whether a materially different result would be likely—the contention and affidavits of Dr. Thorne and Dr. Frishman are silent.

This contention is not supported by evidence or analysis provided by a credible qualified expert witness and ignores all of the requirements and criteria of 10 C.F.R. §§ 2.326 and 51.109. This contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

The issue presented by this contention is the subject of a supplement being prepared by DOE. In its evaluation undertaken at the request of the NRC Staff, DOE intends to rely on: (1) radiological and non-radiological contaminant concentrations predicted for groundwater at the RMEI location, and (2) groundwater pathways beyond the RMEI location as simulated by the Death Valley Regional Ground-Water Flow System model (developed by the United States Geological Survey) for current conditions. The evaluation of potential discharge locations will depend on the output of the model. Potential discharge locations that coincide with the flow

pathways will be evaluated in the supplement. DOE will not, however, presuppose at the outset that any specific locations will be affected. Impacts for a future wetter climate will be evaluated based on a scaling factor for the groundwater specific discharge from the TSPA-LA. The use of the scaling factor is appropriate because the regional modeling shows that the predominant flowpaths continue in the same volcanic-alluvial aquifer and the aquifer beyond the RMEI location is subject to similar changes in hydrologic conditions under the future wetter climate.

In addition, Nevada asserts that DOE's analysis should include descriptions of:

- the extent of the aquifer subject to contamination;
- an analysis of heterogeneities in the alluvial aquifer flow system that could affect radionuclide transport and concentration;
- an analysis of the potential for build-up of radionuclides in the aquifer due to retardation processes;
- an accounting of mass, concentration, and residence time of radionuclides in the affected aquifer throughout the regulatory period; and
- an assessment of potential long-term changes in the alluvial aquifer flow and transport system (including discharge) due to climate variation.

Petition at 1131. In the supplement being prepared by DOE at the request of NRC Staff, DOE intends to utilize radiological contaminant concentrations predicted by the TSPA-LA model for groundwater at the RMEI location and groundwater pathways beyond the RMEI location as simulated by the regional model. The volcanic and alluvial aquifers in the Yucca Mountain region have been studied extensively and, as practicable, that information or abstractions of that information have been incorporated into the TSPA-LA and regional flow models. These models were developed using information from extensive field work and they include heterogeneities appropriate for the scale of the model, and no additional analysis of aquifer heterogeneity is

necessary to be included as part of the supplement. A simplified transport model, consistent with the expectations of the NRC Staff, will be implemented to estimate contaminant concentrations over time along the regional flowpaths. Aquifer characteristics incorporated in the existing models represent the state of existing information. The use of relatively simplified models, based on existing information, will result in a conservative estimate of contaminant flow and transport in the groundwater system.

If the Board finds that the requirements of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326 have been met by Nevada, consideration of this contention should be deferred until DOE issues its supplement. If Nevada disagrees with the resolution of this issue in the supplement, this issue can be raised at that time.

**b. Brief Explanation of Basis**

See section a. above.

**c. Whether the Issue is Within the Scope of the Proceeding**

See section a. above.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

See section a. above.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

See discussion of 10 C.F.R. § 51.109 and 10 C.F.R. § 2.326 above.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

See section a. above.

## **228. NEV-NEPA-22 - No-Action Alternative**

The 2002 FEIS's No-Action Alternative is neither an available, appropriate, nor reasonable alternative for analysis and decision making in that neither of the two No-Action Alternative scenarios likely ever would be determined acceptable for implementation; however, the current practice of at-reactor (or off-site ISFSI), NRC licensed spent nuclear fuel storage can be extrapolated, for EIS comparative impact analysis purposes, for a reasonable and feasible period of time in the future. This deficiency is significant, and if it were to be addressed in a satisfactory manner, the disclosure of overall environmental impacts would be materially different. As a result, the FEIS cannot be adopted by the NRC.

### **RESPONSE**

In this contention, Nevada alleges that DOE inappropriately selected No-Action Alternative scenarios that would not likely be determined acceptable for implementation.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R. § 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to

enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners....” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavits. It submitted affidavits prepared by Steven A. Frishman and Robert J. Halstead that say nothing about any of these criteria and merely adopt the words of Paragraph 5 of Nevada’s Petition, a paragraph that provides none of the analysis and explanations required by the Commission’s regulations. Frishman Affidavit at 1, Attach. B; Halstead Affidavit at 1, Attach. B. Neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b). This regulation requires Nevada’s experts to “set forth the factual and/or technical bases for the movant’s claim that the criteria of paragraph (a) of this section have been satisfied.” Section 2.326(b) goes on to state that “[e]ach of the criteria must be separately addressed, with a specific explanation of why it has been met.”

Additionally, Paragraph 5 simply makes conclusory remarks without any meaningful discussion or analysis, and without an explanation of why the issue raised by the contention is of any significance. Paragraph 5 states, for example, that DOE’s choice of No-Action Alternative scenarios was a “significant” deficiency “and if it were to be addressed in a satisfactory manner, the disclosure of overall environmental impacts would be materially different.” Petition at 1134. In the face of that kind of unequivocal assertion, one would expect a meaningful, scientifically valid analysis showing that there would be a material difference in disclosure of environmental impacts if different No-Action Alternative scenarios were utilized. Instead, Paragraph 5 simply proposes a substitute No-Action Alternative scenario without any analysis whatsoever on this critical question. In fact, no such material difference would exist as DOE’s Scenario 1 included

the analysis Nevada proposes, reviewing the estimated radiological impacts from the operation of storage facilities at 77 locations around the U.S. over the time period during which the repository would be operated and monitored, but simply extended the analysis to incorporate the postclosure timeframe. Repository SEIS, Vol. I at 7-5 to -6. The affidavits and this contention should therefore be rejected.

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**c. Whether the Issue is Within the Scope of the Proceeding**

This contention is inadmissible because it is outside the scope of the proceeding under 10 C.F.R. § 2.309(f)(1)(iii). Although the 2002 FEIS and the Repository SEIS do discuss a No-Action Alternative, no challenge to the adequacy of DOE's discussion of such alternative may be entertained because the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. § 10101 *et seq.*, (NWPA), expressly provides that an environmental impact statement prepared for the Yucca Mountain Site need not "consider the need for a repository, the alternatives to geological disposal, or alternative sites to the Yucca Mountain Site." 42 U.S.C. § 10134(a)(1)(D).

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

For the reasons stated in section c., there is no issue material to the findings that the NRC must make regarding this contention because the NWPA expressly forecloses the need to

consider alternatives to the Yucca Mountain Site, which includes “No-Action Alternatives.” 42 U.S.C. § 10134(a)(1)(D).

Further, there is no issue material to the findings that the NRC must make because, even if required, DOE’s consideration of No-Action Alternatives was reasonable. First, Nevada’s proposed “alternative” – that DOE analyze the “impacts of storing the waste, in equivalent amounts, at on-site or off-site facilities, for an equivalent period of time,” Petition at 1135 – has already been addressed. In Scenario 1, DOE reviewed the estimated radiological impacts from the operation of storage facilities at 77 locations around the U.S. over the time period during which the repository would be operated and monitored, and simply extended the analysis to incorporate the postclosure timeframe. Repository SEIS, Vol. I at 7-5 to -6. Nevada’s assertion that DOE did not analyze such storage impacts, but rather “generically determined [them] to be not significant,” Petition at 1135, is incorrect.

Second, a court will uphold an agency’s discussion of alternatives so long as “the alternatives are reasonable and the agency discusses them in reasonable detail.” *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991). “An agency is required to examine only those alternatives necessary to permit a reasoned choice.” *Ass’n. of Pub. Agency Customers, Inc. v. Bonneville Power Admin.*, 126 F.3d 1158, 1185 (9th Cir. 1997).

DOE selected two No-Action Alternatives: Scenario 1, where long-term storage of SNF and HLW would occur at the current storage sites with effective institutional control for at least 10,000 years; and Scenario 2, where storage would occur at the current sites with no effective institutional control after about 100 years. Repository SEIS, Vol. I at 2-56. DOE selected these two Scenarios to illustrate the range of potential environmental impacts that would be possible if the Yucca Mountain repository is not completed. *Id.* As DOE explained, it recognizes that “the

future course Congress, DOE, and the commercial utilities would take, if Yucca Mountain was not approved, is uncertain.” *Id.* Faced with this uncertainty, DOE selected bounding scenarios.

Nevada has not shown that DOE’s selection of No-Action Alternatives was unreasonable. As DOE stressed, the No-Action scenario in this case is by no means clear. There are a number of plausible outcomes, including “the continued storage of spent nuclear fuel and high-level radioactive waste at each generator site in expanded onsite storage facilities, storage of these materials at one or more centralized locations, study and selection of another location for a deep geologic repository . . . , development of new technologies, or reconsideration of alternatives to geologic disposal.” Repository SEIS, Vol. I at 7-2. But DOE “need not examine an infinite number of alternatives in infinite detail.” *Allison v. Dep’t of Transp.*, 908 F.2d 1024, 1031 (D.C. Cir. 1990). It can use reasonable criteria to narrow the range of its alternative scenarios.

An agency has the discretion to estimate the reasonably foreseeable upper bound of an action’s impacts, and in doing so, fully comports with NEPA’s requirements. *See Natural Res. Def. Council, Inc. v. U.S. Nuclear Regulatory Comm’n*, 685 F.2d 459, 486 (D.C. Cir. 1982) (noting that “[i]f, after considering [the upper bound] of environmental damage, the decisionmakers conclude that the proposed action is worth its societal costs, full account will have been taken of the action’s environmental impact”), *rev’d on other grounds, Baltimore Gas and Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87 (1983). As a result, courts have upheld NEPA analysis methodologies that result in a conservative estimate of environmental effects. *See Mid States Coalition for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 539 (8th Cir. 2003) (finding that using a conservative estimate “did not undermine the purposes of NEPA”). It was therefore not unreasonable for DOE to use bounding scenarios for its No-Action Alternatives.

Nevada's arguments for why it was unreasonable to select these No-Action Alternatives are also unconvincing and inconsistent. It argues that it is "inconceivable" in Scenario 2 that society would permit no institutional controls after 100 years. Petition at 1134. Yet although Nevada argues that society would be unwilling to "accept the willful decision to cease maintenance," apparently this logic does not hold true in the context of Scenario 1, where Nevada contends that a long-term commitment to institutional controls "exceeds credibility." *Id.* DOE agrees that these scenarios are unlikely, 2002 FEIS, Vol. I at 2-65, but they were selected not for their likelihood but to demonstrate the impacts of bounding scenarios for the purpose of comparison. An agency must "set forth only those alternatives necessary to permit a reasoned choice." *Nw. Env'tl. Def. Ctr. v. Bonneville Power Admin.*, 117 F.3d 1520, 1538 (9th Cir. 1997) (internal quotation and citation omitted). This contention should therefore be rejected.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, Nevada has failed to provide the requisite supporting facts, expert opinions and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact, With Supporting References to the License Application**

For the reasons discussed in sections c. and d. above, there is no genuine dispute on any material issue of law or fact because it is outside the scope of the proceedings and because the contention fails to demonstrate any inadequacy in DOE's NEPA analyses. The contention therefore should be rejected.

**229. NEV-NEPA-23 - Aircraft Crash Scenarios – Aging Facility**

SEIS Appendix E, Section E.7, which states that DOE did not consider the Aging Facility to be vulnerable to a hypothetical sabotage scenario involving a large commercial jet aircraft crash due to the spacing and protective nature of the concrete overpacks, fails to accurately identify the number of overpacks damaged, fails to accurately assess the severity of the damage from such a crash, and fails to accurately analyze the amount of radioactive material that would be released from such a crash. These deficiencies are significant, and if they were to be addressed in a satisfactory manner, the disclosure of overall radiological impacts would be materially different, and thus the FEIS and SEIS cannot be adopted by the NRC.

**RESPONSE**

In this contention, the State of Nevada asserts that DOE did not consider the Aging Facility to be vulnerable to a hypothetical sabotage scenario involving a large commercial jet aircraft crash and thus fails to accurately identify the consequences of such a sabotage event.

All NEPA contentions must demonstrate that they meet the criteria of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326, as well as the standards for contentions of 10 C.F.R. § 2.309. Nevada fails to meet the express requirements of 10 C.F.R. §§ 2.326 and 51.109 in requesting that its contention be admitted in this proceeding. Specifically, as set forth in Section V.A.4, Nevada must (1) raise a significant environmental issue; and (2) demonstrate that its contention, if proven to be true, would or would likely result in a materially different outcome in this proceeding. Moreover, its environmental contention must be supported by the affidavit of a qualified witness that sets forth the factual and/or technical basis supporting the claim that these two criteria have been met, including a “specific explanation of why it has been met.” 10 C.F.R.

§ 2.326(b). As noted in Section V.A.4 above, “the Commission expects its adjudicatory boards to enforce the [Section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand reopening motions that do not meet those requirements within their four corners.” *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), ALAB-915, 29 NRC 427, 432 (1989).

Nevada fails to address any of the mandatory requirements of §§ 51.109 and 2.326 in its contention or supporting expert affidavit of Mr. Hugh Horstman. First, Nevada does not in its expert’s affidavit or anywhere in its Petition separately address the criteria for §§ 51.109 and 2.326(a) and demonstrate that the contention raises a significant environmental issue or that the contention, if proven, would or would likely result in a materially different outcome in the proceeding. Nevada’s expert’s affidavit simply adopts Paragraph 5 in the Petition. Horstman Affidavit at 1, Attach. B. With regard to the most difficult showing – a demonstration that a “materially different result would be or would have been likely” if the contention were proven to be true – Nevada’s expert, Mr. Horstman, simply points to the 2002 FEIS and Repository SEIS and documents referenced in those Statements, posits a new hypothetical sabotage event, and then criticizes DOE for not addressing it. The concluding sentence of Paragraph 5 then states, without elaboration, that if Mr. Horstman’s new sabotage event had been included in the Repository SEIS, “the disclosure of overall radiological impacts would have been different.” Petition at 1141. In adopting this statement, Mr. Horstman does not claim, much less demonstrate, that the consequences of this aircraft sabotage event are more severe or more likely than those already addressed in the 2002 FEIS and Repository SEIS.<sup>143</sup>

Mr. Horstman is not an expert on sabotage events. Horstman Affidavit, Attach. A. Mr. Horstman is currently a pilot with Southwest Airlines and formerly served as an Air Force

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<sup>143</sup> Paragraph 5 and Mr. Horstman’s affidavit demonstrate the Nevada was well aware of the requirements of 10 C.F.R § 51.109 and 10 C.F.R. § 2.326 but largely chose to ignore them.

fighter pilot and instructor. He has degrees in Business Administration. He also has worked for the State of Utah as an aviation safety consultant. There is nothing, however, identified in his background which would qualify him to provide expert testimony on possible sabotage events and the radiological consequences of those events. He has adopted Paragraph 5 of the contention, including the statement that if the aircraft sabotage events occurred as he has suggested, “the disclosure of overall radiological impacts would be materially different.” That he is not an expert on sabotage events, and that his testimony is based on extraordinarily remote and speculative possibilities, is demonstrated by his statement in Paragraph 5 that the consequences of the sabotage event would be even worse if a B-52 bomber were used by the saboteurs because the B-52 bomber “would be carrying 4 to 8 times as many engines as assumed for the other aircraft.” Petition at 1140. How a saboteur would obtain and fly a B-52 bomber into the repository is never explained. Given the lack of qualifications to provide expert opinions on sabotage events or the radiological consequences of such events, the affidavit of Nevada’s expert fails to meet the NRC’s admissibility standards and this contention should be rejected. *See Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-98-13, 47 NRC 360, 367-68 (1998).

**a. Statement of Issue of Law or Fact to be Controverted**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**b. Brief Explanation of Basis**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement

**c. Whether the Issue is Within the Scope of the Proceeding**

Without prejudice to other positions taken by DOE, DOE expresses no legal objection based upon this requirement.

**d. Whether the Issue is Material to the Findings that the NRC Must Make**

This contention does not allege a material issue because DOE's analysis of sabotage events was reasonable and fully met the requirements of NEPA. In the Repository SEIS, DOE recognized that "[w]hether acts of sabotage or terrorism would occur, and the exact nature and location of the events, or the magnitude of the consequences of such acts if they were to occur is inherently uncertain—the possibilities are infinite." Repository SEIS, Vol. II, App. E at E-32. Nonetheless, in the Repository SEIS, DOE hypothesized a scenario in which a large commercial jet aircraft would crash into and penetrate the repository facility "with the largest inventory of radioactive material vulnerable to damage from such an event." *Id.* DOE also discussed whether it should consider such a crash into the Aging Facility but chose not to do so for several reasons:

(1) the aging overpacks on the Aging Facility pads, would be 5.5 meters (18 feet) apart (DIRS 184100-BSC 2007, all), such that an aircraft crash into the pad could not damage more than a few of the overpacks, and (2) the storage canisters would be enclosed in thick concrete overpacks that would provide protection from penetration by aircraft parts (DIRS 155970-DOE 2002, Appendix H, p. H-37 and Chapter 7, p. 7-30). Further, as noted in Section e.2.1.2.1, DOE would design the TAD aging overpacks to withstand an impact from a jet fighter aircraft crash.

*Id.*<sup>144</sup> Mr. Horstman does not suggest any errors in the aircraft sabotage analysis in the Repository SEIS but instead asserts that there should have been an additional analysis undertaken involving the Aging Facility. After describing the speed and size of a Boeing 757

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<sup>144</sup> In its accident analysis, DOE considered the possible accidental crash of a fighter plane, "the most likely aircraft impact." Repository SEIS, Vol. II, App. E at E-11.

and a B-52 and the physical characteristics of the Aging Facility, Mr. Horstman contends that in addition to evaluating a large commercial plane crashing into the Repository, DOE should also have considered a saboteur crashing a large commercial aircraft or a B-52 somewhere in the facility, the aircraft then skidding perhaps as much as 1,400 feet including on the aging pad and damaging hundreds of overpacks. Petition at 1140. Mr. Horstman does not explain the extent of the damage to the overpacks or whether there would be any radiological releases. Nor does he assert that this new sabotage event would result in worse consequences than the event analyzed in the Repository SEIS.

As DOE recognized in the Repository SEIS, the analysis of sabotage events is highly uncertain and the possibilities are infinite. Recognizing these same difficulties, in *Pacific Gas and Electric Co.*, the Commission recently rejected as inadmissible a contention that the NRC Staff's environmental assessment had failed to consider alternate threat scenarios. The Commission held that "[a]djudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity." *Pac. Gas & Elec. Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, 67 NRC \_\_ (slip op. at 24) (Jan. 15, 2008). DOE is not required under NEPA to address the kind of highly speculative event Mr. Hortsman proposes. *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Station, Units 3 and 4), LBP-81-14, 13 NRC 677, 688 (1981).

Similarly, although Mr. Horstman is not a qualified expert, and even if the Board were to conclude that this contention involved disputed expert opinions, the well-settled law that a petitioner does not raise a material issue under NEPA simply by presenting a battle of experts, still applies. In *Price Road Neighborhood Ass'n, Inc. v. Department of Transportation.*, 113 F.

3d 1505 (9th Cir. 1997), the Court of Appeals affirmed a district court's grant of summary judgment to the agency. The Ninth Circuit stated that the appellant had:

sought to engage in a battle of the experts with regard to several impacts, including air quality and noise, offering their own studies to contradict those of the agencies. We have consistently rejected such attempts, noting that “when specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts...”

*Id.* at 1511, citing *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)); accord *Havasupai Tribe v. Robertson*, 943 F.2d 32, 34 (9th Cir. 1991) (affirming district court decision based on the administrative record that no supplementation of an EIS was required because “disagreement among experts does not invalidate an EIS”) (citation omitted).

As the Supreme Court stated in *Marsh*, an agency must have the discretion to rely on the reasonable opinions of its own experts “even if, as an original matter, a court might find contrary views more persuasive.” *Marsh*, 490 U.S. at 378. This is because, as the Supreme Court explained in *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976), “[n]either the statute nor its legislative history contemplates that a court should substitute its judgment for that of the agency as to the environmental consequences of its actions.” The NRC has indicated that it would adhere to this same tenet in deciding whether to adopt DOE's EIS. Accordingly, this contention, which is premised on a disagreement between an intervenor's expert and DOE's expert analysis in an EIS does not create a litigable issue and therefore should not be admitted.

**e. Statement of Alleged Facts or Expert Opinion Supporting Petitioner's Position and Supporting References**

For the reasons discussed above with respect to the requirements of 10 C.F.R. §§ 51.109 and 2.326, and as addressed in Section V.A.3 regarding the legal standards under 10 C.F.R.

§ 2.309(f)(1)(v), Nevada has failed to provide the requisite supporting facts, expert opinion and references.

**f. Existence of a Genuine Dispute on a Material Issue of Law or Fact,  
With Supporting References to the License Application**

For the reasons discussed above with respect to the requirements of 10 C.F.R §§51.109 and 2.326 in d. above, there is no genuine dispute on any material issue of law or fact.

## VI. CONCLUSION

Nevada has failed to demonstrate that it is in substantial and timely compliance with its LSN obligations. While it has legal standing as the host state for the repository, it has failed to proffer any admissible contentions. Accordingly, its Petition should be denied.

Respectfully submitted,

*Signed electronically by Donald J. Silverman*

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this 16th day of January, 2009.

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD**

In the Matter of:	)	
	)	
U.S. Department of Energy	)	January 16, 2009
	)	
(License Application for Geologic Repository at Yucca Mountain)	)	Docket No. 63-001
	)	

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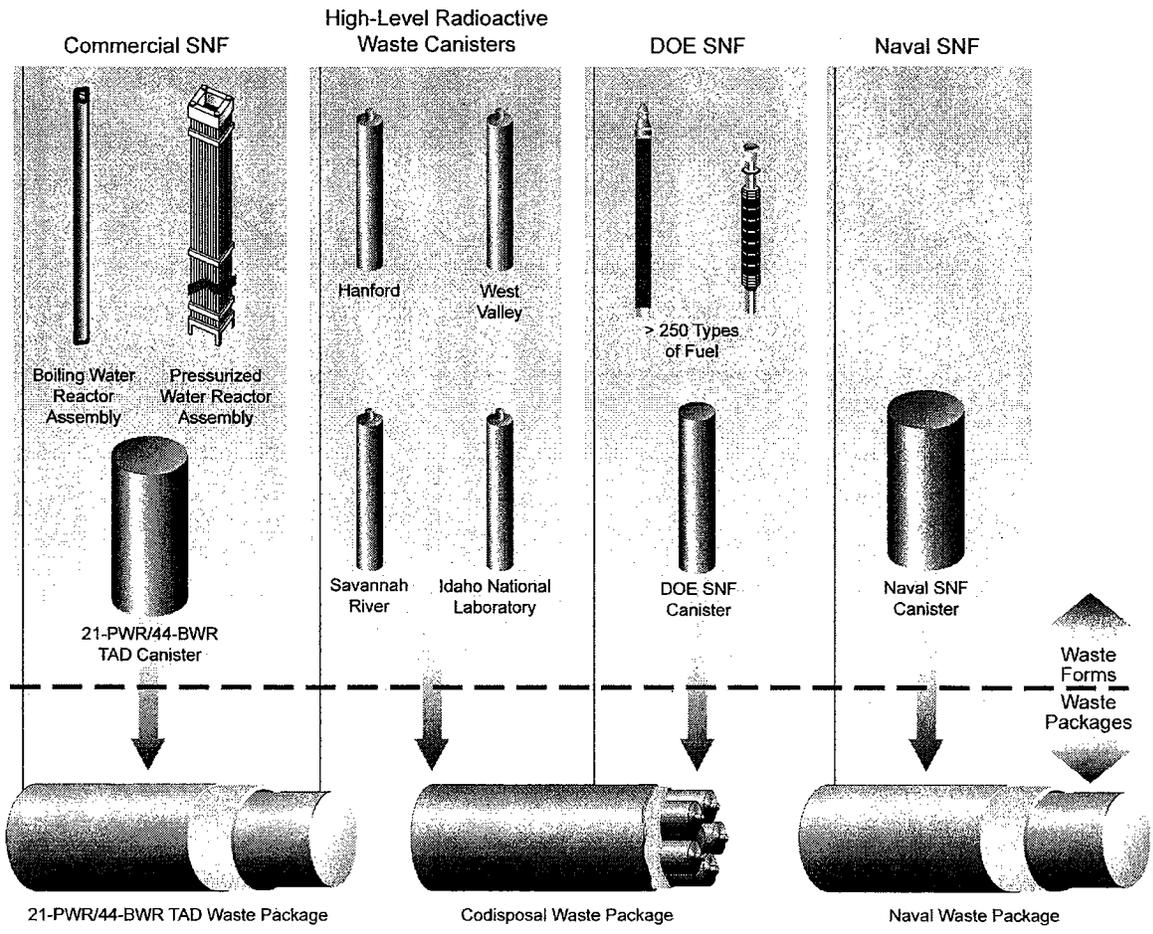
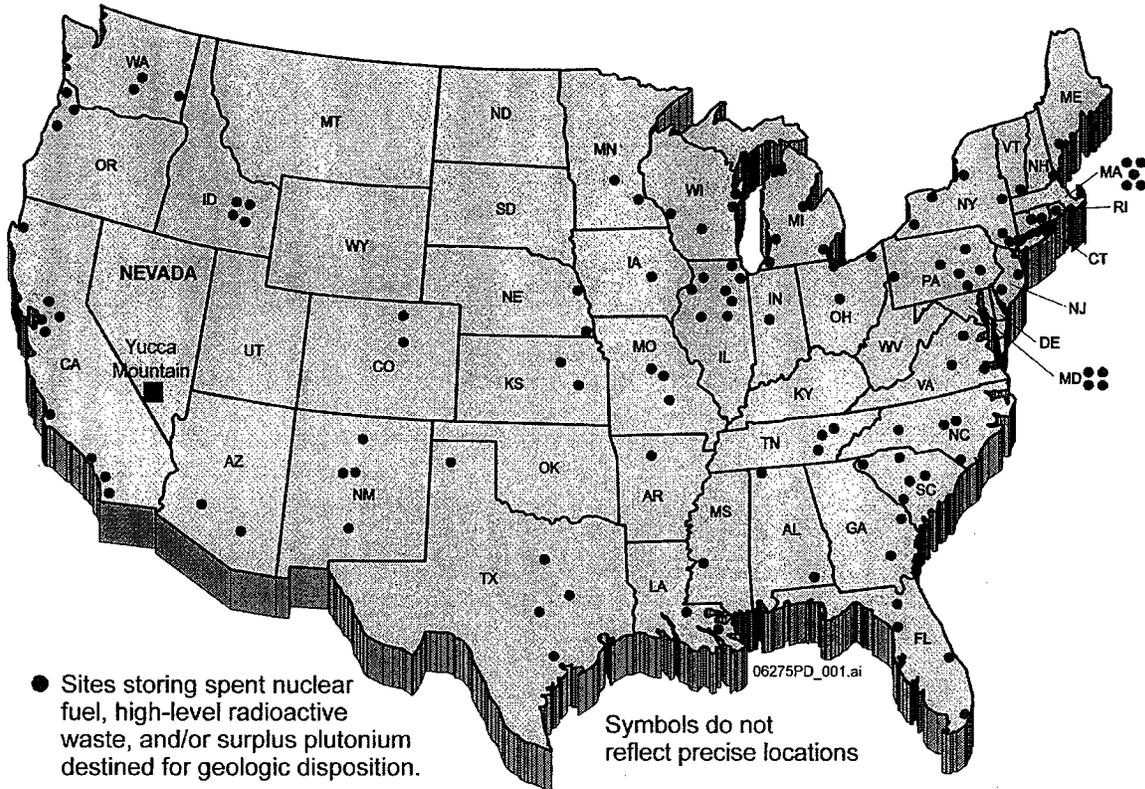
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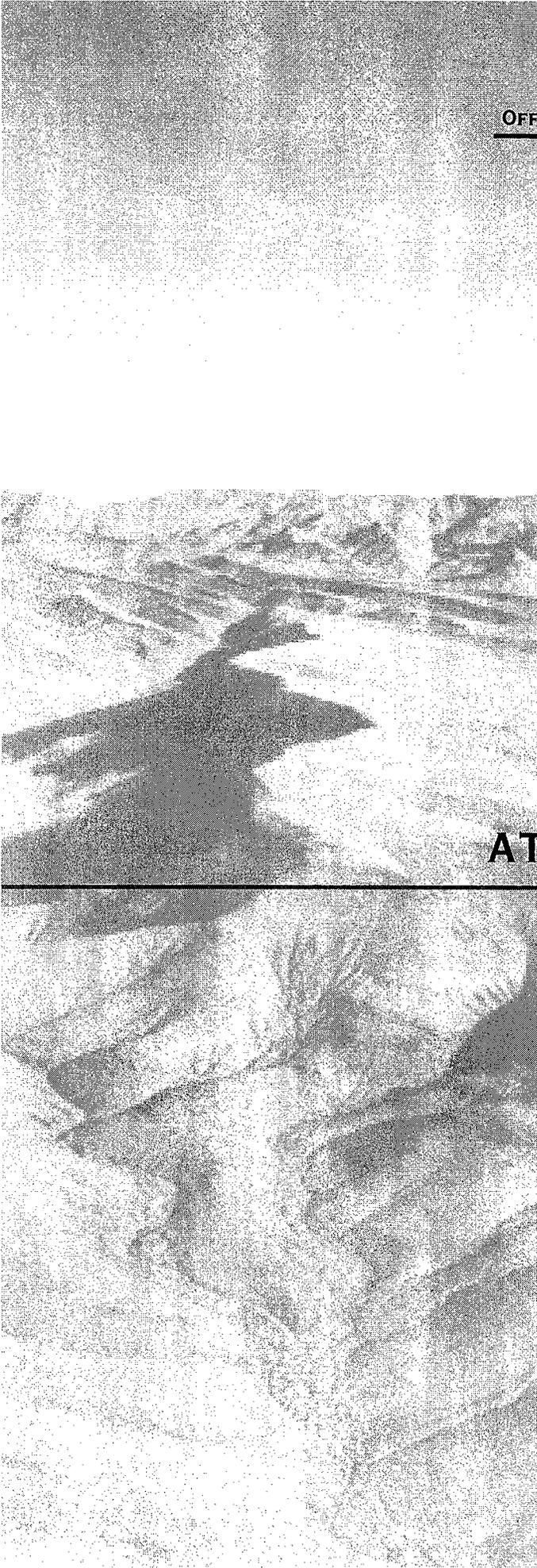
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**SAFETY OF A REPOSITORY  
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June 2008

**THE SAFETY  
OF A REPOSITORY  
AT YUCCA MOUNTAIN**

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# THE SAFETY OF A REPOSITORY AT YUCCA MOUNTAIN

## 1. INTRODUCTION

The U.S. Department of Energy (DOE) has now submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct a geologic repository at Yucca Mountain, Nevada, for the disposal of spent nuclear fuel (SNF) and high-level radioactive waste (HLW). The submittal of the license application is a major milestone in the history of site investigations, scientific analysis, and repository facilities design and is a major step toward safe, permanent disposal of nuclear waste.

This work was begun more than 25 years ago, when Congress adopted the Nuclear Waste Policy Act (NWPA), consistent with the overwhelming consensus in the international scientific community that the best option for a disposal facility for nuclear waste is a deep underground repository. More than 20 years ago, Congress directed the Secretary of Energy to investigate and recommend to the President whether such a repository could be located safely at Yucca Mountain. Following tens of millions of hours of research to answer this question, the Secretary recommended to the President that Yucca Mountain be developed as the site for an underground repository for spent fuel and other radioactive wastes. The Secretary also concluded that there are compelling national interests in favor of proceeding with the project. These national interests included national security, nonproliferation objectives, energy security, homeland security, and efforts to protect the environment. The President approved the recommendation, and in July 2002 the President signed the joint Congressional resolution known as the Yucca Mountain Development Act, designating the Yucca Mountain site for development as a repository for the disposal of SNF and HLW. This action authorized the DOE to proceed in the development of a license application and to seek approval from the NRC to construct a repository. At a later date, a separate licensing decision by the NRC will be required before the repository can commence operations.

The Yucca Mountain repository Construction Authorization license application, which the DOE submitted to the NRC in June of 2008, describes the results of scientific and engineering studies of the Yucca Mountain site, the waste forms to be disposed, the repository and waste package designs, the results of safety assessments of the operations to be carried out at the repository, and evaluations of the long-term performance of the repository, along with general and administrative information. The license application provides the information specified by the NRC in its regulations and other guidance documents. The license application contains results of long-term safety evaluations based on studies of the geologic, hydrologic, and geochemical environment and evaluations of how conditions might evolve over time. These evaluations consider a range of processes that could affect the repository. Because projections of performance for 10,000 years and longer are inherently uncertain, the uncertainties associated with analyses and models of long-term performance are also described in the license application.

This document presents a summary of why the DOE has concluded that it can safely construct and operate a repository for SNF and HLW at Yucca Mountain in Nye County, Nevada and demonstrates that the repository system will safely limit releases well into the future. The conclusion that the repository will be safe if constructed and operated as described in the license application is based on DOE assessments of the ability of the repository to meet EPA standards and NRC regulations governing a repository at Yucca Mountain. This document presents an overview of the evidence, analyses, and conclusions that quantify and substantiate the DOE position that the repository will be safe during operations and after closure, beyond the time when active control of the facility is

needed or can be relied on, and it presents a summary of the safety findings. The document discusses the safety of the repository in two time frames: (1) during the operation of the repository, while wastes are shipped to Yucca Mountain, packaged and placed underground, and monitored; and (2) after the repository is permanently closed. Each of these sections is organized to describe the safety principles governing the design and safety assessments, to present a description of the features or components of the repository that are important to demonstrating safety, and to present a summary of pertinent results accompanied by a discussion of why the DOE has confidence in the results.

**mrem.** The millirem, or mrem, is a measure of the amount of radiation a person receives and how it affects the body. One mrem is less than 0.5% of the amount of radiation received annually from naturally occurring radiation. 1,000 mrem is equal to 1 rem.

The DOE has addressed the potential risks associated with the handling and disposal of radioactive wastes in preparing the license application and its environmental impact statements. The handling and disposal of radioactive wastes are governed by standards and regulations issued and administered by the EPA and the NRC, respectively. These

standards and regulations specify maximum permissible levels of radiation doses, measured in millirem or rem, to workers and the public. The DOE must comply with these regulations and, in order to do so, must examine how the repository is expected to perform under expected or normal conditions as well as in response to the impact of potential hazards and very low probability events that could disrupt the repository system.

The detailed assessments establishing the safety of the repository are presented in the license application. As shown in the application and summarized in this document, the potential doses to workers and the public from the operation of the repository are below the limits imposed by the regulations. The same is true for protection of the public after the repository is permanently closed. In fact, the estimated doses to the public in the distant future are a small fraction of the limits imposed by the proposed regulations. The doses are calculated for a hypothetical individual designed by regulation to be situated in a manner to maximize the calculated dose. The expected doses to real people, especially those with an urban lifestyle, would be smaller. These projected estimates represent a very small fraction of the background radiation that all Americans receive just from living in the United States.

## 2. CONTRIBUTIONS TO SAFETY BY THE SITE, THE MATERIALS TO BE DISPOSED, AND THE REPOSITORY DESIGN

### 2.1 SITE DESCRIPTION AND SELECTION

Internationally, there is a consensus that geologic disposal is the best means for final disposal of SNF and HLW, that geologic disposal can be safe, and that the regulations and analytical approaches used to demonstrate such safety are reasonable. The science supporting the understanding of Yucca Mountain has been developed over more than 30 years by world-recognized experts and has been internationally reviewed. Scientists from the country's National Laboratories, including Sandia, Los Alamos, Lawrence Livermore, Lawrence Berkeley, and Argonne, have been involved since the program's beginning. Internationally recognized experts from the U.S. Geological Survey were responsible for the suggestion to look to the unsaturated zone (see below) for repository development to take advantage of the conditions of limited water. The engineering designs were developed to complement the site's unsaturated characteristics and, especially for the operational period, to build upon decades of precedent experience in the safe handling of SNF and other radioactive materials.

Yucca Mountain was one of nine sites initially studied for the first repository under the NWP. Its identification as a potential site followed early work by the U.S. Geological Survey showing that disposal in the unsaturated zone would offer advantages in deep geologic disposal of SNF and HLW. The conclusion was based on the premise that, because water was the medium that would eventually transport radionuclides away from the repository, a repository site in an environment with limited water would be a benefit to repository performance that was provided by the natural system.

The Yucca Mountain site, shown in Figure 1, is located on federal land adjacent to the Nevada Test Site in Nye County, Nevada, about 90 miles northwest of Las Vegas. The mountain consists of a series of ridges extending 25 miles from Timber Mountain in the north to the Amargosa Desert in the south. The water table at Yucca Mountain is approximately 1,600 to 2,600 ft below the surface of the mountain at the repository

**unsaturated zone.** The unsaturated zone is the zone between the land surface and the regional water table. The rocks in this zone are not completely dry, but the pore spaces are only partially filled with water. The water is held in the pores, which prevents it from moving freely, giving the unsaturated zone its unique character.

location. The underground facility will be located in the unsaturated zone, about 660 to 1,600 ft below the surface and, on average, about 1,000 ft above the water table. The deep water table and thick unsaturated zone at Yucca Mountain are the result of the low infiltration rate of surface water due to low annual rainfall and high rates of evaporation and transpiration (the process by which water passes from soil into plants and then into the air).

The repository will be located in volcanic rock called tuff that was deposited by a series of eruptions between approximately 11 and 14 million years ago. The characteristics of the volcanic rock have been studied in underground excavations and boreholes and by extensive geologic mapping of the surface. Mapping and other studies show that faults are present in the vicinity of Yucca Mountain. The location, timing, and amount of movement on these faults have been characterized as part of the DOE seismic hazard analysis. The location of the underground facility was identified using several factors, including the thickness of overlying rock and soil, the characteristics of the rock that would host the repository, the location of faults, and the depth to groundwater. The facility will be sited



Figure 1. Photograph of the Yucca Mountain Site

deep enough underground to prevent waste from being exposed to the environment and to prevent accidental human intrusion. The host rock for a geologic repository must be stable enough to sustain excavated openings during repository operations. The rock must also be able to absorb heat generated by the SNF and HLW. The Topopah Spring Tuff rock unit in which the underground facility will be constructed exhibits these characteristics.

The combination of the desert environment and the deep water table with the thick unsaturated zone between the surface and the water table define the hydrologic nature of the repository system at Yucca Mountain. The desert environment with its low rainfall and limited infiltration of water into the subsurface is a favorable long-term characteristic of the Yucca Mountain setting. Far in the future, the return of glacial climate conditions to North America would still leave Yucca Mountain in a desert environment. The location of the site significantly contributes to the inherent safety of repository operations. The site boundary is approximately 5 miles away from the waste handling facilities, and there are no permanent residents within approximately 14 miles of the repository. This remote location reduces the effects of potential radioactive releases from normal operations and the abnormal, highly unlikely events considered in the safety analysis. There are design features of the repository and waste handling operations facilities that prevent unlikely events or reduce their potential impact. These safety-enhancing design features are comparable to proven features currently required of nuclear power plants.

Following the process required by the NWPA, Yucca Mountain was one of the five sites originally nominated by the Secretary as suitable for site characterization for selection of the first repository site. Yucca Mountain was one of the three sites recommended by the Secretary to the President as candidate sites for site characterization. Those recommendations were approved by the President. DOE documents that compared the sites at that time showed Yucca Mountain to be one of the best performing sites for long-term safety out of the nine sites initially considered. As noted, the site recommendation and subsequent 2002 decision by Congress to designate Yucca Mountain as the site for development of the repository allowed the DOE to prepare the license application. A license application is the formal document an applicant submits to the NRC to describe proposed activities and document the safety analyses for those activities. The NRC evaluates an applicant's proposed activities and safety analyses through an extensive review of the license application. The NRC must approve the license application before construction of the repository is allowed to take place.

## 2.2 THE NATURE OF THE MATERIALS TO BE DISPOSED AND THE WASTE PACKAGES TO BE USED

The numerous locations where SNF and HLW is currently stored across the United States are shown in Figure 2. The waste forms transported to and received at Yucca Mountain will be solid and robust materials. No liquid waste forms will be accepted for disposal.

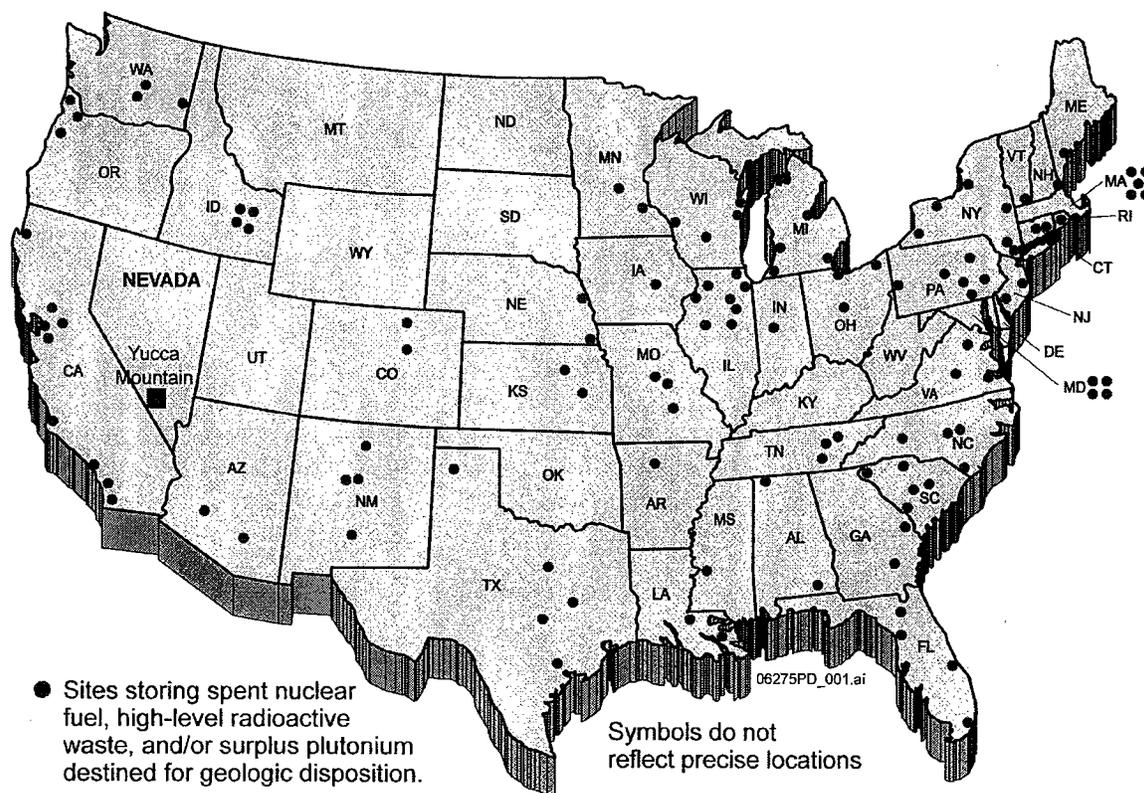


Figure 2. Current Locations of Nuclear Waste Storage Across the United States

Figure 3 shows the types of waste that will be emplaced at the repository. By statute, the DOE is responsible for the safe, permanent disposal of SNF from commercial nuclear power plants. The SNF consists of bundles of rods containing a ceramic uranium oxide fuel and is currently stored by each utility. This ceramic is very resistant to being dissolved. The DOE will also dispose of DOE-owned HLW from the past production of nuclear weapons and smaller quantities of SNF from weapons production reactors, research reactors, and naval reactors. The majority of the DOE SNF is currently stored at DOE sites in Idaho, South Carolina, and Washington state. In addition, the liquid waste from past nuclear weapons production programs is stored in underground tanks at the same DOE sites. Before disposal at Yucca Mountain, this liquid waste will be mixed with silica sand and other constituents, melted together to form a glass, and poured into stainless steel canisters. Once the glass solidifies (vitrifies), the canister will be sealed. When the repository is ready to receive the canisters, they will be loaded into transportation casks and shipped to the repository. Vitrified waste does not dissolve easily and will stay intact for many thousands of years. There is also a small amount of vitrified HLW from a past commercial SNF reprocessing activity that the DOE will receive and dispose of at the repository.

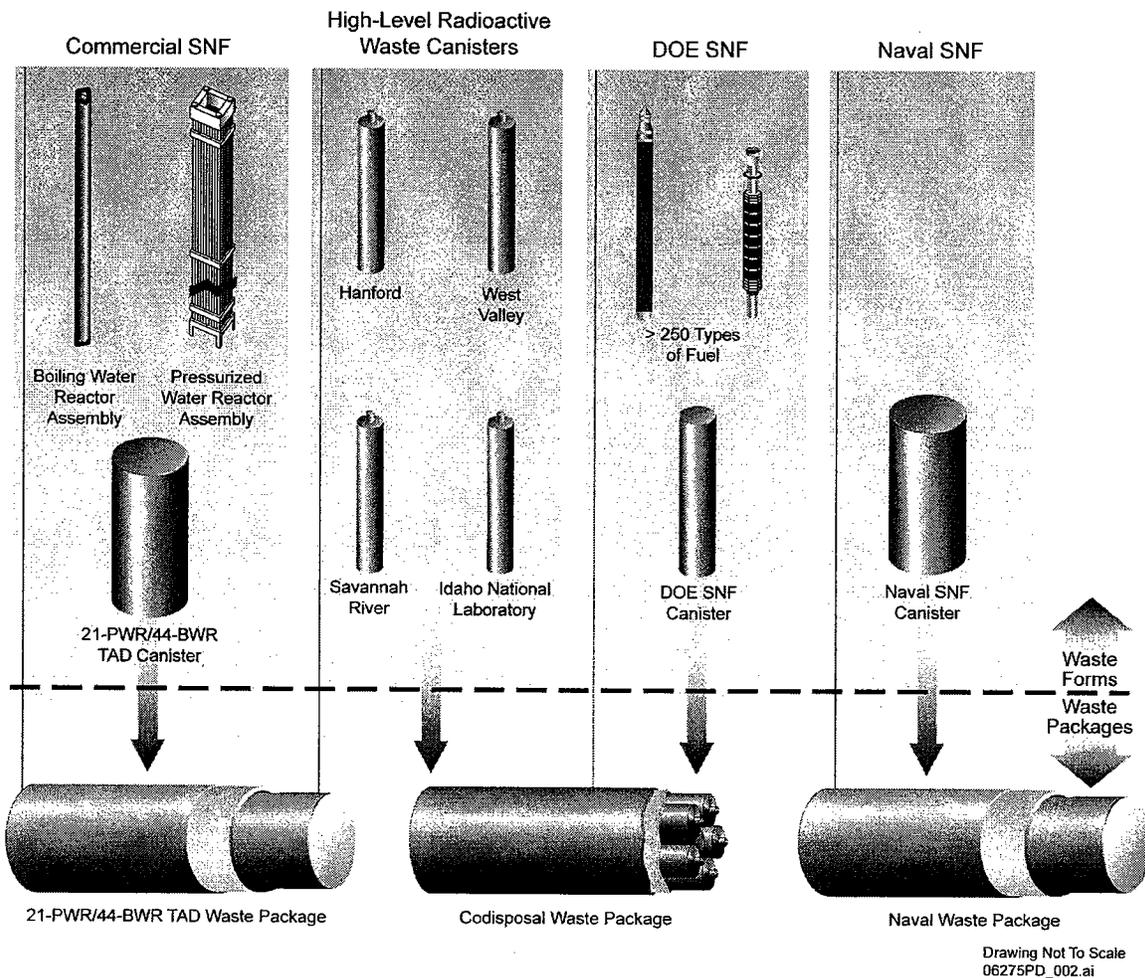


Figure 3. Types of Waste to be Emplaced at the Yucca Mountain Repository and the Waste Packages They Will Be Disposed In

Some of the material that will be disposed in the repository will come from surplus plutonium resulting from the decommissioning of nuclear weapons. Current plans call for the surplus plutonium to be combined with uranium to form fuel that will be used in commercial reactors. The resulting spent fuel will be disposed as commercial SNF. It is likely that more than the Yucca Mountain repository's regulated capacity of 70,000 metric tons of heavy metal (metric tons of heavy metal is the measure for expressing the quantity of SNF specified by Congress in the NWPA) of SNF and HLW will exist in various storage facilities by 2010 (Figure 2).

The waste packages into which the SNF and HLW will be placed are also robust and extremely resistant to corrosion. The waste packages are made of two concentric cylinders. The outermost cylinder of the waste package will be made of a highly corrosion-resistant nickel-based alloy called Alloy 22, which is known for its great resistance to corrosion. The inner cylinder is made of stainless steel and is also very corrosion resistant. Analyses presented in the license application show that, absent unexpected seismic or igneous events, these robust waste packages will last for hundreds of thousands of years.

Most of the SNF will arrive at the repository in a standardized canister known as the transportation, aging, and disposal (TAD) canister. This canister is also made of stainless steel and will be placed inside the other two cylinders, as shown in Figure 4.

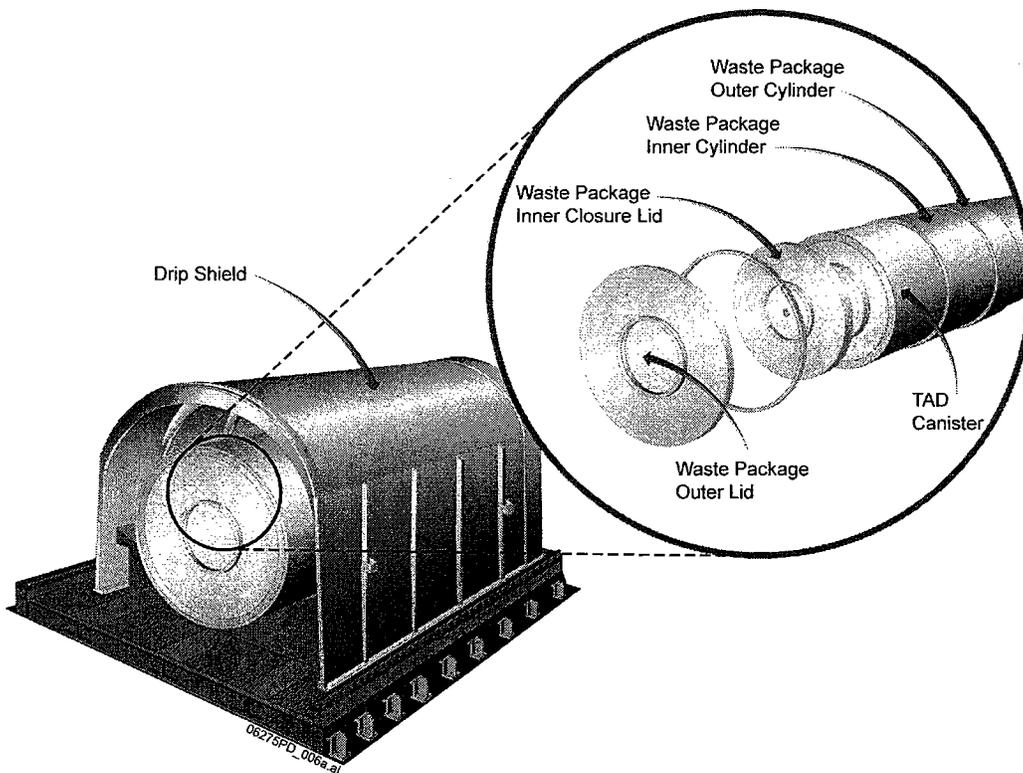


Figure 4. Schematic of TAD Canister Shown Placed inside Waste Package

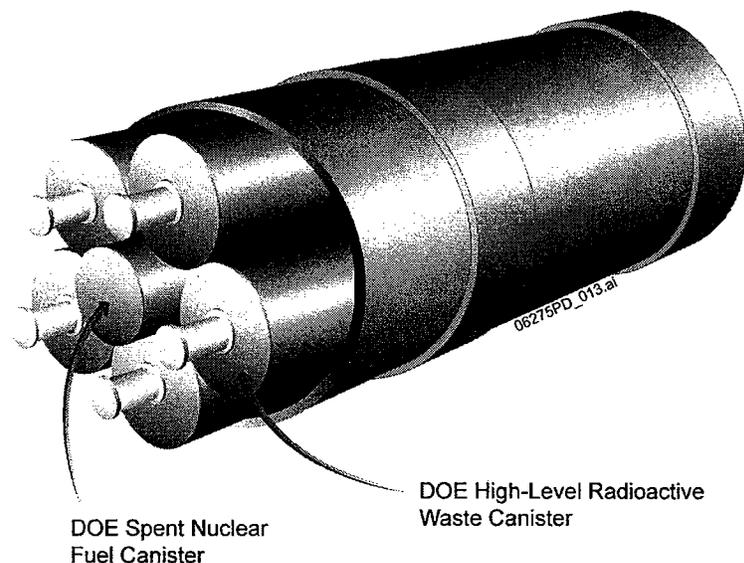


Figure 5. Schematic of DOE HLW Canister and DOE SNF Canister Placed in Waste Package

SNF that does not arrive in TAD canisters will be placed in a TAD canister at the repository. Naval SNF will arrive in a canister that will be placed in the waste package. The stainless steel canisters of vitrified HLW will also be placed inside the two cylinders of the waste package as shown in Figure 5. The figure also illustrates a center canister that will contain DOE SNF to be placed in the canister before shipment to Yucca Mountain.

Before closure of the repository, another metal layer will be placed over the waste packages to provide additional protection against the possibility of water contacting the wastes. The drip shield, shown in Figure 4, will be made of titanium, another

extremely corrosion-resistant metal. All together, there will be four separate layers of highly corrosion-resistant metal protecting the wastes, which are mostly ceramic with a metal cladding and glass, both of which are themselves highly resistant to dissolution.

### 2.3 REPOSITORY DESIGN

The repository design consists of surface and subsurface facilities that perform the functions necessary to receive and handle SNF and HLW, to place these materials into waste packages, to place these packages underground, and to monitor them until closure. Several of these functions are illustrated in Figure 6.

**Surface Facilities**—The principal surface buildings of the repository are the facilities that receive, stage, age, package, and support emplacement of waste (Figure 7). Wastes will be prepared for disposal in one of three types of facilities: the Initial Handling Facility, the Canister Receipt and Closure Facility (three of which will be constructed), or the Wet Handling Facility. The repository surface facilities are based on the concept of handling mostly (about 90%) canistered commercial SNF, with a small amount (about 10%) of the expected commercial SNF arriving either uncanistered in transportation casks or in dual-purpose containers that will need to be reopened and the wastes placed in TAD canisters. The vast majority of waste will arrive in a TAD canister loaded at the electric power company sites prior to shipment to Yucca Mountain. This will minimize the amount of handling needed for uncanistered commercial SNF at the repository. The Initial Handling Facility is capable of handling and transferring canistered waste to waste packages, including HLW and naval SNF. There are three Canister Receipt and Closure Facilities planned for the repository. These facilities are capable of receiving and handling commercial SNF in TAD canisters, placing them into waste packages, and closing the waste packages. The Canister Receipt and Closure Facilities also can handle HLW canisters and DOE SNF canisters.

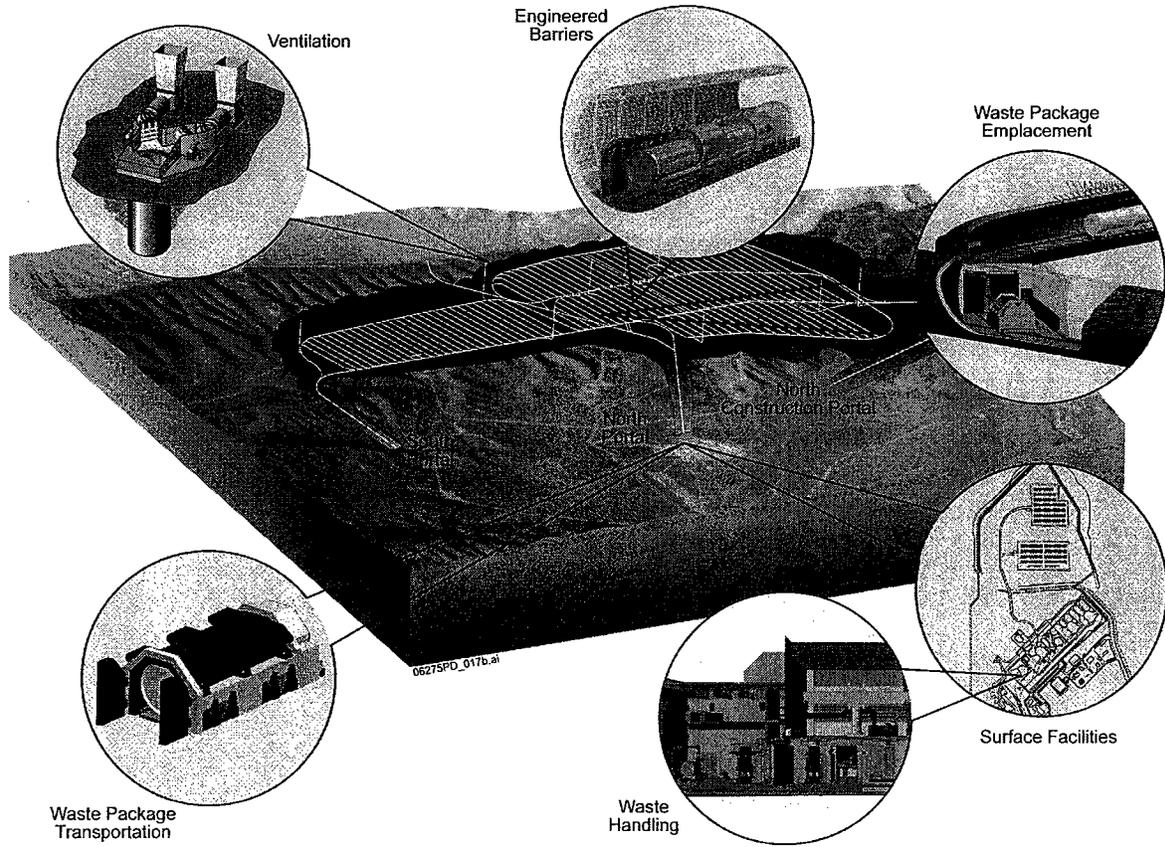


Figure 6. Repository Design Components and Functions

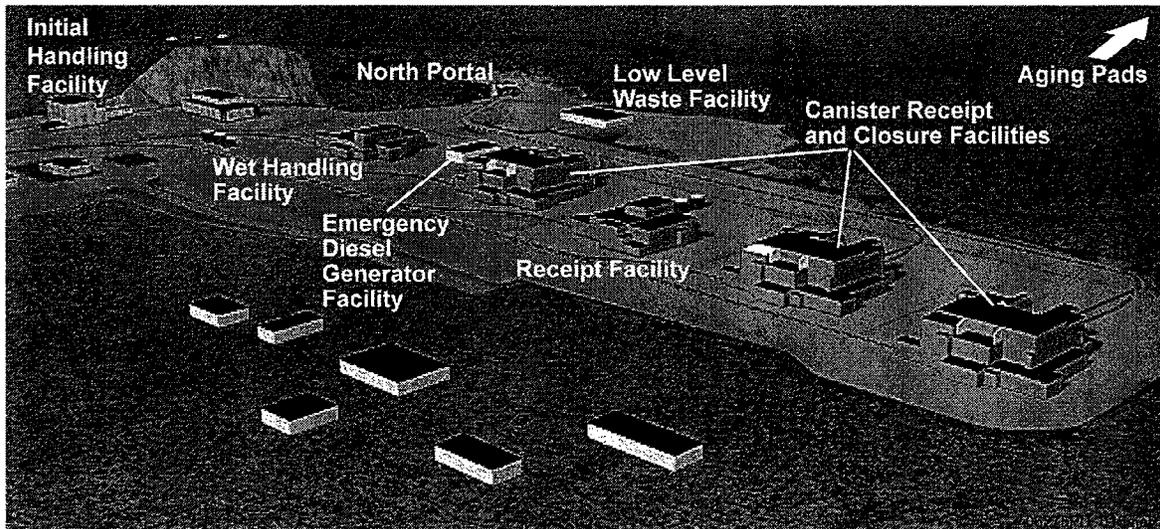


Figure 7. Representation of Principal Surface Buildings of the Repository

The Wet Handling Facility is designed to receive uncanistered commercial SNF. Commercial SNF is transferred under water in a pool into TAD canisters. The Wet Handling Facility includes provisions for handling SNF assemblies in a pool to provide shielding for workers to reduce the normal operating dose associated with handling uncanistered fuel assemblies. Commercial reactor sites already have such facilities; therefore, the repository is using well-developed and well-understood technology that has a record of safe operation.

The Aging Facility consist of the aging pads that provide safe cooling of commercial SNF until the thermal heat load of the SNF has decayed to a level low enough to be safely placed in a waste package. The design of the aging pads, aging overpacks, and TAD canisters is similar to existing dry cask storage systems used at nuclear utilities.

**Subsurface Facilities**—Waste packages will be placed underground in emplacement drifts, supported on emplacement pallets, and aligned end-to-end on the engineered drift invert. The emplacement drifts will be excavated by a tunnel boring machine that makes a circular opening. The invert is what is placed on the bottom of the drift to provide a flat surface. The packages will be spaced about 4 in. apart. The design includes area for up to 108 horizontal emplacement drifts excavated to a nominal 18-ft diameter at a center-to-center drift spacing of about 265 ft. The total subsurface area required to accommodate 70,000 metric tons of heavy metal is about 1,250 acres. The underground facility will be constructed over a period of about 30 years.

Waste packages will be moved, one at a time, from the surface to the emplacement drifts by way of a connecting rail system. The loaded transport and emplacement vehicle will move down the North Ramp and through the repository's main access drift to an emplacement drift and the designated position inside the drift (Figure 8). Before the repository is permanently closed, overlapping and interlocking drip shields will be placed over the waste packages to divert any water that might drip from the top of the emplacement drifts.

Emplacement operations will take place in finished emplacement drifts at the same time as future emplacement drifts are being constructed. During construction, separate ventilation systems operating on the development side and the waste emplacement side will allow separate control of airflow to accommodate different needs and to protect workers. During emplacement, and for the entire time before permanent closure, ventilation will maintain temperatures within the ranges selected for operation and preclosure monitoring. As part of a program to evaluate the repository performance, there will be instrumentation to allow monitoring of emplacement drift interactions with the emplaced wastes. The entire system will be monitored until permanent closure.

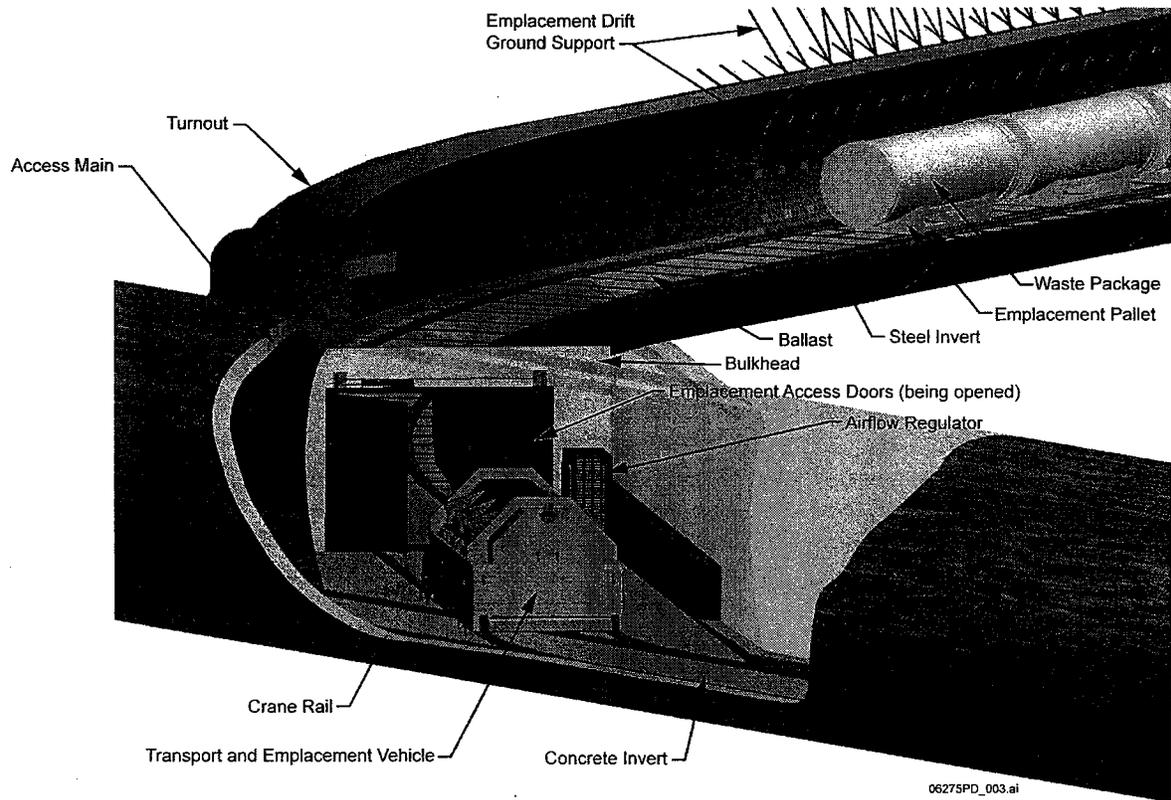


Figure 8. Depiction of the Transportation and Emplacement Vehicle Moving into to an Emplacement Drift to Emplace a Waste Package

### 3. SAFETY DURING THE OPERATIONS PERIOD

The safety principles implemented in the design of the surface facilities are to prevent events that can be foreseen and to make responses to any events that occur as automatic as possible.

Accordingly, the surface facilities are designed (1) to give priority to preventing events (i.e., reducing the likelihood of occurrence) rather than mitigating consequences (i.e., reducing the impact if they should occur); (2) where it is appropriate, to use engineering features in preference to administrative controls to prevent events; (3) to rely on passive features rather than active features or controls; and (4) to allow the automatic startup of safety equipment rather than requiring human intervention to start the equipment. A design that employs this safety philosophy results in a facility with less overall risk. Operational complexity is also reduced because safety features are simple and robust, automatically initiating if there is a need.

**Features of the Repository Facilities that are Important to Safe Operations**—The repository facilities are designed to protect workers and the public. Safety analyses are used to develop a design that prevents, to the extent practical, event sequences that could lead to the release of radioactive material or result in radiological exposure of workers or the public. This strategy requires using prevention features in the repository design wherever reasonable. Information is developed to identify (1) the essential safety functions needed to ensure worker and public safety, (2) the components relied on to ensure these essential safety functions are performed with a high degree of reliability and with margin, and (3) the administrative and procedural safety controls that, in conjunction with the repository design, ensure operations are conducted safely.

The design incorporates the means to limit concentration of radioactive material in air. Design features are incorporated to minimize and control the flow of airborne contaminants. Areas of potential contamination are identified and evaluated. Heating, ventilation, and air conditioning systems capable of limiting the spread of airborne radioactive contamination are provided in the surface handling facilities. These systems control the flow of air from areas with a low potential for contamination to areas with a higher potential for contamination. These systems ensure that radiological material released due to a potential breach of a waste container will pass through high-efficiency particulate air (HEPA) filters prior to exhaust to the atmosphere, thereby mitigating the consequences of this event sequence and protecting workers and the public from releases of radioactive material. The sampled air is continuously monitored for radioactivity by monitors located in potential release points in the surface facilities.

The heating, ventilation, and air conditioning systems are designed to minimize the spread of radioactive contamination by filtration zones and to ensure air flows from areas of low potential contamination toward areas of higher potential contamination. For example, the subsurface ventilation system is designed to have two separate systems for the ventilation of the emplacement drifts and the development area. The air flow and pressure differential between the construction side and emplacement side of the subsurface repository is maintained to ensure that airflow leakage travels from the construction side (supply positive pressure system) to the emplacement side (exhausting negative pressure system) of the subsurface repository. Thus, any leakage that could occur in the emplacement portion of the subsurface would not leak to the construction side.

The design protects workers from exposure to radiation by limiting the time required to perform work in the vicinity of radioactive materials. Design features and controls are implemented to reduce the time required to work in radiological areas during normal operations, consistent with design principles that ensure radiation dose levels are as low as reasonably achievable. Access to high radiation areas or airborne radioactivity areas is controlled, which limits the potential for

workers to be exposed to radiation. This includes access control to and within restricted areas. Controlling personnel access to normally unoccupied high radiation areas, very high radiation areas, or airborne radioactivity areas is part of normal operations. Suitable shielding is provided to protect workers from exposure. Shielding materials absorb radiation and protect workers in the areas where wastes are handled and in transportation underground. The pool of the Wet Handling Facility provides shielding, as do thick concrete walls and appropriate liner material.

A radiation alarm system to warn of significant increases in radiation levels, concentrations of radioactive material in air, and increased radioactivity in effluents will be used. Alarm annunciation will occur if a threshold radiation level has been reached, allowing workers to take appropriate action to protect themselves. Radiation detectors are interlocked with shield doors to ensure that the shield doors are not inadvertently opened if high radiation conditions are present. The facilities incorporate appropriate explosion and fire detection systems and appropriate suppression systems. Related controls include limiting the presence of combustibles and flammable material in areas in which SNF or HLW are present. The design includes the means to control radioactive waste and radioactive effluents and to permit prompt termination of operations and evacuation of personnel during an emergency. These functions protect workers and the public from exposure to radiation.

The design process identifies those structures, systems, and components that are important to safe operation of the repository. The process also provides the assurance that the intended safety functions will be performed. Reliable and timely emergency power will be provided if there is a loss of primary electric power so that instruments, utility service systems, and functions important to safety will continue to operate. Redundant diesel generators and filtration systems are provided as needed to maintain, with adequate capacity, the continued operation of important safety functions.

**Retrievability**—NRC regulations require that the repository be designed to preserve the option of waste retrieval should conditions require it. The DOE has established a policy that any or all of the emplaced waste can be retrieved on a reasonable schedule starting at any time in the preclosure period. The design of the Yucca Mountain disposal system gives future generations the choice of either closing and sealing the underground facility as early as allowable under NRC regulations, or keeping it open and monitoring it for a longer time period, as permitted by the NRC. The design for the repository does not preclude the option for future generations to continue ventilation and monitoring of the repository until making decisions to close the underground facility.

### **3.1 PRECLOSURE SAFETY ANALYSIS**

**Preclosure Safety Analysis Methodology**—The preclosure safety analysis (PCSA) methodology examines the repository design for events that ultimately could lead to the release of radionuclides during operations and systematically examines the resulting event sequences, probabilities, and consequences involved. The initiating events include both internal events (e.g., the drop of a canister) and external events (e.g., an earthquake). Event sequences that might involve criticality are evaluated, and, if necessary, design features and procedural safety controls are implemented to ensure that criticality is prevented. The end products of the PCSA are calculated doses to worker and public groups identified in NRC regulations and a comparison to regulatory limits for maximum doses.

The identification of events involves the compilation of events that are applicable to the repository, including both internal and external events. Events with similar system response are grouped, and screening criteria are applied to eliminate the calculation of consequences for those of sufficiently low probability to be below regulatory concern. Next, event sequence diagrams are developed,

portraying the actions subsequent to an initiating event. An event sequence is a series of actions or occurrences that could potentially lead to exposure of individuals to radiation. An event sequence includes one or more initiating events and associated combinations of repository system component failures, including those produced by the action or inaction of operating personnel. Different sequences that could result are evaluated to determine probabilities of occurrence of the sequence of events. Once the probabilities have been determined, the sequences can be categorized by probability, and the consequences, expressed as doses, can be calculated. The categories include those event sequences that are expected to occur one or more times before permanent closure of the repository and those more rare occurrences that are not expected to occur but are analyzed to determine what the consequences would be. Doses are calculated for workers and members of the public for the first category and for the public for the second category.

Once the doses are determined, they are compared to regulatory limits. If the doses exceed the regulatory limits, event sequence prevention or mitigation strategies are used to refine the repository design, and the event sequences are reexamined. This is an important aspect of the preclosure design and assessment strategy. It allows the DOE to change the design in order to minimize the likelihood of or to prevent an event sequence that leads to doses to workers or the public. If the doses are below the regulatory limits, the parts of the repository system that are important to safety are then identified. Special care is taken in the construction and operation of these components that are important to safety to ensure that the repository is operated safely.

The PCSA considers event sequences that are anticipated to occur. Systems are made reliable enough to prevent the event that might initiate the sequence or to reduce the severity of the consequences in case the initiating event does occur. Additionally, through the identification of potential hazards, the structures and equipment are designed to prevent undesired outcomes. For example, cranes lifting waste containers are limited in their movements to prevent the waste container from being lifted too high and hitting the walls of the structures. In the unlikely event that a waste container is breached, the structure is built to confine the radioactive material within affected areas and to filter the air through HEPA filters to capture the radioactive materials. These structures are heavily shielded, and these types of operations are performed remotely. Used filters will be handled as radioactive wastes and will be properly disposed. Overall, a defense-in-depth approach is taken. This approach (1) seeks to prevent an entire potential chain of events, (2) prevents each step in such a potential chain of events individually, and (3) prepares to effectively mitigate the consequences of each event in that potential chain.

### **3.2 RESULTS OF THE PRECLOSURE SAFETY ANALYSIS**

The preclosure system safety evaluations show convincingly that the repository, if designed and operated as planned, will be safe and meet the applicable EPA standards and NRC regulations. Results of the PCSA in support of the license application show that the calculated potential doses are well below the limits allowable under the regulations. The results of the PCSA discussed below are summarized in Table 1 and represented in Figure 9.

#### ***Normal Operations***

The NRC has set maximum dose limits for normal operations, including limits to dose resulting from certain unexpected events that would be likely to occur during normal operations. The DOE has not identified any such unexpected events; however, as discussed below, the DOE has identified less frequent, abnormal events. The DOE has used conservative methods to evaluate potential doses such that the results overestimate the likely doses to be received during actual operations.

**On Site**—Radiation workers and onsite members of the public will receive only a small fraction of the dose limits permitted by NRC regulations. The NRC limits radiation worker and onsite public doses to the total normal operating dose and the annualized dose from any event likely to occur during normal operations. Because there is no likely event-sequence dose contribution, the NRC radiation worker limit of 5 rem per year is considerably more than the calculated dose of 1.3 rem per year as the maximum dose for a radiation worker within the geologic repository operations area. There will also be nonradiation workers that are in proximity to the repository. The NRC has set a limit of 100 mrem per year for these individuals, and it is calculated that a nonradiation worker could receive up to 78 mrem per year at the most exposed location.

Table 1. Summarized Results of Preclosure Safety Analysis

Person Exposed	Location	Type of Exposure	NRC Limit	Calculated Dose
Public	Site boundary	Normal operations and expected event sequences	15 mrem/yr	0.05 mrem/yr
		Abnormal events	5 rem (per event)	10 mrem
Radiation Worker	Within the geologic repository operations area	Normal operations and expected events sequences	5 rem/yr	1.3 rem/yr
Nonradiation worker (onsite member of the public)	Outside the repository fence, within the site boundary	Normal operations and expected event sequences	100 mrem/yr	10 mrem/yr (nominal) 78 mrem/yr (maximum)
Nevada Test Site and Nevada Test and Training Range (public)	Site boundary	Normal operations and expected event sequences	100 mrem/yr	0.11 mrem/yr
		Abnormal events	5 rem (per event)	30 mrem

**Offsite**—Normal operations associated with handling of radioactive material will contribute only a small fraction of the permitted dose limit to the public in the general environment (i.e., everywhere outside the site boundary, Nevada Test Site, and Nevada Test and Training Range). The NRC maximum limit to the public at the site boundary is 15 mrem per year. The calculated dose at the site boundary to the general environment (due entirely to normal operational releases) to a hypothetical member of the public is 0.05 mrem. The calculated dose of 0.11 mrem per year for a member of the public not in the general environment is a very small fraction of the NRC limit of 100 mrem per year.

### Abnormal Events

The NRC also has set maximum dose limits for abnormal events, and the DOE has identified and analyzed the consequences of infrequent, abnormal events. Because conservative methods were employed to evaluate the potential doses, the DOE believes that the results overestimate the likely doses to be received during actual operations.

**Offsite**—Even though it is possible to conclude that the need to consider certain accident events has been excluded by aspects of the design, the DOE has nonetheless considered and analyzed

these potential accidents to check that systems are in place in case the unexpected happens. This involves an analysis of assumed failures in the structures and equipment and of the systems designed to control releases from such events with a greater than 1 in 10,000 chance of occurrence over the operational period. The results of these analyses show the total dose per event could be up to approximately 10 mrem. Compared to an NRC limit of 5 rem (5,000 mrem) per event, this is a small fraction of the regulatory standard.

The DOE will also implement an Emergency Response Plan, which addresses responses to accidents that may cause a radioactive material release. It is important to note, however, that it is not expected that accidents that have been categorized as likely to occur during the operational period would require a response by an offsite response organization. Despite this expectation, the DOE will be prepared so that in case there is such an event, offsite response organizations will be notified and could be mobilized.

### **Comparative Doses**

The exposures associated with potential releases from the repository during operations and before permanent closure are well below the range of exposures people encounter every day and accept as part of their lives. An understanding of the magnitude of these exposures can be developed by comparing the potential releases from the repository to other similar exposures people encounter every day.

Normal operations associated with handling radioactive material lead to a calculated small dose to a person at the site boundary of 0.05 to 0.11 mrem per year. This is a small fraction of the NRC allowable limit, and an even smaller fraction of naturally occurring background radiation. Doses at this low level can be found in food, such as fruits and vegetables that contain potassium. The radiation dose from eating a banana with naturally occurring radioactive potassium is about 0.01 mrem. Therefore, the dose to the public from normal operations of the repository is about the same as eating five bananas in a year. In addition, the Health Physics Society recommends against quantitative estimation of health risks below an individual dose of 5,000 mrem in one year, or a lifetime dose of 10,000 mrem in addition to background radiation. 10,000 mrem in a 70-year lifetime is equivalent to about 150 mrem per year. The conservatively estimated offsite dose from normal operations is well below this level.

The potential radiation release due to an abnormal event or accident is higher but still below the range of risk routinely accepted by the public. The results of the analyses presented in the license application show the total dose per abnormal event or accident could result in approximately a 10 to 30 mrem dose at the site boundary. Naturally occurring background radiation in the United States is in the range of from about 200 to 300 mrem per year. Many locations in the United States have background radiation 100 mrem per year higher than this average. In other words, potential additional doses to the public from an abnormal event at the repository are comparable to those associated with a choice to live in a part of the country with higher background radiation.

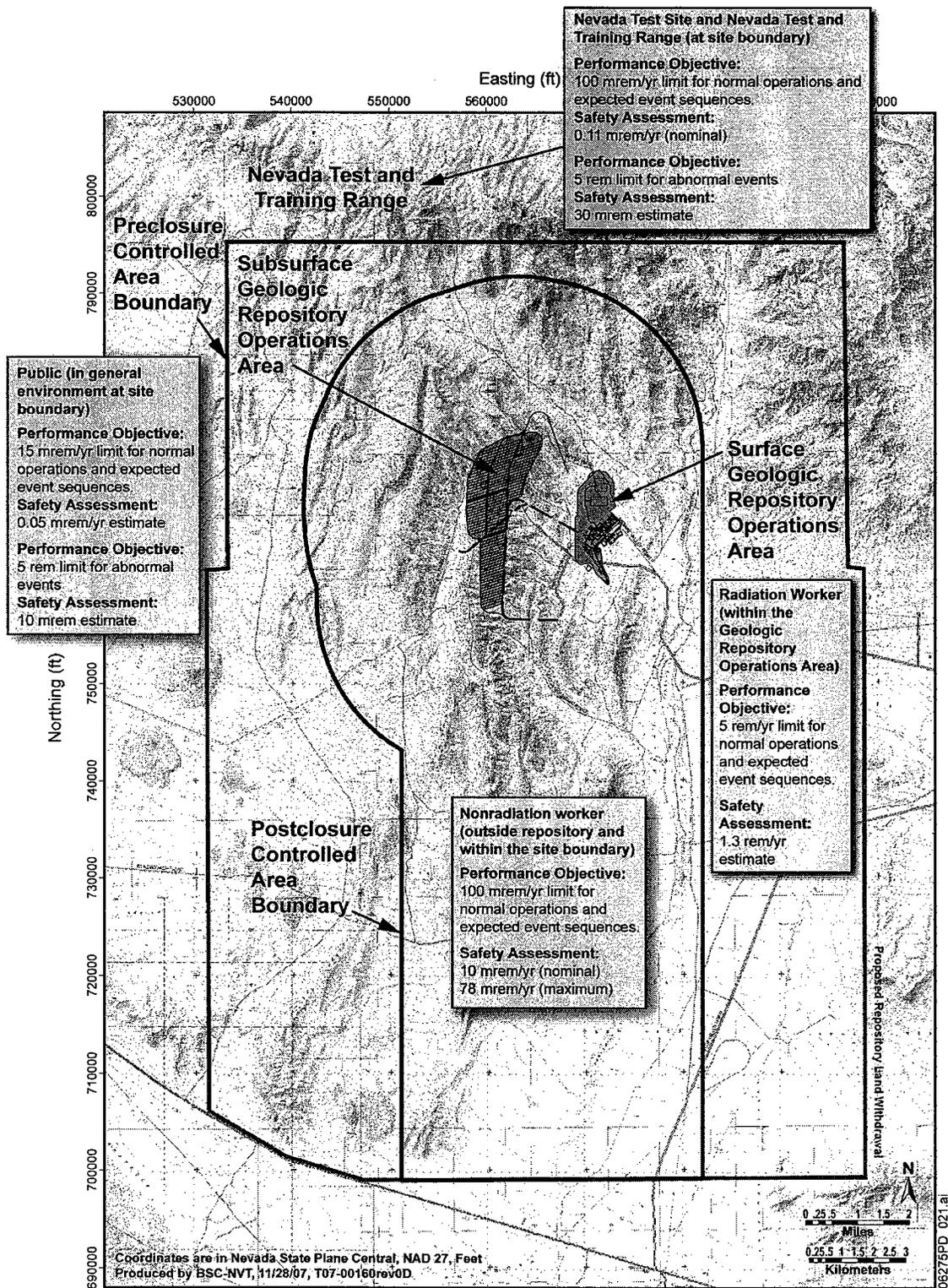


Figure 9. Summarized Results of Preclosure Safety Analysis Compared to Regulatory Performance Objectives at the Yucca Mountain Repository

## 4. SAFETY OF THE REPOSITORY AFTER PERMANENT CLOSURE

The safety of the repository at Yucca Mountain after permanent closure (postclosure) is ensured by the use of two safety principles. First, the engineered barrier system is designed so that, working in combination with the natural features of the site, potential, very distant future radiological doses to a reasonably maximally exposed individual described in the regulation are expected to be well below the limits specified by the NRC. In other words, the engineered components must be designed to take advantage of the characteristics of the natural features of the Yucca Mountain site.

**reasonably maximally exposed individual.** A hypothetical person, defined by regulation, who is likely to receive a greater radioactive exposure than the average person in the area because of the conservative way the regulations define the lifestyle characteristics.

The second safety principle is that the geologic repository includes multiple barriers, consisting of both natural barriers and an engineered barrier system. Geologic disposal of radioactive waste is predicated on the expectation that one or more features of the geologic setting will be capable of contributing to the isolation of radioactive waste, meaning it acts as a barrier to the movement of radionuclides out of the repository. While there is an extensive geologic record ranging from thousands to millions of years, this record includes many uncertainties. In addition, there are uncertainties in the isolation capability and performance of engineered barriers over very long timeframes. These two types of uncertainties are addressed by requiring that multiple barriers make up the repository system to ensure that repository performance is not wholly dependent on a single barrier. As a result, the system is more tolerant of failures and external challenges, such as earthquakes.

### 4.1 FEATURES OF THE REPOSITORY SYSTEM CONSIDERED IN ASSESSMENTS OF LONG-TERM PERFORMANCE

The combined geologic and engineered features that make up the postclosure repository system have several attributes that are important to keeping radionuclides away from humans. Because water is the primary medium by which radionuclides could be released from the repository, the beneficial characteristics of the system primarily relate to the ability of the site and the design to prevent or limit the movement of water. The system features are described here in the order that a drop of water would encounter them as it moved from the surface to the environment where the reasonably maximally exposed individual would live.

**capillary forces.** Forces caused by surface tension that cause liquids to be held in small-diameter pores. Capillary forces are a characteristic of unsaturated zone hydrology that cause water to be held in much the same way a sponge holds water until it is saturated. These forces limit the movement of water through the rock.

Above the repository, the important features are the nature of the site and its geologic character. The topography, rock, and soils at the surface of Yucca Mountain are the initial features that limit the movement of water into the mountain (Figure 10). Precipitation at Yucca Mountain is very low and is expected to remain low even during somewhat colder and wetter future climates associated with the

likely return of glacial conditions to North America. Runoff, evaporation, and plant transpiration combine to divert water and permit only a small fraction of the already-low expected precipitation at the site to infiltrate into the mountain. The volcanic tuffs in the unsaturated zone above the repository will further reduce the movement of water through the unsaturated zone. They divert

percolating water, attenuate or dampen pulses of infiltration, and limit seepage into the emplacement drift through capillary forces. The repository horizon is expected to remain well above the water table during wetter future climate conditions.

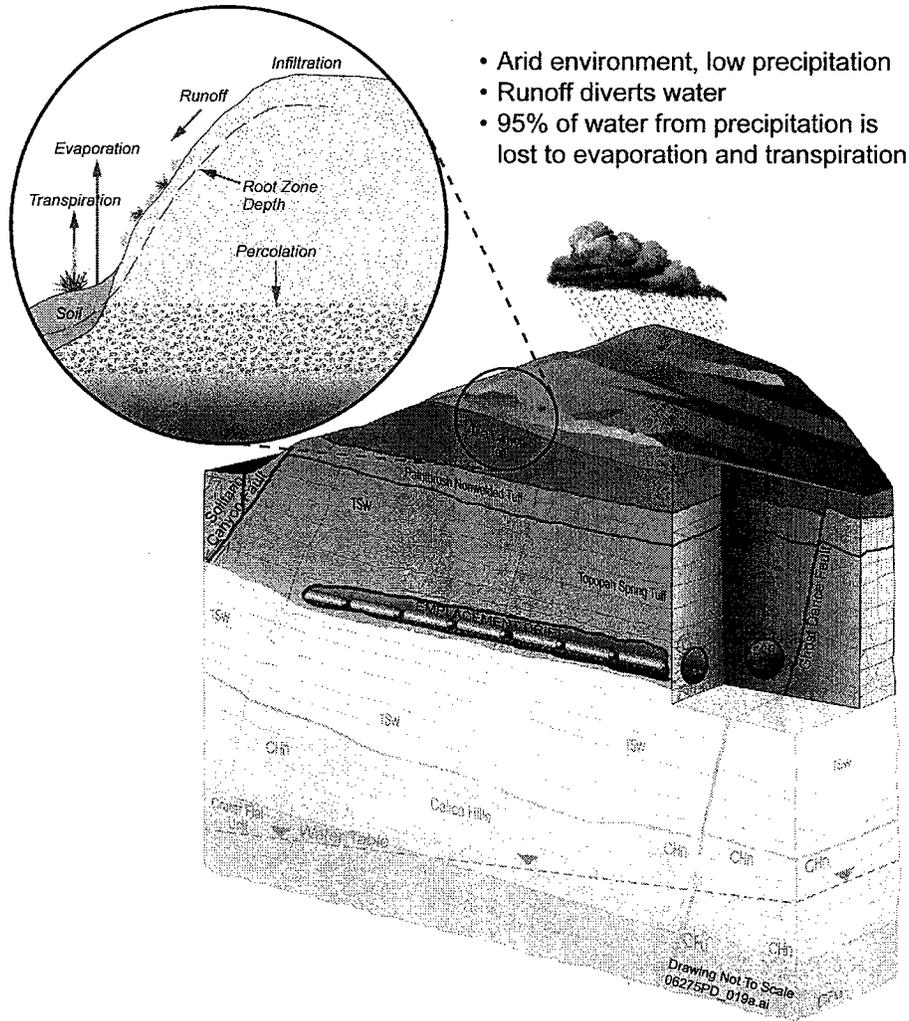


Figure 10. Features of the Repository above the Emplacement Horizon That Limit the Amount of Water That Can Contact the Waste

The features of the engineered barrier system have been designed to prevent or limit the movement of water and to prevent or substantially reduce the release of radionuclides from the waste. Figure 11 illustrates these features, which include the emplacement drift, the drip shield, the waste package, the waste form and other materials contained inside the waste package, the waste package pallet, and the drift invert. Because of capillary forces, most of the water moving in the unsaturated zone will be diverted around the emplacement drifts, and only a fraction will seep into the drifts. Structurally strong and highly corrosion-resistant titanium drip shields will prevent contact between seepage water and waste packages. These shields are expected to be intact for hundreds of thousands of years. Waste packages will be made with an outer cylinder of a highly corrosion-resistant nickel-based alloy known as Alloy 22, which will prevent any contact between water and the waste for as

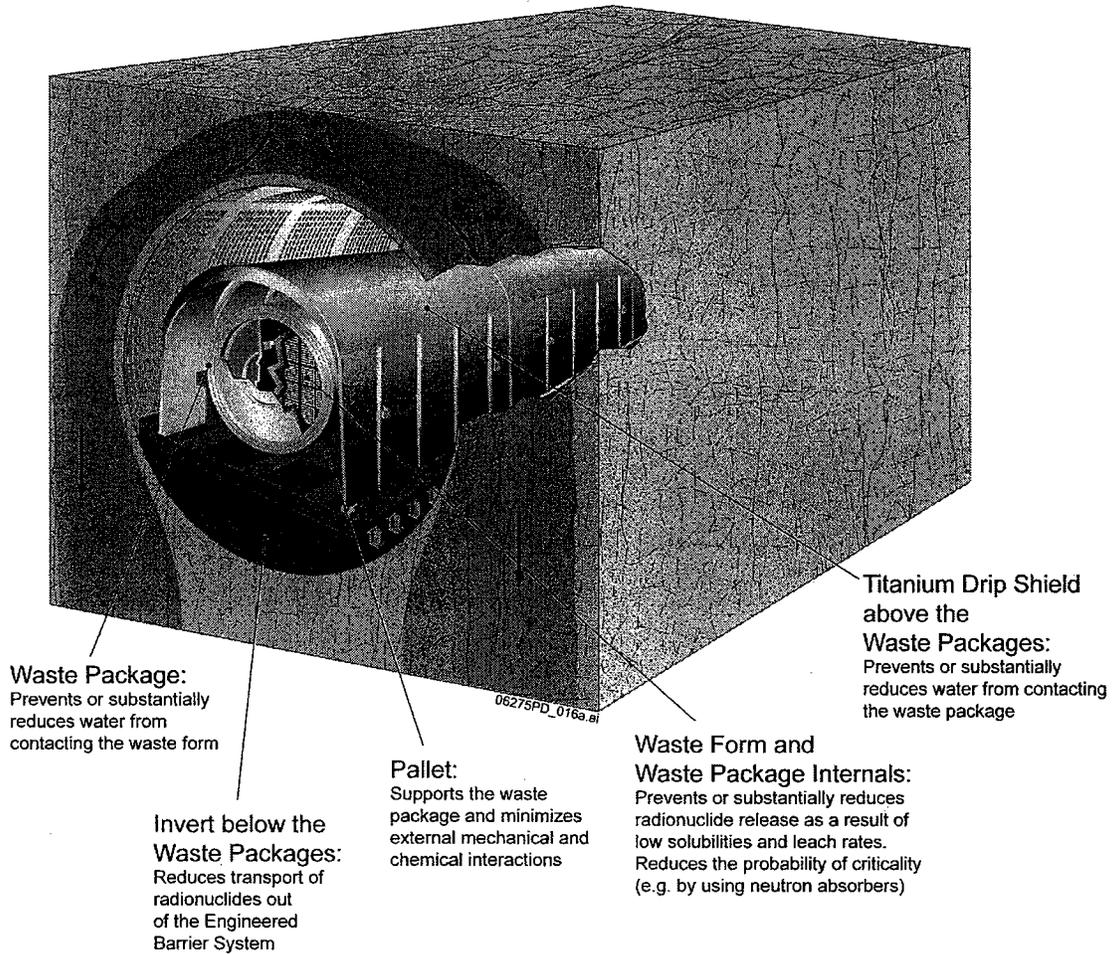


Figure 11. The Features of the Engineered Barrier System that Prevent or Limit the Movement of Water and Prevent or Substantially Reduce the Release of Radionuclides from the Waste

long as the waste packages remain intact, which is also expected to be for hundreds of thousands of years, absent unlikely seismic and igneous events. Stress corrosion cracking related to rockfall or in welds could potentially cause damage to drip shields and waste packages into thousands of years, but the size and characteristics of the cracks are not expected to allow the movement of water into the packages. Although breach of a waste package will permit the potential release of radionuclides, any such release will be impeded by the slow rate of waste form degradation. The waste forms are solid, and degradation will not begin until air and moisture contact the waste form.

**diffusion.** The spreading out of particles, such as radionuclides, as they move in water (e.g., how a drop of ink spreads in water).

Significant release of radionuclides can only occur if they are dissolved in water or attached to very small particles called colloids and if there are continuous liquid pathways into and leading out of the waste package through the invert and into the surrounding rock. Some minor gaseous releases will also occur, but they will disperse rapidly. Continuous pathways of flowing liquid water are not expected in the unsaturated repository environment, although limited diffusive transport may occur.

The amount of water in contact with the waste form is expected to be limited to a thin film on the waste form surface. The waste form will limit radionuclide release rates because most of the radionuclides are not very soluble in the water due to chemical conditions in the mountain. Both SNF and HLW glass will degrade and dissolve slowly in the repository environment.

**solubility.** A material is soluble if it dissolves readily in liquids that contact it. Solubility is controlled by chemistry and can be limited by the amount of material already dissolved.

**sorption.** Attraction of a radionuclide to an object, such as a molecule becoming attached to it.

Analogue evidence indicates that glass, metals, and ceramic materials may be preserved for thousands of years in the unsaturated zone underground. For example, there is volcanic glass in some Yucca Mountain rock that has been

there for more than 10 million years. Transport of radionuclides by water out of the engineered features of the repository will be further limited due to the small volumes of water and limited number of flow paths present in the unsaturated zone. The transport of many dissolved radionuclides, including those that are the greatest part of the total inventory of radionuclides, will be further retarded by sorption on iron corrosion products that form within the waste package once degradation begins. Waste package internal structures will begin to corrode before the waste form. Radionuclides transported in the water can also be trapped and retarded by sorption onto corrosion products.

Unlike other hazardous materials, the danger associated with radioactive materials naturally diminishes over time through a process known as radioactive decay. The half lives of the majority of the radionuclides stored at the repository are fairly short. About 1,000 years after repository closure, little more than 18% of the original amount of radioactivity emplaced in the repository would remain, and about 6% would remain after 10,000 years. Imagining the initial quantity of radioactivity emplaced in the repository as 1,500 marbles, natural radioactive decay would leave 270 marbles after 1,000 years and only 90 marbles after 10,000 years. By 100,000 years, there would only be eight marbles left. Finally, after 1 million years, just one marble out of the original 1,500 would remain—the amount of the original radioactivity remaining would be about 0.07%, and about 99.93% of the radioactivity originally placed in the repository would have decayed.

**half life.** The time it takes for a substance to lose one-half of its radioactivity.

Below the repository, the geologic layers are important features along the potential transport pathways from the repository to the environment. These include the unsaturated and saturated volcanic rocks immediately below and south of the repository, as well as alluvial deposits in the Amargosa Valley that will be encountered along the flow path approximately 6 to 9 miles south of Yucca Mountain (Figure 12). Any radionuclides that migrate down through the unsaturated zone to the water table must be transported through the saturated zone before they can reach the accessible environment. The transport of radionuclides will be limited by the rate at which water flows. In addition, several processes will cause the movement of radionuclides to be slower than the rate of movement of the water. These include diffusion into the porous matrix of fractured volcanic rocks, sorption of radionuclides onto mineral surfaces in both fractures and the porous rock matrix, and precipitation of minerals as chemical conditions change along the flow path.

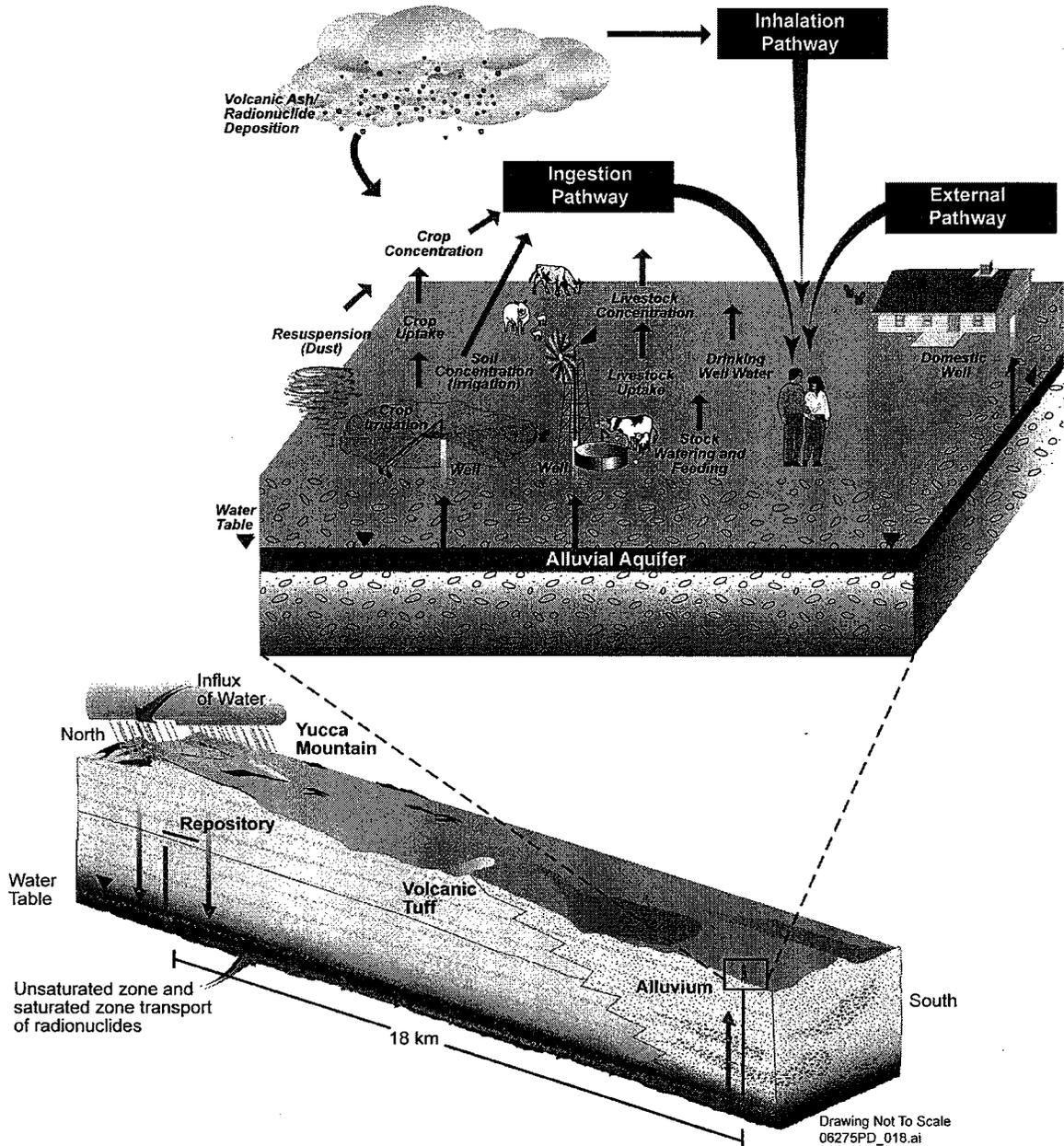


Figure 12. Location and Characteristics of the Reasonably Maximally Exposed Individual and the Features of the Natural System below the Repository That Limit Movement of Radionuclides to That Location

The final portion of the movement of water is to the humans that could use it. The reasonably maximally exposed individual is a hypothetical individual defined by regulations to exist in the accessible environment who draws water from a well centered in the potential contaminated groundwater coming from Yucca Mountain (Figure 12). The reasonably maximally exposed individual is defined by regulation in a way that makes sure that this person is more exposed than

can be expected for a real individual near the same location. This individual may be exposed to radiation from contaminated water in a number of ways, all of which are calculated.

## 4.2 TOTAL SYSTEM PERFORMANCE ASSESSMENT

The postclosure repository system is, by its nature, a passive system that requires no external actions or activities in order to perform its function; indeed, no human intervention is planned or necessary after closure. Given the time periods over which the repository must perform, neither automated nor active systems can be relied upon to reduce risk. Because the natural features important to isolating wastes are existing elements of the site and system, they must be used as they are. Safety after permanent closure (i.e., the postclosure period) is assessed by examining the features, events, and processes that could affect long-term performance. Features, events, and processes are the specific conditions or attributes of the geologic setting; the degradation, deterioration, or alteration processes of engineered barriers; and the interactions between the natural and engineered features that might affect performance of the geologic repository. The assessment method used is called total system performance assessment, and its approach is internationally accepted. For Yucca Mountain, the specific way in which it was performed is defined by the NRC regulations.

### Total System Performance Assessment

**Methodology**—Total system performance assessment (TSPA) is a calculational tool that provides quantitative estimates of the long-term performance of the total repository system over a range of possible conditions using computer models that are based on site data and materials-testing data and accepted principles of physics and chemistry. A TSPA compiles analytic models of the engineered and natural system processes acting at the repository into an overall computer model of the repository and surrounding environment to assess overall repository performance. With the TSPA model, the DOE can estimate releases of radionuclides from the repository under a range of conditions over many thousands of years and estimate the potential doses to persons.

### **total system performance assessment.**

A risk assessment that quantitatively estimates how the proposed Yucca Mountain disposal system will perform in the future under the influence of specific features, events, and processes, incorporating uncertainty in the models and data.

The TSPA models are usually referred to as abstracted models and involve the extraction of essential information from large quantities of data. An abstracted model in a TSPA may take the form of something as simple as a table of values that were calculated using a complex computer model or of a fully three-dimensional computer simulation. These are the models used to evaluate system performance and estimate the likelihood that the performance will comply with regulations and ensure long-term safety. The responses of the total system extend over periods beyond those for which data have been or can be obtained; the TSPA models address this by treating the data as uncertain and evaluating the results in a probabilistic manner.

TSPA model development includes the compilation of a list of all possible features, events, and processes (FEPs) that could apply to the behavior of the system. The existence of a fault is an example of a feature. An example of an event is a seismic event (e.g., earthquake), and an example of a process is the gradual degradation of the waste package wall by general corrosion. The DOE used various types of analyses to determine the FEPs it should include in the modeling. The selected features, events, and processes are assembled into scenario classes, which describe expected situations and disruptive situations, such as seismicity and volcanism.

Estimates of doses are calculated using a probabilistic approach called Monte Carlo sampling. A value is selected for each of the uncertain data inputs, and the repository performance is simulated for 10,000 and 1 million years. This is repeated 300 times, and the maximum of the mean (average) value is identified for the 10,000-year performance standard. For the 1-million-year performance standard, the maximum of the median value is identified.

**Model Corroboration**—Confidence is also enhanced if differences in results are properly understood when there are independent evaluations of the same system. In 2002, an international group of experts was brought in to review the TSPA of that time. Their finding was that this assessment represented a competent modeling effort in keeping with international practice. Twenty-seven recommendations were made to improve the assessment, all of which have been addressed. Suggestions by several other external expert reviews have resulted in numerous improvements in the model.

In keeping with the requirements to provide a basis for confidence in the models used in TSPA, numerous sensitivity, uncertainty, and insight analyses were performed to enhance understanding of the models and to verify that what is calculated provides confidence from the standpoint of how the system ought to behave in response to changes. Insight analyses were single-realization analyses that focused on what appear to be outliers in the cluster of results from hundreds of probabilistic analyses. Knowing what combination of factors caused that outlier and understanding whether or not it makes sense from a scientific point of view further enhances confidence in the model.

There have been other quantitative models and evaluations of the repository system's potential safety. The DOE evaluated the differences in outcomes and understands them, adding confidence to its own modeling approaches at several levels. One example of a TSPA comparison done independently of DOE is the system analyses produced by the Electric Power Research Institute, using its independently developed model and software, IMARC. This comparison suggested that, to the degree that the Electric Power Research Institute approach may be more realistic, the DOE Yucca Mountain repository TSPA is conservative in that it likely overestimates dose projections. Other methods of evaluating the credibility of modeling results include a comparison to a simplified DOE TSPA analysis that was performed independently from the main TSPA effort. Another modeling effort involved removing some key conservatisms in a performance margin analysis. Each of these modeling efforts produced comparable results.

#### **4.3 RESULTS OF THE POSTCLOSURE TOTAL SYSTEM PERFORMANCE ASSESSMENT**

The postclosure system safety evaluations show convincingly that the repository is safe and meets the applicable EPA standards and NRC regulations. The regulations specify several measures for addressing the consequences of a repository at Yucca Mountain: radioactivity doses to humans and groundwater radioactivity content. The regulations prescribe the method for calculating dose to a hypothetical future human being in Amargosa Valley known as the reasonably maximally exposed individual. This hypothetical future individual is defined in such a way as to provide a conservative estimate of potential doses that could result from exposure to radionuclides carried from the repository in groundwater. Any real person living in the region would receive considerably less dose. The reasonably maximally exposed individual is specified to live approximately 11 miles south of the proposed repository. Summarized results for the TSPA are presented in Tables 2 and 3 and discussed in the text that follows.

Table 2. Postclosure Performance Results for the Individual Protection Standard and Human Intrusion Standard

	Mean	Median	95th Percentile
<b>Individual Protection Standard</b>	No more than 15 mrem	No more than 350 mrem <sup>a</sup>	None (95th percentile is provided here for comparison only)
First 10,000 years	0.24 mrem		0.67 mrem
Time of occurrence	10,000 years		10,000 years
Post-10,000 years <sup>b</sup>		0.9 mrem	9.1 mrem
Time of occurrence		~800,000 years	1,000,000 years
<b>Human Intrusion Standard</b>		No more than 350 mrem <sup>a</sup>	
Post-10,000 years <sup>b</sup>		0.01 mrem	
Time of occurrence		~202,000 years	

NOTE: <sup>a</sup>Proposed

<sup>b</sup>Within the proposed period of geologic stability, defined as 1 million years.

Table 3. Postclosure Performance Results for the Groundwater Protection Standard

	Combined <sup>226</sup> Ra and <sup>228</sup> Ra Concentration	Gross Alpha Activity Concentration	Dose from Combined Beta- and Photon-Emitting Radionuclides
<b>Groundwater Protection Standard:</b> Limit for Activity Concentration or Annual Dose	5 pCi/L	15 pCi/L	4 mrem
<b>Performance Results:</b> Projected Maximum Mean Activity Concentration or Annual Dose	<10 <sup>-6</sup> pCi/L	10 <sup>-4</sup> pCi/L	Whole body: ~0.06 mrem Thyroid: ~0.26 mrem
Natural Background Level	0.5 pCi/L	0.5 pCi/L	Background level excluded in regulatory requirement

The NRC regulations specify a maximum mean allowable annual radiological dose to the reasonably maximally exposed individual, for all scenarios combined (that is, including the effects of low probability events such as volcanism and seismicity) of no more than 15 mrem per year for the first 10,000 years. The mean value of the annual estimated dose to the reasonably maximally exposed individual is 0.24 mrem. Even if one considered the 95th percentile (95 out of every 100 simulations resulted in a dose level lower than this number), the value is 0.67 mrem. Both of these numbers are only a small fraction of the allowable limit. Proposed EPA standards and NRC regulations also specify a dose limit for the time from 10,000 years after closure through the period of geologic stability (defined as 1 million years). The regulations specify a maximum median allowable annual radiological dose to the reasonably maximally exposed individual, for all scenarios combined (i.e., including the effects of low probability events such as volcanism and seismicity) of no more than 350 mrem for this time period. The calculated median value of the annual estimated dose to the reasonably maximally exposed individual for all scenarios combined is 0.96 mrem. The 95th percentile value is 9.1 mrem. These numbers are an extremely small percentage of the allowable limit. Analyses against the groundwater protection and human intrusion standards result in comparable margins.

As noted, the reasonably maximally exposed individual is a hypothetical person defined in such a way to maximize dose to potential releases from the repository. People living in the Amargosa Valley would receive considerably less exposure because no real individual would exhibit all of the characteristics of the reasonably maximally exposed individual. People living farther from Yucca Mountain would be expected to receive even less exposure. Yucca Mountain is located in a closed groundwater basin, which ensures that, unless major geologic changes occurred, the radionuclides could not leave the basin.

### ***Comparative Doses***

The potential releases from the repository after permanent closure are also well below the ranges of exposures people encounter every day and accept as part of their lives. As previously noted, naturally occurring background radiation in the United States is in the range of from about 200 to 300 mrem per year. Many locations in the United States have background radiation 100 mrem per year higher than this. The Health Physics Society recommends against quantitative estimation of health risks below an individual dose of 5,000 mrem in 1 year or a lifetime dose of 10,000 mrem in addition to background radiation. A dose of 10,000 mrem over a 70-year lifetime is equivalent to about 150 mrem per year.

The estimated annual doses from the repository to the reasonably maximally exposed individual for both the 10,000-year and 1-million-year period are lower than 1 mrem. This is about the same radiation dose that is received in a two-hour flight on an airplane or from watching a color television over a year. This is a fraction of a percent of naturally occurring background radiation. The estimated 95th percentile level (i.e., the value at which 95% of the calculated doses are below this level) annual doses for the 1-million-year period is lower than 10 mrem. A comparable radiation risk is that received from a chest x-ray. The maximum calculated annual dose level is about 40 mrem. This reflects the extreme values of the parameter distributions. Comparable radiation risks are at a level of dose significantly less than that received annually by an airline flight crew. These are very small percentages of the naturally occurring background radiation, well below the variability across the United States and are not likely to lead to a significant increase in the risk of cancer. It is also important to note that these potential doses are calculated for the reasonably maximally exposed individual and include very low probability disruptive events (e.g., a volcano erupting through the repository). The actual doses to a real individual would be significantly lower, at a level not expected to meaningfully contribute to an annual dose already received from background radiation.

### ***Confidence in the Long-Term Safety Evaluations***

The estimated safety consequences shown are not predictions but are cautious and reasonable estimates of potential future performance. Nations with nuclear power programs are planning to pursue geologic disposal whether or not they are planning to recycle their SNF. Every nation actively involved in planning, finding a site for, or licensing a repository has done calculations broadly similar in scope to the TSPA performed by the DOE.

The NRC requires performance assessments to provide the information needed to make an informed licensing decision. Uncertainties are, however, inherent in evaluating a first of a kind facility like the repository and in estimating system performance over very long time periods (i.e., many tens of thousands of years). Thus, requirements are included to ensure that uncertainties inherent in any performance assessment are thoroughly articulated and evaluated. In addition, the DOE is required to show that all available, pertinent information has been taken into account and analyzed as a corroboration of the concepts and approach involved in the estimation of long-term system performance.

**Natural Analogue Studies**—Computer models show how a repository would most likely respond to changing conditions over a vast expanse of time, but there is no real way to test directly to see if events actually unfold as predicted. There are, however, examples and analogues of the kinds of climatic, geologic, and hydrologic processes that could affect repository performance. Scientists have studied information pertaining to different analogue sites throughout the world to gain a better understanding of the long-term processes that are relevant to Yucca Mountain.

By studying the past climates in an area, scientists can project the likely future climates. For example, sedimentary deposits in a dried lakebed at Owens Lake, California (about 100 miles west of Yucca Mountain) provide a nearly 425,000-year record of past climates in the region. This information, along with information from other climate analogues such as the 500,000-year record obtained from cores taken from the walls of a cave known as Devils Hole near Yucca Mountain, helps corroborate estimates of precipitation levels and atmospheric temperatures in the past, which, when coupled with information from the earth's orbit, can allow prediction of future climate states.

Scientists have also analyzed water movement in an ancient underground city in Kaymakli, Turkey (second century AD). The climate and type of rock are similar to those found at Yucca Mountain. In studying the Turkish site, scientists have observed very little water seeping into the deep underground excavations. Researchers believe that caves containing prehistoric paintings, such as those found in the Chauvet Cave in southern France, provide excellent natural analogues for the water flow at Yucca Mountain. The 30,000-year-old paintings in these caves were made with oxides of iron and small amounts of manganese, as well as clay, charcoal, and silica. None of these materials would survive long in the presence of abundant water. Yet many cave paintings have survived in locations far more humid, and with more than three times the rainfall than Yucca Mountain. Those paintings survived because water tends to flow around caves and tunnels, not into them, in part because of the comparative size of the different openings. In unsaturated rock, what little water is available in the pores and fractures has a tendency to remain there rather than flow into larger openings, such as caves or tunnels. These analogue studies suggest that seepage into repository tunnels will be minimal.

An important analogue site is a natural uranium deposit at Peña Blanca, Mexico, where the climate and rock are very similar to Yucca Mountain. The studies at this site focused on the migration of naturally occurring radioactive particles over millions of years. In these studies, scientists have observed that the particles migrated only a few yards along major fractures in the rock. The uranium deposits at Peña Blanca appear to have changed over millions of years in many of the same ways scientists expect that spent fuel rods would change within a repository at Yucca Mountain. Studies indicate radioactive particles similar to those that would exist in a repository at Yucca Mountain moved only a few yards from the ore deposit and in very low quantities.

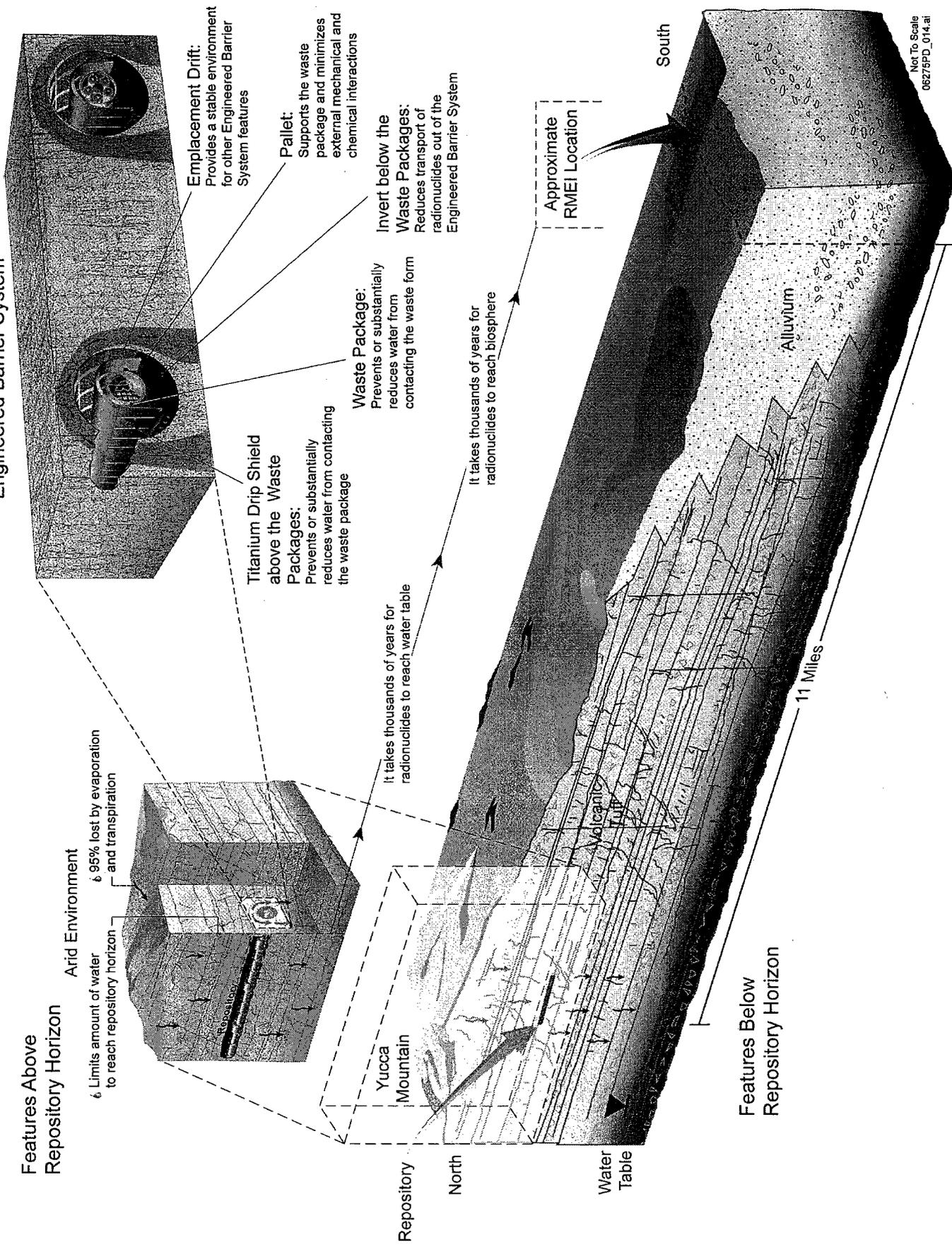
These and other studies are reported in the technical documents that support the license application, and in total they support a finding that there is a basis for having confidence in the results of the TSPA—sufficient confidence, the DOE believes, to support a decision to allow the repository project to move into its next phase: construction. Scientific studies will continue during construction and operations, and safety evaluations will be updated at each of the major decision points and at any other time as new information becomes available and needs to be evaluated in terms of system performance implications. In addition, the entire systems will be monitored until permanent closure, and following closure of the repository, the site will continue to be monitored for continued long-term scientific and safety evaluations.

## **5. CONCLUSIONS**

Technical analyses, based on approaches that are accepted internationally, provide the rationale for DOE conclusions that the repository can be built and operated safely and that the repository system will protect people far into the future. The analyses have been independently reviewed by experts, and the successive versions of the numerical models have benefited from constructive suggestions for improvement. The repository construction, operation, and performance are subject to oversight by independent regulatory agencies, and the DOE cannot construct the repository and begin operations unless the NRC finds that the repository can be operated safely and that it will protect humans far into the future. Those findings will be developed in hearings on the license application that will be open to the public and in which those who oppose the repository will have a full and fair opportunity to present any contrary evidence. The licensing hearing will be a rigorous in-depth review of the scientific and engineering support for DOE conclusions that the repository can be constructed and operated safely and will protect people far into the future, as required by EPA standards and NRC regulations.

In summary, the analyses detailed by the license application meet the applicable standards promulgated or proposed by the NRC for the construction, operation, and closure of a geologic repository at Yucca Mountain. The DOE has a valid basis for asserting that such analyses demonstrate this position. The DOE welcomes scrutiny of the license application as an opportunity to demonstrate the soundness of the science and design that underlie DOE's application to construct the repository. If the NRC eventually grants the DOE the authority to construct and operate the repository, the public can have full confidence that the repository is based on sound science and engineering and that the nation's inventory of SNF and HLW will be disposed of without unreasonable risk to the health and safety of the public.

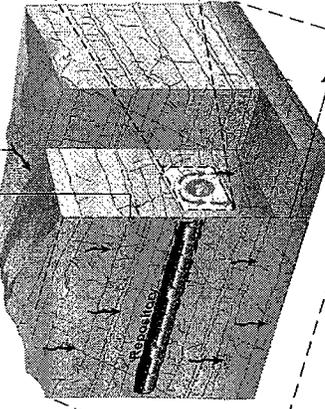
# Engineered Barrier System



Features Above Repository Horizon

Arid Environment

6 Limits amount of water to reach repository horizon and 95% lost by evaporation and transpiration



Emplacement Drift: Provides a stable environment for other Engineered Barrier System features

Titanium Drip Shield above the Waste Packages: Prevents or substantially reduces water from contacting the waste package

Waste Package: Prevents or substantially reduces water from contacting the waste form

Invert below the Waste Packages: Reduces transport of radionuclides out of the Engineered Barrier System

Pallet: Supports the waste package and minimizes external mechanical and chemical interactions

It takes thousands of years for radionuclides to reach water table

It takes thousands of years for radionuclides to reach biosphere

Repository

North

Water Table

South

Approximate RMEI Location

Features Below Repository Horizon

11 Miles

Alluvium

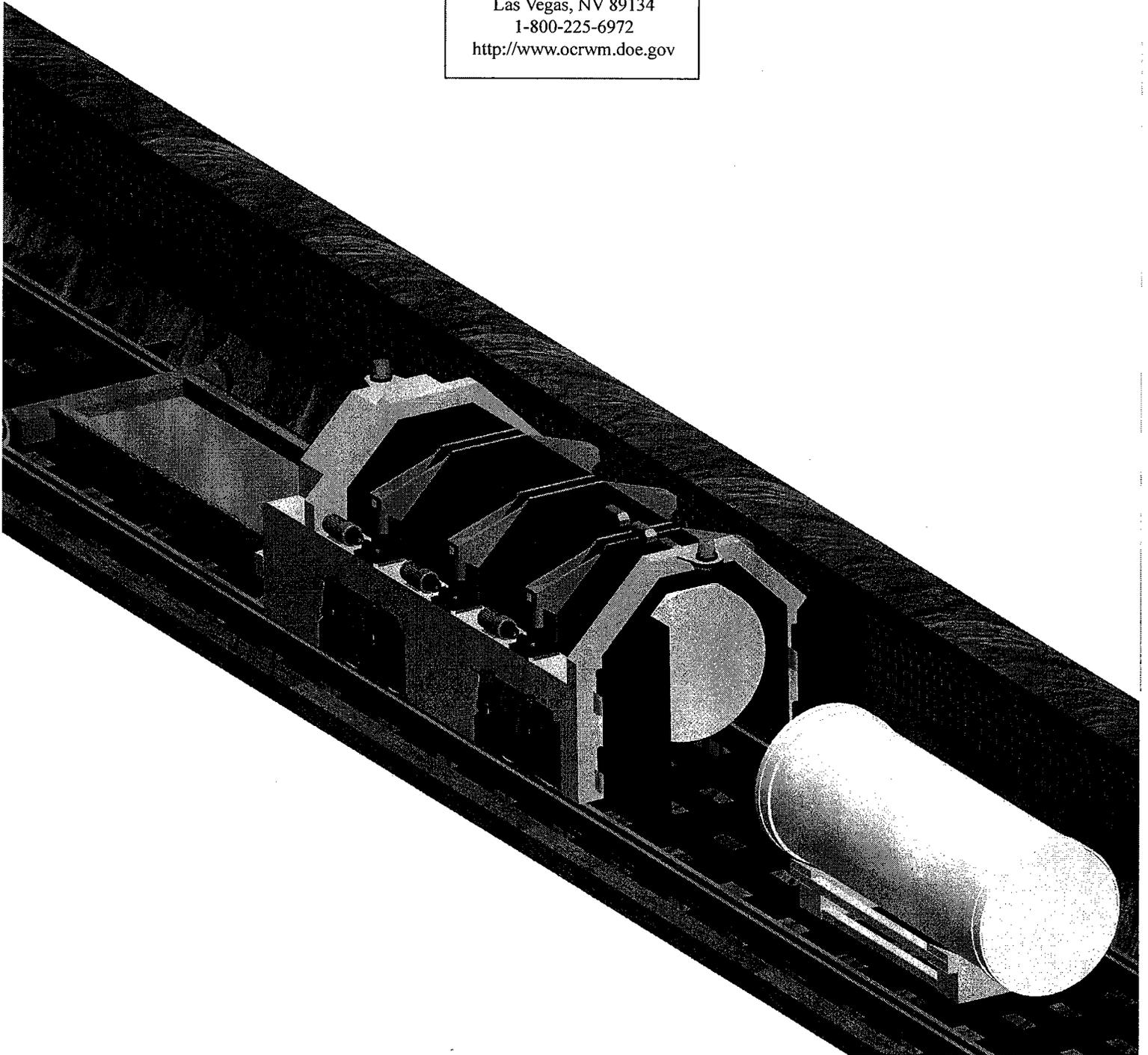
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U.S. Department of Energy  
Office of Civilian Radioactive  
Waste Management

June 2008

1551 Hillshire Drive  
Las Vegas, NV 89134  
1-800-225-6972  
<http://www.ocrwm.doe.gov>



**AFFIDAVIT OF PETER SWIFT**

**ATTACHMENT 2**

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

_____ )	
In the Matter of )	
U.S. DEPARTMENT OF ENERGY )	Docket No. 63-001
License Application to Construct a )	
Geologic Repository at Yucca Mountain )	
_____ )	

**AFFIDAVIT OF PETER N. SWIFT**

I, Peter N. Swift, the undersigned affiant, do hereby make the following statements in support of the Department of Energy's (DOE) Answer to the State of Nevada's Petition to Intervene. This affidavit is based upon my own knowledge, information, and belief, review of Yucca Mountain Project records, and review of the State of Nevada's Petition.

1. My name is Peter N. Swift, and my curriculum vitae is attached to this Affidavit. I am an employee of Sandia Corporation, the management and operating contractor for Sandia National Laboratories (SNL). SNL is the DOE Office of Civilian Radioactive Waste Management's Lead Laboratory for Repository Systems ("the Lead Laboratory").

2. Since 2006, I have been the Lead Laboratory's Chief Scientist for the Yucca Mountain Project. The Lead Laboratory has responsibility for development of the Total System Performance Assessment (TSPA) model. Before that, I was the TSPA department manager for SNL from 2000 to 2006.

3. The TSPA provides quantitative estimates of the long-term performance of the Yucca Mountain disposal system over a range of possible conditions using a linked system of computer models that simulate processes, events, and features significant to the performance of the system, accounting for associated uncertainties.

4. Four iterations of the TSPA are relevant to this affidavit. One version, referred to as the TSPA-SR, was completed in 2001 to support the DOE's Yucca Mountain Site Recommendation in 2002. The TSPA-FEIS was prepared in connection with DOE's Final Environmental Impact Statement for the Yucca Mountain repository, also in 2002. A preliminary version of the TSPA supporting the License Application for construction authorization (TSPA-LA Model version 5.000) was completed in 2007 and was used to support the DOE's Draft Supplemental Environmental Impact Statement for the Yucca Mountain repository and portions of the Safety Analysis Report in the License Application and the DOE's Final Supplemental Environmental Impact Statement for the Yucca Mountain repository. A final version of the TSPA, TSPA-LA Model version 5.005, was completed in 2008, and was used to support both the Safety Analysis Report in the License Application and the DOE's Final Supplemental Environmental Impact Statement for the Yucca Mountain repository.

5. The State of Nevada requested a copy of the TSPA model and codes in 2003. *See* June 26, 2003 letter from Robert R. Loux to W. John Arthur (LSN Accession #DEN000758818). In response DOE provided the State of Nevada with a DVD that contained the requested model and related codes for the TSPA-SR. *See* August 8, 2003 letter from W. John Arthur to Robert R. Loux (LSN Accession #DN2002503623).

6. In response to that same request, DOE offered to provide the State a copy of the TSPA-FEIS. Nevada declined that offer. *See* June 26, 2003 letter from Robert R. Loux to W. John Arthur (LSN Accession #DEN000758818).

7. In October 2007, DOE gave Nevada an external hard drive that contained the TSPA-LA Model version 5.000 and related model codes. The external hard drive, which was prepared by the Lead Laboratory, contained approximately 150 Gigabytes of data files. These

data files constituted the GoldSim calculation files for TSPA-LA Model version 5.000. *See* October 12, 2007 letter from Jane R. Summerson to Christine L. Schulte, with copy to R.R. Loux and J.R. Egan (LSN Accession # DEN001600532).

8. In June 2008, DOE gave Nevada two external hard drives related to the TSPA-LA Model version 5.005. Those hard drives, which were prepared by the Lead Laboratory, contained the computer model files for the TSPA-LA Model version 5.005 that allow execution of the TSPA model. Those files included the appropriate TSPA-LA GoldSim model files, including limited intermediate results viewable within the GoldSim Player application, so as to facilitate Nevada's review.

9. In July 2008, DOE conducted a tutorial for Nevada's experts to explain differences between versions 5.000 and 5.005 of the TSPA-LA Model and to answer other questions regarding the TSPA's structure.

10. All of the versions of the TSPA model require the software program GoldSim. With the correct version of the GoldSim software and appropriate computer hardware, the computer model files that DOE has provided to Nevada in June 2008 would enable Nevada to run full and partial realizations of TSPA-LA Model version 5.005.

11. The TSPA analysis relies on supporting Analysis Model Reports (AMRs). These AMRs document models and analyses of the major processes relevant to repository performance, simplified abstractions of process models suitable for incorporation in the TSPA, or other data inputs that are used in the TSPA.

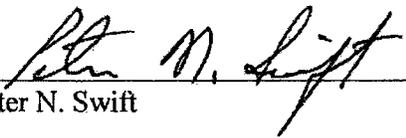
12. It is my understanding that the supporting AMRs are available on the Licensing Support Network (LSN).

13. I have reviewed the contentions filed by Nevada. There are many contentions in which Nevada has alleged the existence of errors or deficiencies in the implementation or execution of the TSPA, or in supporting AMRs or data on which the AMRs are based, but for which Nevada does not provide any quantitative or qualitative description of the effect on overall repository performance as a consequence of the alleged error or deficiency.

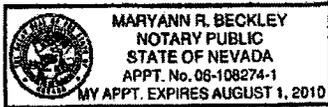
14. In my judgment, it would have been possible for Nevada to provide a qualitative and in many cases quantitative assessment of the effect of these alleged errors and deficiencies on the TSPA results or the model abstractions reflected in the AMRs. These assessments could have been based on interpretation of the TSPA-LA documentation, supporting AMRs and related files that are available on the LSN, and supplemental analyses using the TSPA computer files that DOE provided to Nevada.

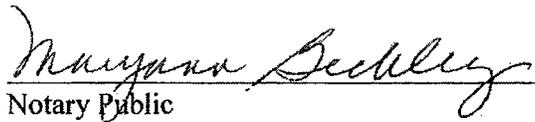
15. I have reviewed the recurring statement in Nevada's Petition that asserts that the TSPA is too complicated and difficult for Nevada to have provided any description of the effect of their asserted errors and deficiencies. I disagree with that statement. The TSPA-LA documentation, computer model files, and supporting AMRs to which Nevada has access, gives the State the ability to evaluate the significance of alleged errors and deficiencies qualitatively, and, in many cases, to perform supplemental analyses or assessments that would quantify the effect of the alleged error or deficiency, in general without undertaking a complete rerun of the TSPA-LA. By performing such qualitative and quantitative analyses, Nevada could have evaluated whether modifications to account for the alleged error or deficiency would have any significant effect on the TSPA-LA model and the estimates of regulatory performance resulting from that model.

16. I am aware of no reason why the State, if it believes that there is an error or deficiency in any model abstraction, input, assumption, or other aspect of the TSPA-LA or the supporting AMRs, could not have performed its own evaluations of the potential significance of these alleged errors and deficiencies, provided that the State's experts have the technical or scientific knowledge and understanding of the TSPA and the appropriate hardware and software to interpret and, as necessary, to run the TSPA-LA model.

  
Peter N. Swift

The above-named affiant personally appeared before me this 13<sup>th</sup> day of January, 2009, and executed this affidavit.



  
Notary Public

My Commission expires: August 1, 2010

**CURRICULUM VITAE OF PETER SWIFT**

**ATTACHMENT 3**

## **Peter Swift**

Organization 06780, Mail Stop 0778  
Sandia National Laboratories  
Albuquerque, NM 87185-0778, USA

### **Summary**

Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM, and Chief Scientist for the Department of Energy Office of Civilian Radioactive Waste Management's Lead Laboratory for Repository Systems, Las Vegas, NV

Nineteen years experience in transuranic and high-level radioactive waste disposal programs

Ph.D. in Geosciences, University of Arizona

### **Professional experience**

#### **Radioactive Waste Disposal Programs**

October 2006 - present, Chief Scientist for the Department of Energy Office of Civilian Radioactive Waste Management's (DOE-OCRWM) Lead Laboratory for Repository Systems and Distinguished Member of the Technical Staff, Sandia National Laboratories (SNL).

Senior technical advisor to the Yucca Mountain Project Lead Laboratory Program Manager regarding adequacy and completeness of technical work supporting the Yucca Mountain project. Represent scientific activities supporting the national high-level waste disposal program to senior DOE management and external groups including the Nuclear Regulatory Commission (NRC), Nuclear Waste Technical Review Board (NWTRB), and the national and international peer community.

April - September 2008, Member of the Independent Expert Review Team (IERT) for the Draft Environmental Impact Statement for the West Valley Demonstration Project, New York.

Lead within the IERT for review of uncertainty and sensitivity analyses in the West Valley Long-Term Performance Assessment. The IERT was a ten-member panel convened by the New York State Energy Research and Development Authority to provide independent review of preliminary drafts of the DOE's draft environmental impact statement for the West Valley facility.

April 2006 - September 2006, Chief Scientist for SNL Yucca Mountain Transition Team.

Provided scientific leadership to the SNL team during the transition of repository postclosure science programs for the Yucca Mountain Project from the Bechtel SAIC Company (BSC) to SNL.

December 2000 - April 2006. Manager, Total System Performance Assessment Department, SNL, Albuquerque, NM, and Total System Performance Assessment Department Manager, BSC, Las Vegas, NV (March 2004-April 2006), Performance Assessment Strategy and Scope Subproject Manager, BSC (December 2001-March 2004), Total System Performance Assessment Process Model Report Manager, BSC (February 2001-December 2001).

At SNL, manager for approximately 15 technical staff members working on total system performance assessment for radioactive waste repositories. Within BSC, manager for approximately 50-60 technical and administrative personnel, management responsibility for designing, conducting and documenting total system performance assessment analyses for the Yucca Mountain license application, also management responsibility for analyses to identify and prioritize scientific and engineering work needed to support analyses of long-term performance of the proposed Yucca Mountain repository. Technical spokesperson for the Yucca Mountain project in interactions with DOE, NRC, NWTRB, and various other US and international groups.

June 2000 - February 2001. Deputy Department Manager-Albuquerque, Civilian Radioactive Waste Management System Management and Operating Contractor (CRWMS M&O) Performance Assessment Department, Yucca Mountain Project, USA, and Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Primary responsibility for technical work performed by the Albuquerque, NM staff of the CRWMS M&O Performance Assessment Department. Staff included approximately 35 technical and support personnel at SNL and Duke Engineering and Services, Albuquerque.

September 1998 - December 2000. Distinguished Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Member of the CRWMS M&O Performance Assessment Department. Lead for modeling of consequences of disruptive events, including volcanism and seismicity, in the total system performance assessment for DOE's Yucca Mountain Project, 1999-2000. Lead for scenario development and screening of features, events, and processes, 1998-1999. Participated in technical exchanges with CRWMS M&O, DOE, and NRC staff on scenario development and disruptive events. Represented the DOE's approach to scenario development for performance assessment internationally.

October 1997 - September 1998. Principal Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Lead for scenario development methodology for the Yucca Mountain Project total system performance assessment. Active in developing new business opportunities for SNL within the USA and internationally. Member of the Waste Isolation Pilot Plant (WIPP) Technical Integration and Compliance Departments. Lead for WIPP compliance application documentation, co-lead for far-field technical activities (site-related geology and hydrology).

September 1993 - October 1997. Senior Member of the Technical Staff, Sandia National Laboratories, Albuquerque, NM.

Member of the Waste Isolation Pilot Plant (WIPP) Performance Assessment and Technical Integration and Compliance Departments. Team Leader for Compliance Documentation. Acting Manager of the WIPP Compliance Department, January - March 1995. Acting Manager of WIPP Compliance Support Department, December 1994.

Lead responsibility for preparing contributions by SNL (Scientific Advisor for the WIPP) to the WIPP Compliance Certification Application, submitted to the U.S. Environmental Protection Agency (EPA) in October, 1996, and the No-Migration Variance Petition, submitted to the EPA in June, 1996. Integrated WIPP long-term performance assessment with SNL technical program and regulatory compliance activities coordinated by the DOE and Westinghouse Waste Isolation

Division. Participated in regulator and stakeholder interactions with the DOE, EPA, the State of New Mexico, the National Academy of Sciences, international review groups, and public groups. Represented WIPP Project to international technical audiences.

November 1989 - September 1993. Scientist III, Tech Repts, Inc., Albuquerque, New Mexico.

Contract member of the Performance Assessment Department at SNL evaluating compliance of the WIPP with EPA long-term regulations. Task leader for geology and climate-related studies and coordinator of technical documentation. Work included analysis of long-term climate variability at the WIPP and conceptual application of climatically-varying recharge to regional groundwater-flow model.

### **Mineral Exploration**

July 1987 - August 1989. Exploration Geologist, Chevron, U.S.A., Denver and Houston.

Developed new oil and gas prospects and contributed to the structural analysis and seismic interpretation of existing prospects in southern Oklahoma. Served on a nine-member committee that assessed the teaching and practice of structural geology throughout the corporation.

April 1975 - July 1979. Various field operations in uranium exploration, Geomet Exploration, Inc., Boulder, Co, and North Park Uranium Associates, Rand, Colorado.

As staff member and later project leader for uranium exploration programs, participated in and directed radiation surveys at regional and local scales, directed claim-staking projects, and managed the field operations of two- to ten-person crews throughout the western United States.

### **Academic Teaching and Research**

January 1996 - May 1996 and January 1997 - May 1997. Instructor, Department of Civil Engineering, University of New Mexico, Albuquerque.

Co-taught two one-semester graduate courses in radioactive waste management, with Dr. Ruth Weiner.

August 1989 - December 1989. Instructor, Department of Geology, University of New Mexico, Albuquerque.

Taught a one-semester graduate seminar on basin analysis and sedimentary tectonics.

June 1980 - May 1987. Teaching Assistant and Research Aide for the Department of Geology and Geophysics, University of Wyoming; Teaching Associate and Research Associate for the Department of Geosciences, University of Arizona.

Taught undergraduates in mineral deposits, petroleum geology, structural geology, geophysics, and field methods. Conducted research in topics including uranium exploration and global tectonics.

## Education

University of Arizona, Tucson, Arizona  
Ph.D., Geosciences, tectonics program, May, 1987  
University of Wyoming, Laramie, Wyoming  
M.S., Geology, May, 1982  
B.S., with honors, Geology, December, 1980  
Yale University, New Haven, Connecticut  
B.A., English, May, 1974

## Professional Associations

American Geophysical Union, Geological Society of America, American Association for the Advancement of Science.

## Publications and Presentations

### Technical Reports

Garrick, B. J., J. T. Bell, S.J. Bennett, R.H. Fakundiny, S.P. Neuman, F.L. Parker, M.T. Ryan, P.N. Swift, C.G. Whipple, and M.P. Wilson, 2008. *Independent Review of the Draft Environmental Impact Statement for Decommissioning and/or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center*, prepared by the Independent Expert Review Team for the New York State Energy Research and Development Authority, West Valley New York.

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Bechtel SAIC Company (BSC) 2001, *FY01 Supplemental Science and Performance Analyses, Volume 2: Performance Analyses*, TDR-MGR-PA-000001 Rev. 00, Bechtel SAIC Company, Las Vegas, Nevada (lead author).

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Galson, D.A., and P.N. Swift, 1995. "Recent Progress in Scenario Development for the WIPP," in *High Level Radioactive Waste Management: Proceedings of the Sixth Annual International High-Level Radioactive Waste Management Conference and Exposition*, Las Vegas, NV, April 30-May 5, 1995, American Nuclear Society, 391-393.

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## **Selected Unpublished Presentations**

### **Presentations to the National Academy of Sciences National Research Council Board on Radioactive Waste Management**

*Observations on Accuracy and Uncertainty in Performance Assessment*, BRWM Fall Meeting, Washington, D.C., September 3, 2003 (invited speaker)

*Recent Department of Energy Analysis of Yucca Mountain Barriers Using Total System Performance Assessment*, BRWM Winter Meeting, Washington, D.C., December 12, 2002 (invited speaker)

### **Presentations to the Nuclear Waste Technical Review Board**

*Total System Performance Assessment: Modeling Approach and Overview of Results*, NWTRB Spring Meeting, Las Vegas, Nevada, May 29, 2008

*Barrier Capability and the Assessment of System Performance*, NWTRB fall meeting, Amargosa, NV, September 27, 2006

*Status of the Lead Laboratory Transition*, presented to the NWTRB Fact-Finding Visit on the Status of the Total System Performance Assessment, Las Vegas, NV, August 3, 2006

*Total System Performance Assessment for License Application Results and Summary of Total System Performance Assessment Documentation and Validation*, presentations to NWTRB subgroup workshop on Total System Performance Assessment, Las Vegas, NV, August 23, 2005

*U.S. DOE YMP TSPA Status and Plans* (presented by P. Swift, coauthored by Robert Andrews and Jon Helton), presentation to NWTRB Subpanel on Performance Assessment, Las Vegas, NV, December 14, 2004

*Overview of the U.S. Department of Energy Total System Performance Assessment Model and Overview of Nominal Scenario Class and Igneous Disruption Scenario Class Results in the Total System Performance Assessment*, presentations to NWTRB Subpanel on Performance Assessment, Las Vegas, NV, March 8, 2004

*Barrier Capability Analyses*, NWTRB Winter Meeting, Las Vegas, NV, January 28, 2003

*Status of the Department of Energy's Igneous Activity Analyses*, NWTRB Fall Meeting, September 17, 2003

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*Project Plans for Fiscal Year 2002-2003: Performance Assessment*, NWTRB Spring Meeting, Washington D.C., May 8, 2002

*Performance Assessment Prioritization Overview* (presented by P. Swift, coauthored with

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*Implementing a Consistent Treatment of Uncertainty in the TSPA-LA*, NWTRB Winter Meeting, Pahrump, NV, January 29-30, 2002

*WIPP PA Consequence Modeling*, NWTRB trip to the Waste Isolation Pilot Plant, Albuquerque, NM, August 12, 1991

### **Presentations to the National Academy of Sciences National Research Council Committee on the Waste Isolation Pilot Plant**

*Fluid Injection, The WIPP, and "The Hartman Scenario,"* presentation to members of the NAS WIPP Committee, Albuquerque, NM, August 18, 1998

*Fluid Injection and the WIPP* (presented by P. Swift, coauthored with Dan Stoelzel, Palmer Vaughn, Jim Bean, and Ross Kirkes), NAS WIPP Committee quarterly meeting, Washington, D.C., May 15-16, 1997

*Overview of the Compliance Certification Application Performance Assessment* (presented by P. Swift, coauthored with D. Rip Anderson, Hong-Nian Jow, Mel Marietta, Jon Helton, Palmer Vaughn, Jerry Berglund, Dan Stoelzel, and Kurt Larson), NAS WIPP Committee Quarterly Meeting, Albuquerque, NM, November 22, 1996

### **Presentations to the U.S. Nuclear Regulatory Commission Advisory Committee on Nuclear Waste**

*Overview of the U.S. Department of Energy Total System Performance Assessment Model*, ACNW Spring Meeting, Rockville, MD, March 25, 2003

*Component Performance and Key Contributors to Nominal Scenario Class Dose in the U.S. Department of Energy Total System Performance Assessment*, ACNW Spring Meeting, March 26, 2003

*Overview of the U.S. Department of Energy Total System Performance Assessment Model*, ACNW meeting on the Biosphere, February 24, 2004

*Performance Assessment Prioritization Overview*, ACNW Spring Meeting, Rockville, MD, March 19, 2002

*Implementing a Consistent Treatment of Uncertainty in the Total System Performance Assessment – License Application*, ACNW Spring Meeting, Rockville, MD, March 19, 2002

*Technical Updates Since the Preliminary Site Suitability Evaluation Report*, ACNW Spring Meeting, Rockville, MD, March 19, 2002

### **Presentations to the U.S. Nuclear Regulatory Commission Staff**

*Presentation/Organization of Performance Assessment in Safety Analysis Report*, U.S. Department of Energy Presentation on its License Application for a High-Level Waste Geologic Repository at Yucca Mountain, Nevada, Rockville, MD, June 20, 2008

*Presentation/Organization of Performance Confirmation in Safety Analysis Report*, U.S. Department of Energy Presentation on its License Application for a High-Level Waste Geologic Repository at Yucca Mountain, Nevada, Rockville, MD, June 20, 2008

*Disruptive Scenarios: Igneous Eruptive Model Abstraction*, presented by P. Swift, coauthored with William Statham, NRC-DOE Technical Exchange on Total System Performance Assessment for Yucca Mountain, Las Vegas, NV, April 4, 2008

*Use of Infiltration Model Results in the Total System Performance Assessment*, NRC-DOE Technical Exchange on Infiltration at Yucca Mountain, Las Vegas, NV, April 2, 2008

*Introduction to the NRC-DOE Appendix 7 Meeting on Total System Performance Assessment*, NRC-DOE Appendix 7 Meeting on Total System Performance Assessment for Yucca Mountain, Las Vegas, NV, March 31, 2008

*Igneous Consequences in the Total System Performance Assessment*, NRC-DOE Appendix 7 Meeting on Igneous Consequence Modeling, Las Vegas, NV, January 8, 2008

*Performance Assessment Prioritization Overview*, NRC-DOE Technical Exchange on Future Issue Resolution Meetings, Las Vegas, NV, February 5, 2002

*Total System Performance Assessment Supplemental Sensitivity Analyses: Igneous Activity*, DOE/NRC Technical Exchange on Key Technical Issues, Las Vegas, NV, June 21-22, 2001

*Total System Performance Assessment and Integration Key Technical Issue Subissue 2 – Scenario Analysis* (presented jointly with Geoff Freeze), DOE/NRC Technical Exchange on Features, Events, and Processes, Las Vegas, NV, May 15-17, 2001

*Overview of Postclosure Features, Events, and Processes Relevant to Repository Design and Thermal-Mechanical Effects*, DOE-NRC Technical Exchange on the Key Technical Issue and Subissues related to Repository Design and Thermal-Mechanical Effects, Las Vegas, NV, February 6-8, 2001

*Total System Performance Assessment—Site Recommendation Rev. 00—Igneous Analyses*, presented by P. Swift, coauthored with Michael Sauer, DOE/NRC Technical Exchange: Total System Performance Assessment—Site Recommendation Briefing, Las Vegas, NV, January 23, 2001

*Container Life and Source Term, Subissue 5, Acceptance Criterion 7: Risk*, DOE-NRC Technical Exchange on Key Technical Issues and Subissues Related to Criticality, Las Vegas, NV, October 23-24, 2000

*Structural Deformation and Seismicity Subissues in the Total System Performance Assessment—Site Recommendation*, DOE/NRC Technical Exchange, Las Vegas, NV, October 11-12, 2000

*TSPA-SR Features, Events, and Processes Approach: Process and Methodology*, DOE/NRC Technical Exchange on Total System Performance Assessment (TSPA) for Yucca Mountain, San Antonio, TX, June 6, 2000

*Igneous Activity in the Total System Performance Assessment – Site Recommendation: A Summary*, NRC/DOE KTI Technical Exchange on Igneous Activity, Las Vegas, NV, August 29-31, 1999

*Comparison of DOE's Scenario Methodology to Criteria and Guidance in the NRC TSPA&I IRSR Rev.1, Section 4.4*, DOE/NRC Appendix 7 Meeting on the TSPA FEP Database, Las Vegas, NV, September 8, 1999

*Scenario Development for the Yucca Mountain TSPA*, DOE/NRC Appendix 7 Meeting on Disruptive Events, Las Vegas, NV, October 6-8, 1998.

### **Presentations to the U.S. Environmental Protection Agency**

*Climate Change and Long-Term Performance Assessment for the Waste Isolation Pilot Plant*, EPA Technical Workshop on Waste Isolation Pilot Plant Compliance Issues, Washington D.C., February 14-16, 1995

*Scenario Development for the WIPP* (presented with D.A. Galson, coauthored with D.A. Galson, T.W. Hicks, and R.D. Wilmot), EPA-DOE Technical Exchange Meeting, Albuquerque, NM, September 22-23, 1994

**ATTACHMENT NEV-SAFETY-01-1**

**Statement of Edward F. Sproat III, Director  
Office of Civilian Radioactive Waste Management  
U.S. Department of Energy  
Before the  
Subcommittee on Energy and Air Quality  
Committee on Energy and Commerce  
U.S. House of Representatives  
July 19, 2006**

Mr. Chairman and Members of the Committee, I appreciate the invitation to appear before the Committee to discuss the current status of the Yucca Mountain Project and my plans over the next two and one-half years.

It has been more than five years since I last appeared before this Committee as a vice president of Exelon Generation and testified about the Pebble Bed Modular Reactor (PBMR) project in South Africa. During 2002 I was in South Africa as the Chief Operating Officer of PBMR assisting the South Africans in determining the feasibility of commercializing that technology. I am pleased to report that the South African government has decided to proceed with demonstration and commercialization of the PBMR.

More recently, I was involved with forming a consortium to compete for the Next Generation Nuclear Plant project to demonstrate the cogeneration of electricity and hydrogen from the PBMR. While that technology and demonstration project holds much promise, I see a more urgent near-term need for this Nation's energy security; that is to move the issue of the disposition of spent nuclear fuel and high-level radioactive waste

forward with a sense of urgency. It is for that reason that I accepted President George W. Bush's appointment to serve as the Director of the Office of Civilian Radioactive Waste Management (OCRWM).

I have now been in my new position as Director for about five weeks. During this period I have been conducting a thorough assessment of the Yucca Mountain Project, and that assessment has not yet been completed. I continue to gather data on functional areas of the Project to determine the performance gaps between the current state and the levels of performance that will be necessary for the successful execution of this Project.

In order to expedite this assessment process, I have instructed my Office to issue Requests for Proposals for independent assessments of the draft License Application, the Quality Assurance programs and their implementation by DOE and its major contractor, and of the engineering processes and procedures being utilized by DOE and its major contractor. While I am not yet prepared to give you a full report of my assessment, I can tell you that there are a number of very good people working on this Project who can form the nucleus of a high-quality team needed to successfully design, license, build and operate the Yucca Mountain repository and the waste acceptance and transportation systems. I also can tell you that there are a number of process and organizational issues which must be addressed, all of which are correctable.

There are four strategic objectives that I intend to pursue and implement during my tenure as Director. Let me explain these objectives and why they are important.

My first objective is to submit a high-quality and docketable license application to the Nuclear Regulatory Commission (NRC) no later than Monday, June 30, 2008.

This objective is my first priority and will receive my full management attention.

Success in meeting this objective is not measured only by the calendar, but also by the quality and completeness of the application. Before I will allow the application to be submitted, I must be satisfied that:

1. There is a repository design which meets the licensing requirements;
2. The application accurately reflects the design;
3. The data which are used to justify the design in the application are accurate and were generated in compliance with Quality Assurance requirements;
4. The application adequately addresses all of the guidance of the *Yucca Mountain Review Plan* (NUREG 1804); and
5. The writers of the application have attested to the accuracy and completeness of their sections.

I am certain there will be those who will question how these criteria can be met with such an aggressive schedule. I can tell you unequivocally that the concepts of safety, quality and schedule discipline are not mutually exclusive. This concept is demonstrated by world class nuclear organizations on a daily basis and I intend to hold my organization and its contractors to the same standards.

With a license application submittal on June 30, 2008, the best-achievable schedule for Yucca Mountain would lead to receipt of a license to begin to receive and possess spent nuclear fuel and high-level radioactive waste at Yucca Mountain in 2017. Attached is a more detailed set of schedule milestones for your information.

Let me define what I mean by “best-achievable schedule.” The schedule after the Department submits the License Application is predicated on 1) appropriations consistent with the Administration’s requests and passage of our proposed legislation entitled the “Nuclear Fuel Management Disposal Act”; and 2) an NRC construction authorization decision that is consistent with the timelines contained in the Nuclear Waste Policy Act. There are a number of uncertainties currently beyond the control of the Department that have the potential to significantly delay the opening date for the repository and cannot be accurately predicted. The most important is the ability of the Department to have access to the Nuclear Waste Fund to support the cash flows needed to implement the Project. I respectfully ask Congress to pass the Administration’s proposed legislation to address this issue; access to the Fund is key to moving the Project forward.

Other factors that have the potential to delay the Project include: 1) the length and outcome of any derivative litigation, 2) Congressional approval of the permanent withdrawal of the lands needed for the operational area of the repository, and 3) obtaining any necessary Federal or state authorizations or permits for the repository and the transportation system. The Administration’s proposed legislation addresses most of these

uncertainties and will go a long way in reducing schedule risk and the cost uncertainties of the Yucca Mountain Project while still fully protecting public and worker health and safety.

My second objective is to design, staff, and train the OCRWM organization such that it has the skills and culture needed to design, license, and manage the construction and operation of the Yucca Mountain Project with safety, quality, and cost effectiveness.

I am still in the process of assessing the current state of my organization and the skill gaps that may exist compared to what is needed to meet this objective. I do know that additional skills and competencies are required to enhance the current organization and that attracting and retaining individuals with these skills will be a major challenge. I have been encouraged, however, by the Department's Office of Human Capital Management and its help in meeting this challenge.

My third objective is to address the Federal Government's mounting liability associated with unmet contractual obligations to move spent fuel from nuclear plant sites.

What seems to have been lost in the Yucca Mountain debate over the last several years is that the U.S. Government has legally binding contracts with all owners of nuclear power plants to take possession of and remove their spent fuel. There are two major implications of the Government's inability to perform per the contract requirements: 1) the financial liability borne by America's taxpayers for non-performance of the contract

continues to grow every year, and 2) the ability of this country to depend on nuclear energy as a strategic energy option for the long term is in jeopardy because spent fuel continues to accumulate at existing plants. There is no one solution to these problems. It will require a portfolio of legal and financial solutions to address these problems; but it can be done, and I intend to work with the Congress and the contract holders to try to break this impasse.

My fourth objective is to develop and begin implementation of a comprehensive national spent fuel transportation plan that accommodates state, local and tribal concerns and input to the greatest extent practicable.

I believe that the planning of the transportation system for the country's spent nuclear fuel and high-level radioactive waste has been underfunded and not given the attention and resources that it demands. The recent National Research Council's report on spent fuel transportation concluded that, while there are no technical barriers to the safe transportation of spent nuclear fuel, there are a number of social and institutional challenges that must be addressed before large-scale shipments commence. I agree with this conclusion and I intend to put into place processes which maximize the ability of the public to understand the risks and mitigating safety precautions, and to influence as appropriate the selection of transportation routes in their areas. Some work has already been done in this area with local planning groups, but much more needs to be done at an accelerated pace.

In summary, these four strategic objectives will form the basis of planning and resource allocation during my tenure. I believe that these areas must be addressed today to move forward on the issue of final disposal of spent nuclear fuel and to prepare the Project for long-term success in meeting the mandated direction of the Nuclear Waste Policy Act. I will do my best to make this a reality.

### **Yucca Mountain Repository Schedule**

<b>Milestone</b>	<b>Date</b>
Design for License Application Complete	30 November 2007
Licensing Support Network Certification	21 December 2007
Supplemental Environmental Impact Statement (EIS) Issued	30 May 2008
Final License Application Verifications Complete	30 May 2008
Final Rail Alignment EIS Issued	30 June 2008
License Application Submittal	30 June 2008
License Application Docketed by NRC	30 September 2008

### **Best-Achievable Repository Construction Schedule**

Start Nevada Rail Construction	5 October 2009
Construction Authorization	30 September 2011
Receive and Possess License Application Submittal to NRC	29 March 2013
Rail Access In-Service	30 June 2014
Construction Complete for Initial Operations	30 March 2016
Start up and Pre-Op Testing Complete	31 December 2016
Begin Receipt	31 March 2017

The schedule above is based on factors within the control of DOE, appropriations consistent with optimum Project execution, issuance of an NRC Construction Authorization consistent with the three year period specified in the Nuclear Waste Policy Act, and the timely issuance by the NRC of a Receive and Possess license. This schedule also is dependent on the timely issuance of all necessary other authorizations and permits, the absence of litigation related delays and the enactment of pending legislation proposed by the Administration.

**ATTACHMENT NEV-NEPA-16-1**

**U.S. DEPARTMENT OF ENERGY (DOE)  
TRANSPORTATION EXTERNAL COORDINATION  
WORKING GROUP (TEC) MEETING**

**September 20-21, 2005 Pueblo, Colorado**

**Meeting Notes**

**Day 1 (September 20)**

**Optional Tour of the Transportation Technology Center, Inc. (TTCI)**

In the morning, Ruben Peña, Manager of Business Development, TTCI, directed the tour of the site where 80 TEC participants visited the Rail Dynamics Laboratory, learned about its Emergency Response Training Center (ERTC) and observed the railcar designed and constructed by Private Fuel Storage, LLC (PFS) to carry shipments of spent nuclear fuel (SNF) to its temporary storage facility.

The TTC site is owned by the U.S. Department of Transportation (DOT), Federal Railroad Administration (FRA) and is operated and maintained by TTCI, a subsidiary of the Association of American Railroads (AAR). TTCI performs extensive technological research and development, as well as real-world testing. The 52 square mile facility offers an array of specialized testing facilities and tracks enabling testing of all types of freight and passenger rolling stock, vehicle and track components, and safety devices.

**TEC Welcome and Meeting Overview**

***Introduction***

*Judith Holm, Director, DOE/RW, Operations Development Division, Office of National Transportation*

Ms. Holm called the meeting to order and welcomed the participants. She reviewed the agenda and called special attention to the plenary sessions being held during the remainder of the day. Ms. Holm stated that the purpose of this meeting is for the participants to get immersed in rail. There will be opportunity for questions at the end of each presentation over the next two days.

## **Colorado Welcome**

*Jim Reed, Denver Office, National Conference of State Legislatures (NCSL)*

Mr. James Reed, Transportation Program Director, offered a special welcome, speaking on behalf of the State of Colorado and the NCSL. Mr. Reed noted that NCSL had been a participant in TEC since its inception. NCSL is headquartered in Denver, Colorado and represents state legislators from all states in a variety of issues on energy, environment, and transportation. Mr. Reed noted sites of interest in the Pueblo area and stated that the state of Colorado has beautiful scenery and architecture. He also mentioned that Pueblo was voted as one of the best places to live in 1988 and hosts the annual Colorado state fair.

## **Program Update from OCRWM's Office of Transportation**

*Moderated by Judith Holm and presented by Gary Lanthrum, Director, DOE/RW Office of National Transportation (ONT)*

Mr. Lanthrum provided an update of OCRWM's Office of National Transportation (ONT), followed by a more focused discussion of the DOE decision to use dedicated rail as the primary transportation mode for shipments to Yucca Mountain. Following Mr. Lanthrum's presentation, representatives from the AAR and FRA provided their perspectives on the decision.

**Key Accomplishments** — According to Mr. Lanthrum, recent accomplishments in the OCRWM transportation program include the following:

- On July 18, 2005 OCRWM's ONT announced its decision to use dedicated trains as the usual shipment mode.
- An Environmental Assessment (EA) was published as part of a Public Land Order submitted to the Department of the Interior through the Bureau of Land Management (BLM)

The benefits of the dedicated train service will enable OCRWM to better manage resources by avoiding lengthy "dwell times" in rail yards resulting in shorter transit time. In addition, there will be increased routing flexibility and operational control over shipments.

The Draft EA essentially extends part of the original land withdrawal and significantly reduces the right of way. The Draft EA on land withdrawal will provide BLM with documentation on mineral resources and socio-economic analyses; land use and ownership; public participation; and intergovernmental consultation.

**Funding and Priorities** — In regard to funding, Mr. Lanthrum noted that the development of the transportation system is directly linked to the development of the repository. The repository is currently going through the license process. ONT funding is tied to overall OCRWM funding and project status. In 2004, ONT funding was \$64 million and in 2005 there was no increase in funding. No appropriations have been made for 2006.

The priorities for 2006 include:

- Focus on completing the Draft Nevada Rail Alignment EIS
- Initiate first steps in acquisition of casks

- Continue to work with State Regional Groups (SRGs) and Tribes
- Coordinate with key stakeholders through TEC regarding route selection criteria, 180(c) development and security planning
- Update OCRWM section of Radioactive Material Transportation Practices Manual
- Conduct trade studies
- Differentiate between requirements and expectations

**Cask and Rolling Stock Acquisition** — ONT has a preference for cask systems that provide the maximum flexibility in terms of facility and fuel compatibility. DOE has been looking at cask size and how it affects system operation performance. Multiple cask procurements will be undertaken to accommodate differing inventories of waste, and differing facility capabilities.

For rolling stock acquisition, little has changed since the last TEC meeting. DOE has not yet made a decision either to procure a fleet of locomotives or to utilize locomotives supplied by the railroads. Prototypes will most likely be out in about five years.

**Nevada Rail Development** — DOE is in the process of completing technical data collection along the corridor. The technical data includes hydrological, geological, photogrammetry and terrain information. All of this data is being used to assess alignment options. The Draft Rail Alignment EIS should be issued in 2006 with the final EIS to be issued in 2007.

**Institutional/Operational Activities** — Mr. Lanthrum identified key Institutional activities underway or planned. They include the following:

- Develop and issue Section 180(c) Policy
- Work with SRGs to develop regional suite of routes
- Meet with individual Tribes to establish a consultation and coordination mechanism on topics like Section 180(c) and routing
- Update Radioactive Materials Transportation Practices Manual (DOE M 460.2-1)
- Develop information materials for use in exhibits, tours and by various organizations

He noted that the new OCRWM transportation brochure was available at the registration table.

Key Operations activities include the following:

- Develop the Classification Guide for Secure Transportation of Nuclear Waste
- International transportation sabotage studies
- Transportation logistics/routing models
- Operational and systems studies

Mr. Lanthrum concluded his presentation by stating that despite budgetary setbacks, ONT still continues to make significant progress, and infrastructure acquisition plans are moving forward.

### **Questions and Comments from the Audience**

A member of the audience asked if data being collected along the Caliente Corridor would be available to the public. Mr. Lanthrum said that, at some point, the information will be released but the reports are not final yet. He will look into portions of the information being released. A question was asked as to why there is still a two-percent grade restraintment. Mr. Lanthrum said that DOE prefers to keep a two-percent grade but that could be overcome if needed. Other

considerations are slower speeds, operations, and size of train. Another audience member noted that incremental funding is not consistent everywhere, and the comment was noted. A member asked if there was a formal decision and/or documentation for deciding to go with dedicated trains. Mr. Lanthrum said that although the decision was not published in the Federal Register, there was an official press release that was issued by DOE and sent out to the SRGs.

## ***Perspective of the American Association of Railroads (AAR)***

*Bob Fronczak, AAR*

Mr. Fronczak stated that AAR was delighted with DOE's decision to use dedicated trains. He pointed out that DOE focused on three areas in making this decision. These areas were safety, security and cost. In the area of security, using dedicated trains will provide better visibility, as the trains will be shorter. The dwell time in rail yards will be less, and experienced rail personnel will be a part of this process, minimizing injury.

### **Questions and Comments from the Audience**

An audience member asked Mr. Fronczak to clarify what, in AAR's view, are dedicated trains, and what are the implications of routing?

- Mr. Fronczak stated that a dedicated train is a train that goes from a point of origin to a destination and back again, carrying the same commodity each time. An example of this would be a coal train. Dedicated trains do not necessarily include locomotives because there is a need to give an electric signal to the brakes, and that cannot be done unless they have Electronically Controlled Pneumatic (ECP) brakes. For dedicated trains, there is no routing and no escorts through a classification yard. Cask cars are very heavy, and that has an effect on the train's dynamics.

## ***Perspective of the Federal Railroad Administration (FRA)***

*Kevin Blackwell, FRA*

Kevin Blackwell provided discussed FRA's *Dedicated Train Study (DTS)*. The DTS is expected to be provided in a Report to Congress shortly. Mr. Blackwell provided the timeline for finalizing the DTS Report to Congress, which is as follows:

- November 1, 2004 — FRA initially submitted the draft final *DTS Report to Congress* to the DOT Office of the Secretary (OST) for review and clearance.
- December 2004 — FRA received questions and comments from DOT OST and addressed them to the extent possible to facilitate the DOT OST clearance process.
- February 2005—FRA resubmitted the *DTS Report to Congress* back to DOT OST for clearance.
- June 2005 — the *DTS Report to Congress* was cleared by the Office of Management and Budget (OMB).

The *DTS Report to Congress* is currently with the DOT Secretary's staff waiting for clearance to deliver the report to Congress. When delivered to Congress, the study will be publicly available. FRA checks with OST on a weekly basis as to its status.

At this time, FRA does not have any formal position on the use of dedicated trains for the transportation of spent nuclear fuel or high level radioactive waste. FRA is cognizant of the fact that rail movements of this material have occurred over the past 40+ years in regular train service, and these movements have been done safely and securely. However, FRA also recognizes that there are operational efficiencies in the rail operating environment to be gained in using dedicated trains. These include: rail transit times, train dynamics, and the ability to further reduce the already low risk of radiation exposure to railroad personnel and the general public in incident free transportation, as well as in the event of an accident.

### **Questions and Comments from the Audience**

An audience member asked how FRA is going about ramping up responsibilities, and what are some concrete things being done to prepare for when DOE is ready to ship. Mr. Blackwell said that FRA is looking into increasing resources to make sure it can implement its responsibilities. FRA will inspect trucks as the shipments ramp up. FRA would like more state involvement and participation, but that is voluntary. He noted that the inspection program has grown stagnant in the last five to eight years. A question was raised as to whether FRA plans to ask for a budget increase. Mr. Blackwell said that FRA asks for a budget increase every year. He said that two years ago FRA asked for 50 new inspectors and ended up with funding for six new inspectors.

## **Program Update from EM/Office of Transportation**

*Moderated by Judith Holm, OCRWM/ONT*

### ***EM Transportation Overview***

*Ella McNeil, EM Office of Transportation*

Ms. McNeil provided an update on the continuing efforts for cleanup and waste disposition by the Office of Environmental Management (EM) and transportation activities. She said that the disposition of “orphan” or special waste streams is one of the remaining obstacles to site cleanup across the DOE Complex. DOE is working with sites to develop comprehensive lists of orphan streams and to identify the needed treatment and disposal options, including identification of disposal facilities. An accelerated cleanup schedule is dependent on the ability to ship and dispose of the waste safely.

The current DOE/EM Waste Management Policy is as follows:

- Low-level radioactive waste (LLW) and mixed low-level waste (MLLW) are disposed of at the generation site, if that is practical. If onsite disposal is not available, waste is disposed at another DOE facility. Commercial facilities can also be utilized for disposal if compliant, cost effective, and in the best interest of DOE.
- Transuranic (TRU) waste is handled in two ways. Defense-generated waste is disposed at the Waste Isolation Pilot Plant (WIPP) in Carlsbad, NM. Non-defense waste is placed in safe storage awaiting future disposition.
- High-level radioactive waste (HLW) and SNF is stabilized, if necessary, and placed in safe storage until a geologic repository is available.

FY 2005 accomplishments include the following:

- Increased volumes disposed with reduction in transportation incident rate
- Vast majority of stored legacy waste worked off
- Rocky Flats TRU and MLLW shipments completed
- Mound TRU shipments to Savannah River completed
- Large quantities of “orphan wastes” were resolved at closure sites
- Commercial receiver sites identified for Fernald Silo residues

Through July 2005, approximately 18,000 shipments were made with 15 incidents – this is compared with 23 incidents in FY 2004. A management review of incidents will be held in October. No major incidents have yet been reported in FY 2005. Savannah River, Rocky Flats, Brookhaven, Idaho, Portsmouth, Mound, Oak Ridge, and Ohio sites all reported incidents in 2005, ranging from drums shifting during transport to the side-swiping of a Fernald Silo 3 shipment. No contamination or release of materials from their packages resulted from these incidents.

Ms. McNeil cited some site-specific shipping details as follows:

- Rocky Flats: All buildings and structures have been removed. There will be 10 shipments in FY 2006. About 50 truck shipments and 150 railcars remain to be moved.
- Fernald Silo 3: Shipments should be complete by the end of CY 2005 (175 to 200 shipments total).
- Fernald Silo 1 and 2: Shipments will continue into CY 2006; 245 shipments completed (2,000 to 2,200 total shipments expected).
- Oak Ridge: Completed shipment of 4,396 cylinders of DUF6 (2,520 in FY 2005); 5,951 cylinders total. A haul road is scheduled for completion in February 2006. This will significantly reduce commercial shipments.
- Richland: Weekly shipments to Pacific EcoSolutions number between two and three. A decision on special nuclear material is pending.
- West Valley: Currently shipping LLW to Envirocare and Nevada Test Site (NTS).
- Savannah River: Shipments include LLW and MLLW to Envirocare and NTS, TRU to WIPP, and neptunium to INL.
- Brookhaven: LLW shipments to Envirocare will resume in 2007. Two Type B shipments were recently completed to Los Alamos National Laboratory.
- Mound: Closure is on track for 2006; TRU shipments to Savannah River completed; shipments to Envirocare and Nevada Test Site (NTS) continue.
- Columbus: Waste shipments will continue into FY 2006. A Supplement Analysis for TRU transport has been prepared (comment period closes October 11, 2005).

- Paducah/Portsmouth: Paducah has resumed shipping to NTS, Envirocare shipments continue. Portsmouth shipments to NTS continue as well.

In addition, more than 3,900 truck shipments of TRU waste from eight sites have been transported to WIPP. Eleven small quantity sites have been completed. Mound rail shipments of TRU waste were completed in August. Idaho National Laboratory (INL) is making about 11 shipments per week. NTS is expected to complete TRU shipments by the end of CY 2005. Savannah River, Hanford, and Los Alamos continue to make TRU shipments. Issuance of a Request for Proposal (RFP) for WIPP transportation services is expected in September 2005.

DOE sites have been donating liftliners, liftliner fixtures, loading frames, and light generator equipment to the Army Corps of Engineers in New Orleans, to support hurricane relief efforts.

There were no questions or comments from the audience.

## ***Rail Best Practices Review***

*Eric Huang, EM Office of Transportation*

DOE conducted a review May 18-19, 2005 in Oak Ridge, TN. The review focused on loading and securing of packages. Participants included EM generator and shipping sites, as well as receiver sites, suppliers, and rail carriers. Rail shipment incidents that led to the review included:

- Brookhaven shipment to Envirocare – railcars arrived with water (melted snow) leaking (March 2005)
- Portsmouth shipment to Envirocare – metal debris gondola car arrived with portion of burrito bag open (May 2005)
- Mound shipment to Envirocare – Utah NOV for railcar not in a strong tight condition due to breach of railcar liner (May 2005)

Activities during the review included an observation tour at East Tennessee Technology Park (ETTP), sessions where experiences and lessons learned were shared, and a brainstorming session of best practices for safe and compliant rail shipment.

- Fernald Best Practices: Key components included training and retraining of all personnel and taking advantage of unit train to optimize rail shipping schedule. Lessons learned included diligence, inspections, and contact with railroads and disposal sites.
- Brookhaven Best Practices: Loading best practices outlined were patch hole, use geotextile liners and super load wrappers, use double-wrapper for debris and soil around debris to avoid puncture, use absorbent inside package, use covers on all railcars, complete loading of railcar in one day, and DOE review of all waste management and railcar shipment checklists prior to shipment.
- Rocky Flats Best Practices: Loading best practices identified were to install geotextile liners on bottom of car and top of waste and to install tarp and bow system.

- Savannah River Best Practices: Loading best practices include use of polypropylene-coated fabric wrapper, use liner as shipping package, use 66-ft (110-ton) gondola cars, placement of four drums on pallet and band to pallet with four metal bands, use gondolas with hard tops, and use 85-gallon overpacks as the package.
- Oak Ridge Best Practices: Loading best practices included use multiple barriers in packaging with absorbent to solidify liquid from potential release point, use double layers of super load wrappers, use straps outside the wrappers to secure boxes and wooden bracing at the end of railcars, cover railcar with tarp, and make sure QA/QC engineer oversees work and verifies compliance.

The review identified top best practices during the planning phase, the pre-loading phase, the loading phase, and the post-loading phase.

#### Planning:

- Define scope of work and include railcar specifications and other requirements in the subcontract with railcar suppliers.
- Perform thorough options analyses.
- Use dedicated fleets with hard covers.
- Define training needs and ensure program is in place.
- Utilize lessons learned from others.

#### Pre-Loading:

- Conduct thorough inspection.
- Compile all relevant documents and procedures.

#### Loading:

- Define critical activities and perform multiple-step inspections.
- Layer load/material/waste to avoid puncture of liner.
- Prevent rain/snow from infiltrating railcars during loading and transit.
- Do prep work before entering contaminated area.

#### Post-Loading:

- Inspect! Inspect! Inspect!
- Photograph outside of railcars and photograph shipment before and after package closure.

### **Questions and Comments from the Audience**

Mr. Huang was asked how shipments with burrito bags are unloaded. He responded that Envirocare uses a tipping mechanism and that the liners are all one-time use equipment.

Another audience member asked how involved the States were in the review. Mr. Huang answered that in the future DOE will try to expand the type of people involved in such reviews.

## **DOE Practices Manual**

*Ella McNeil, EM Office of Transportation*

Ms. McNeil provided an overview of plans to revise DOE M 460.2-1, *Radioactive Material Transportation Practices Manual*.”

On August 3, 2005, EM held a kick-off meeting for the revision of the *Transportation Practices Manual*. An internal writing team has been assembled that is led by EM and includes representatives from the DOE Field Offices, Naval Reactors, National Nuclear Security Administration (NNSA), and OCRWM. The second conference call was held on September 8, 2005.

Ms. McNeil shared the proposed timeline for revision of the Manual. The new draft is scheduled for completion by January 2006; informal review by DOE will begin in February; and the draft revision will be provided to the SRGs for comment in April 2006. The projected timeframe for submittal of the Manual into the formal DOE Directives system is September 2006, with manual re-issuance anticipated in December 2006.

EM has been receiving questions as to why there will be no Protocol Topic Group for revision of the Manual. Work will parallel that of existing Topic Groups (rail, security, training), and those groups will feed input into the revision process. DOE wants to focus the energy and resources of TEC members on the resolution of new issues and another topic group could dilute participation in existing groups. TEC and the SRGs will be involved in revision through the comment process. This is the same process used for development of the Modular Emergency Response Radiological Transportation Training (MERRTT). The comment resolution matrix will once again be employed for the revised Manual.

Ms. McNeil also announced that the EM Office of Transportation website is being revised, and the Best Practices will be part of that site.

### **Questions and Comments from the Audience**

One audience member expressed disappointment in the perceived lack of outside review. A letter was sent to DOE three weeks ago by three of the SRGs requesting the Protocol Topic Group be revived during the revision process. The Protocols are seen by some as one of DOE’s most useful TEC-produced documents. Ms. McNeil responded that OCRWM and EM collectively decided (on the September 8<sup>th</sup> call) not to revive the Protocols group.

Another member of the audience said that there is not much interaction/review time if there are major changes to the Manual. Alex Thrower responded that OCRWM needs to review the questions in the letter from the SRGs and get back to them. He added that the Security Practices section of the Manual was written before ‘9/11’ and will probably need a complete rewrite.

On other matters, the attendees said that oversight is needed to prevent the situation last year with Paducah from recurring. Ms. McNeil said that new EM management is coming up to speed to ensure shipment safety and is having biweekly telecoms.

## **Flagstaff Commodity Flow Survey**

*Bill Spurgeon, EM Office of Transportation*

On August 10-11, 2005, EM conducted a 24-hour commodity flow survey focusing on hazardous material shipments in Flagstaff, AZ. Participants included the Arizona Department of Transportation, the Flagstaff Fire Department, and DOE staff. Survey participants examined truck shipping manifests at a Flagstaff rest area. A report should be available in the next couple of weeks. The placard identification count revealed no Number 7 (radioactive) placards. A disparity was noted in the weight and number of shipments, which consisted primarily of bulk cargo, liquid by weight. By count, gasoline shipments were numerous; by Emergency Response Guidebook numbers, flammable liquids. In the future, origin and destination information will be included.

### **Questions and Comments from the Audience**

When asked if railroad information such as the truck survey information is available, Mr. Spurgeon answered “Yes, it could be obtained.” One audience member asked if other sections of the country would be covered, and Mr. Spurgeon said that Oklahoma, Arizona, and Wyoming have responded that they would be interested in participating in future studies. A member of the Western Interstate Energy Board (WIEB) expressed surprise that DOE would offer a service that should be a DOT activity. Mr. Spurgeon replied that the survey was a public service and part of TRANSCAER outreach. Another audience member said that the survey might send a subliminal message like “What are you worried about our shipments for – look at this other stuff.” Still another member asked about the future of the program and questioned why no radioactive shipments showed up in the survey. Mr. Spurgeon replied that it was a real-time survey and the Department staff who conducted it was “letting the chips fall where they may” and that DOE has a vested interest in seeing how the Department’s shipments fall into the overall scheme of things.

## **Day 2 – Plenary Sessions (September 21)**

### **Plenary I– Rail Testing and Technology**

*Moderated by Gary Lanthrum, OCRWM/ONT*

#### **OCRWM/ONT Rolling Stock**

*Gary Lanthrum, OCRWM/ONT*

Mr. Lanthrum discussed rolling stock design and acquisition, interface with railroads and utilities, and cask procurement.

OCRWM rolling stock development strategies are based on AAR Standard 2043 and operating standards compliance. No buffer car/escort requirements have yet been established. OCRWM is working toward approval to develop conceptual design work for a single car design based on the best of existing technology. In the past, security cars were converted cabooses, which proved to

be very uncomfortable for the escort staff. A new escort car design will be developed. A unique train will be designed to afford the ultimate in safety, security, and performance for DOE shipments to Yucca Mountain.

**Rolling Stock Strategy** — DOE has been meeting with rail car manufacturers and will need a fleet of about 140 cars to meet its spent fuel transportation needs. Feedback includes a statement that AAR S-2043 requires trains be tested as a whole and all cars should subsequently come from the same vendor. There is a 6-year window for getting to the actual construction of railcars.

**Performance Requirements Evaluation** — ONT has engaged the Transportation Technology Center, Inc., (TTCI) to provide preliminary evaluation of several standard and premium railcar truck designs. Both long and short cars are being considered.

**Custom Cask Car Development** — DOE will be buying U.S. Nuclear Regulatory Commission (NRC)-certified casks and would like to have a single cask car design. A skid that would minimize handling is also desired. DOE does not yet have the appropriation necessary for acquisition of railcars.

**Custom Buffer Car Development** — The purpose of a buffer car is to provide spacing between cask cars and escort cars. DOE wants to minimize exposure to crew members (one reason for deciding to use dedicated trains for the shipments). Buffer cars are flat cars with an option to carry a standard 20-foot container. They also carry spare parts and cask support equipment and may require additional weight or ballast.

**Custom Escort Car Development** — Ride quality differs in passenger car designs by different manufacturers. DOE is looking at passenger car experience and will add security requirements to the design of the escort car. The car is expected to be a bi-level design that provides operations and communications workspace, living and storage space, bunk rooms, bathrooms and a shower, kitchen and dining area, and a common lounge area. Systems for the car will include air conditioning, potable water and wastewater, storage, diesel generator, and electrical and lighting equipment.

**Standard Locomotive** — On-line real-time monitoring and braking systems will be important in the locomotive design. Each spent fuel train will use two locomotive units (expected to be 4,000 horsepower each) with electronically controlled pneumatic brake systems. A buy/lease analysis is planned by OCRWM.

**ONT's Rolling Stock Acquisition Plan** — ONT continues to develop a two-part procurement: conceptual design and final design, prototype and fabrication from a single vendor lead team. The plan is to purchase 120 cask cars, 60 buffer cars, and 30 escort cars. Production will be tied to repository waste throughput.

**Interface with Utilities** — DOE is experiencing an awkward interface with the utilities due to the numerous lawsuits against DOE. ONT plans to match rolling stock and casks with utility needs and capabilities, and plans to discuss preferences for shipping cask options with the utilities.

**Cask and Rolling Stock Interface** — Cask-to-cradle-to-car designs must be integrated. Efforts are underway to standardize the interface between the transfer skid and the cask cars.

**Transportation Cask Acquisition** — Thirty-percent of the material to be shipped can be covered by existing casks. DOE will be developing a conceptual design in the next year or so. Dual-purpose (storage and transport) casks do exist that meet requirements of 10 Code of Federal Regulations (CFR) Part 71 and Part 63 requirements.

**Summary** – Mr. Lanthrum wrapped up by saying that DOE does not have the rolling stock to meet S-2043 standards, but there is time to procure that stock if the money is available.

### **Questions and Comments from the Audience**

A member of the audience asked if the information from the utilities would be shared with the States. Mr. Lanthrum replied that some of the information could be proprietary. Another member said that most accidents are related to human factors and railbed conditions and asked what DOE is doing to make sure railbeds are safe. Mr. Lanthrum answered that the FRA is responsible for inspecting railbeds and an FRA representative said that FRA and the railroads share the responsibility. FRA will work with the railroad to inspect the tracks. He stated that DOE would own the track from Caliente to the repository at Yucca Mountain. He was then asked if track is ready now; and replied that spent fuel is being shipped now. On another note, Mr. Lanthrum made a clarification that electro-pneumatic brakes also provide part of the communication function for a train. Someone then asked if the casks would be capable of transporting canistered and bare fuel, to which DOE staff responded that DOE would have casks with both capabilities. Mr. Lanthrum said that the capability exists for canisterized fuel, but it is not currently part of the contract. Another individual asked how DOE is going to handle the fuel from Utah. Mr. Lanthrum responded that the Utah fuel is not part of the plan yet. The last question posed by the audience was if escort car and communications equipment would be interoperable with emergency responders. Mr. Lanthrum said yes, but there will be a security aspect that will not be interoperable.

### ***Testing at the Transportation Technology Center, Inc. (TTCI)***

*Rubin Peña, TTCI*

Mr. Peña provided an overview of testing activities at TTCI. TTCI is owned by AAR and has DOT/FRA for a landlord. The Center's core competencies are driven by the railroads and include safety, reliability, efficiency, and independent assessment. Basic capabilities include research, development and testing; rail security; emergency response training; and technology development. The facility features 48 miles of dedicated track and has the largest crash wall in the United States. The Center is looking into building a passenger car training facility and aboveground tunnel to test transit and freight vehicles. TTCI conducts tests to the worst-case scenario.

**Railcar Safety Criteria** — The goals of railcar safety standards are to provide an unbiased and consistent method to evaluate proposed designs, publish evaluation regimes and success criteria, shorten the time needed to introduce new products, and to improve fleet efficiency and reliability. These criteria are used in derailment studies, product development, and to focus on past problem areas. Freight railroad standards are established by the Equipment Engineering Committee, through which certification must be obtained.

Freight car safety standards now in effect include:

- Chapter XI, which covers vehicle dynamics and derailment and theoretical analyses and tests;
- M965 that applies to 100 ton trucks only;
- S286/M976 for cars that weigh between 268,000 and 286,000 pounds;
- Chapter VII for intermodal cars; and
- S-2043, safety performance specifications for trains carrying high-level radioactive waste (HLW).

M976 and S-2043 standard requirements are similar. S-2043 is more comprehensive than Chapter XI. All criteria are based on extensive test analyses.

S-2043 became effective in 2000 and requires three types of cars used in a train carrying HLW: locomotives, buffer cars, and cask cars. It also requires the use of electronically controlled pneumatic brakes, onboard monitoring of every car, crew onboard a dedicated train and a buffer car between the waste and people.

Once individual cars have been tested to standards, multi-car, unit train testing will be required.

There were no comments or questions from the audience.

## **Plenary II – Rail Operations and Safety Standards**

*Moderated by Jay Jones, OCRWM/ONT*

### ***Safety and Operational Standards***

*Bob Fronczak, Association of American Railroads (AAR)*

Mr. Fronczak stressed the importance of railroad safety and informed the audience that AAR safety briefings are conducted prior to the beginning of all meetings. He cited dramatically improved safety conditions for railroads which compare favorably with other industries since the benchmark year was established in 1980. The year of 1980 was established as the benchmark because of the passage of the Staggers Act which deregulated the railroad industry. Mr. Fronczak detailed areas of improvement, including grade crossings, train accidents, trespass fatalities, mainline train collisions, etc. He stated that human factors account for 48-percent of all railroad related accidents. The current trend indicates a flattening instead of continued improvement, and this has the industry concerned. Increased awareness and continuing safety training regimen are being given serious consideration within the industry. A railroad employee is currently in a safer working environment than a hotel, farm, or airline worker. He asserted that North American railroad working conditions compare favorably with railroad working environments in other countries.

Statistics were provided to the group indicating HazMat accidents have decreased significantly (90-percent since 1980), with only one percent of train accidents involving the release of a HazMat material. Improved technology and rolling stock equipment (redesigned rail axle and trucks, acoustic bearing wayside detectors, head shields and shelf couplers, thermal insulation on tank cars and thicker skid plates on the bottom of tank cars to protect valves) have greatly contributed to the worker and the general public's safety within the industry.

Mr. Fronczak informed the group that in the past the AAR has assisted in the safety training of over 20,000 emergency first responders. AAR coordinates this activity with the carriers in providing HazMat and safety information and training. Safety training and guidance encompasses: Crew Resource Management, the operation of Remote-Controlled Locomotives, locomotive simulator and interactive video training, continuing participation in Operation Lifesaver in conjunction with the rail carriers and various community stakeholders, and grade crossing improvements.

Since 1980, AAR has provided \$232 billion to upgrade existing track grade crossings and laid 5.7 million tons of new quarter-mile rail.

### **Questions and Comments from the Audience**

A DOE member of the audience inquired about the general financial condition of the rail carrier industry. Mr. Fronczak responded that the carriers are doing well since they recently have added fuel surcharges to their general contracts allowing for continuing fluctuations in diesel fuel prices. Union Pacific railroad is the single largest diesel fuel user in the USA.

Another questioner requested information on the miles of new rail track laid in 2005. Again, Union Pacific responded that 850 miles of replacement track were laid on their system in 2005.

### ***Train Operators' View of Rail Operations and Safety***

*Scott Palmer, Brotherhood of Locomotive Engineers and Trainmen*

Mr. Palmer's opening statement declared that the rail industry and its workers and the nuclear industry do not understand each other.

As background information to the audience, new hire training for Burlington Northern Santa Fe (BNSF) railroad incorporates a 15-week training program. When employees finish the training, pending an open-book examination on the railroad's operating rules and safety; employees are qualified to work as brakemen and switchmen. After 2-4 years of operating experience, they can qualify to enter the Locomotive Training Program. This training comprises 5 months of study involving the Book of Rules, simulator training, and territory qualifying real-time runs. Engineers are re-certified every three years, including vision and hearing tests and a background Department of Motor Vehicle (DMV) search for Driving Under the Influence (DUI) violations. Employees must attain a 90-percent test score with an instructor's test ride to remain a carrier qualified engineer.

SNF trains pose a unique problem to the train crews. Municipal or local first responders receive mandatory HazMat basic training to prepare them to help reduce exposure and provide dose rate background information. Train crews do not understand what the risks and the anti-contamination procedures are with SNF shipments. There are no recognized preferred rail routes. Issues remain as to who will receive HazMat training along the rail route, and who is called in cases involving an SNF train accident?

**Health and Safety Concerns** – Mr. Palmer stated that there are currently no Radiation Protection Training Programs in place within the rail industry and no training sessions are scheduled to be conducted in the foreseeable future. At issue is which Federal agency will make that recommendation, and which agency will enforce those regulations. Mr. Palmer remarked that

train crews will have a potential for higher dosage risk than the general public in exposure regarding SNF shipments. He suggested that dosimetry equipment be provided to monitor train crew members' health.

The current locomotive cab safety environment does not include air conditioning, does not protect crew members from small gunfire via bullet-proof windows, or provide an air-tight environment (smoke or air contaminates). Communication problems will have to be resolved prior to the SNF shipments. Cellular coverage is poor or non-existent over many isolated rail corridors. The Security Escort Force and the train crew will need to maintain constant contact while en route. New communication equipment will have to be implemented in the locomotive cab and rail Operations Centers prior to the start of SNF shipments. The ever-present Rail Fan will track and report (via the internet) all SNF train movements. Rail communication transmissions will be intercepted and reported by fan members. The issue of operating rail safety was addressed as the technology and configuration of main-line rail switch and lock keys has not been altered in decades. These keys can be purchased by the general public at various rail fan venues making it relatively easy to stop trains by throwing the main-line switches. Once a train has been stopped, it is difficult to protect the train from trespassers.

There were no questions or comments from the audience.

## ***Operations and Short Line Railroads – Interchange and Other Issues***

*Keith Borman, the American Short Line and Regional Railroad Association (ASLRRA)*

Mr. Borman provided the TEC group with the following background information: Short Lines are normally the originating carrier in the movement of rail shipments. Short Lines began as corporate or industry-owned railroads prior to the enactment of the Staggers Act in 1980. After 1980, some branch lines operated by the Class I carriers became “unprofitable” (by Class I standards) and, instead of being abandoned by those Class I railroads, the lines were either “sold” (substantially reduced price) or donated to a Short Line carrier.

Total Short Line trackage is 46,474 miles, which comprises one third of the available U.S. rail network. The average Short Line (545 railroads at Class II and III level) maintains 82 miles of rail track. The Short Line industry employs approximately 25,000 people and serves over 11,000 customers who employ another 1.2 million workers. Over 25-percent of all rail interchanges involve movements that involve the origination or delivery of Short Line shipments. Regarding HazMat shipments, the Short Lines handle over 50-percent of these movements.

The Short Lines do not have the financial “deep pockets” that the Class I carriers possess. Short Line industry capital expenditures were \$300 million, and maintenance expenditures were \$460 million in the previous year. But the Short Lines have to meet the same safety and track maintenance standards as the larger and more profitable Class I carriers. The average annual salary for a Short Line employee including benefits is \$54,000. The Class II and III carriers are every bit as safe as their larger Class I cousins with 1 rail related worker fatality in 2004.

A growing concern within the Short Line industry is the looming “286K” (where the loaded gross maximum car weight is 286,000 lbs.) initiative in rail car handling. Some of the larger Regional railroads and Short Line carriers are currently in compliance with the track regulations, some Class II's and III's will require 286,000 lb. shipments to move at restricted speeds, and some of

the Short Lines will not be able to accommodate shipments whose combined gross car and commodity weight exceed 286,000 lbs (SNF shipments will exceed those weight parameters).

**Funding Rail Infrastructure Upgrades** — Short Lines contract with the Class I's to provide employee training and qualification for new hiring candidates. I.R.C. 45G SHORT LINE TAX CREDIT, this three year statute, states that the Short Lines can use 50-percent of their cost for Track Infrastructure upgrades as a tax credit. Mr. Borman suggested to the group that they promote the extension of this tax statute to keep the Short Lines solvent in the foreseeable future. State grants and Federal grants go to the highways, not the rail carriers. He requested that DOE look into providing Federal grants to the Short Lines as an investment in those carriers's future.

### **Questions and Comments from the Audience**

A question was asked about the progress on the 286K initiative Mr. Borman reiterated that this is an ongoing and individual carrier effort and stated that the existing tax credit is assisting in the progress of Short Line's meeting the requirements to handle 286,000 lb. shipments.

## **Plenary III – Shipping Experience of Spent Fuel by Rail**

*Moderated by Kevin Blackwell, FRA*

### ***Progress Energy's Shipping Experience in North and South Carolina***

*Steve Edwards, Progress Energy*

Mr. Edwards' presentation was based on the experiences of Progress Energy with SNF transportation in and throughout the States of North and South Carolina. His focus was on the success factors related to Progress Energy's effective and secure SNF shipment record. During his introduction, Mr. Edwards noted the importance of public information management as an essential part of their shipment strategy.

Progress Energy has managed almost 200 shipments without measurable radiological exposures to train workers or members of the general public. Mr. Edwards attributed this success to: robust package design; nuclear safety focus; identified accountabilities; and quality maintenance. Progress Energy uses the same people to run the transportation program as those who work at its reactors. All shipping and cask related activities are conducted by Progress Energy. There are established clear roles and responsibilities and dedicated crews for all SNF activities. Most security aspects of SNF shipments cannot be discussed; however, Progress Energy believes that dedicated trains are necessary for security and safety. Mr. Edwards noted that express shipment information is held "close to the vest," until just in advance of shipment. Continuous remote monitoring of all shipments is expressly controlled by Progress Energy, rather than through organizations. Detailed procedures have been developed and are followed by all Progress Energy personnel associated with loading, unloading, shipment preparations, security, all equipment use, and routine and emergency transportation.

Progress Energy has a well defined shipment organization which includes escorts who accompany all shipments and possess knowledge and experience with radiological and mechanical aspects of the system. Three methods of communications are employed for all

shipments: GPS; radio; and phone. In addition, there are plant locators and responders at each site who can be dispatched to any shipment should any irregularity occur. Response Managers are assigned to each shipment to respond to any questions the public or others may have. Progress Energy has scenarios against which all crews are trained, and who have available to them continuously recorded current radiological and all hazards information. Progress Energy has held meetings with local communities through which shipments travel, and adheres to advance notification requirements of NRC, the States, and counties.

In sum, Mr. Edwards said that he believes on the commercial side, there is a fair amount of experience in shipping SNF, and there are a number of lessons that can be provided by Progress Energy. Generally, Mr. Edwards noted that Progress Energy abides by the philosophy that with every shipment there is an opportunity to do something better than in any previous shipments.

There were no questions or comments from the audience.

## ***A Perspective on DOE's Dedicated Train Decision***

*Joe Grumski, MHF Logistical Solutions*

The focus of Mr. Grumski's presentation was on the DOE decision to shipment nuclear waste via dedicated trains. The premise is that dedicated trains have a positive impact on safety, security, economics, rail logistics, and scheduling. Key benefits include:

- Safety — Lower risk to public, operational personnel, and equipment
- Security — Ability to change routing, better observation, significantly less time in public sector
- Lower Packaging and Equipment Costs — Less railcars, casks, and operation personnel
- Contracting — More simplified

Mr. Grumski suggested that a life-cycle implementation program is needed for transportation equipment and packaging systems utilizing the dedicated trains. He said that quantitative numbers are needed to support the justification to implement the policy. There were no questions following his presentation.

There were no questions or comments from the audience.

## ***Ohio Inspection Experiences***

*Brent Kiser, State Inspection Program, Public Utilities Commission of Ohio*

Mr. Kiser discussed his Ohio inspection experiences. Ohio uses TRANSCOM to track shipments, including, for example, those from Portsmouth. The view of the Public Utilities Commission is that it will inspect all radiological shipments throughout Ohio. There are 14 rail shipment inspectors and 25 HazMat specialists employed by the State of Ohio. As a HazMat specialist, one can stop and inspect a vehicle on the road side. HazMat specialists are in marked cars. After inspection, the HazMat specialists will note violations on inspection reports and will assess civil penalties for violations—revenues obtained from citations are distributed in part to the general fund and in part to training for first responders, not to augment inspection activities. Once a citation is issued, a windshield sticker is issued that prevents shippers from continuing to

transport until the violation is corrected. Among the types of information reviewed by inspectors are: driver qualifications; hours of service; maintenance; security; new entrant safety audits; etc

Mr. Kiser recommended that, given the importance of training, 180(c) grants should stipulate standard training, such as provided at TTCI, for all State and local inspectors. All shipments with radioactive materials traversing the State are inspected by Ohio inspectors. Mr. Kiser stated that, most commonly, the weak link identified in shipments results from defects in carrier equipment. Mr. Kiser noted that some highway shipments might more efficiently be handled by rail, though he mentioned rail equipment defects have also been revealed through inspections. No matter which modality, Mr. Kiser said that inspectors can and do stop shipments, having found defects even on new transporters.

Mr. Kiser related various experiences in surveys and inspections throughout the State of Ohio, especially related to Portsmouth, Fernald, and Mound. Mr. Kiser complimented Fernald for its management of shipments where inspectors are allowed on site to perform inspections. Mr. Kiser said that radioactive material shipments are generally safer than petrol and other shipments. Mr. Kiser stressed that Ohio is interested in all HazMat and radioactive material shipments and that they will *all* be inspected. If necessary, inspectors will travel out of State to ensure that once a shipment enters and travels through Ohio, it is safe.

As an enforcement agency, inspectors from Ohio demand to see security plans. Ohio issues Commercial Vehicle Safety Alliance (CVSA) stickers so that other States can recognize that Level I inspections have been conducted. Mr. Kiser suggested that rail may want to adopt this practice.

### **Questions and Comments from the Audience**

A TEC member asked how to encourage States to become more involved in inspections. Mr. Kiser said he could only address HazMat, and he finds that Federal, State, and local jurisdictions work well together in Ohio. Mr. Blackwell mentioned that due to funding cuts, there are limited activities, predominantly training, that can be supported by the Federal Rail Administration (FRA). In most cases, he said that Federal and State jurisdictions work well together. In hazardous materials, he noted there are only 25 FRA inspectors nationwide; in Ohio, there are only three inspectors that are trained to conduct FRA and hazardous materials shipments. Ohio is the second largest inspection regime behind California, which has the largest, in the United States.

A member asked for clarification whether the jurisdiction of FRA-certified inspectors was limited to areas within a State's lines. Mr. Blackwell deferred the specifics of the answer to Mr. Calhoun, who was not in attendance, and committed to reply at a later time. Mr. Kiser reiterated that Ohio inspectors will travel out of State when a shipment will be traversing Ohio, and they will issue citations as necessary.

### ***Union Pacific Rail Transportation***

*Rodger Dolson, Union Pacific Railroad*

Mr. Dolson introduced his presentation by providing a description of the Union Pacific Railroad and its current operating structure. He discussed the relevance of this structure to the role that Union Pacific (UP) will play in future shipments of SNF and HLW under the OCRWM program.

One significant point made by Mr. Dolson related to UP's steady and increasing demand for rail services, especially from El Paso to California, and to Mexico. As a result, UP has developed a velocity improvement strategy to free up train and track capacity. Mr. Dolson said this strategy was necessary because, among other factors, one mile per hour in speed frees up 5,000 rail cars, having a significant impact on UP resources. Other areas that UP is studying include a unified plan and the LEAN initiative to improve rail services. Also, UP has underway a capital improvement plan which is represented by the over \$2.8 billion investment in 2005, by which UP is relaying and improving 850 miles of rail and 4.4 million ties. In addition, UP is making terminal and siding improvements throughout the nation and investing in other equipment and leases to improve UP capacity. Mr. Dolson noted that in making these improvements UP is sending a message to its customers that UP is positioning itself well to handle increased demand for services, including SNF and HLW shipments.

Mr. Dolson described UP's record for handling hazardous materials, of which 15-percent represents Class 7 materials. In general, UP has normal handling, with manifest service, for hazardous materials. UP employs specific protocols for handling hazardous materials and security plans. In Omaha, UP manages a Response Management Control Center (RMCC) which coordinates with the National Incident Management System (NIMS). As an example of routine UP operations, Mr. Dolson described its nationwide chemical transportation safety management structure. This structure includes managers and special agents throughout the UP system.

Mr. Dolson recommended that routing of SNF and HLW shipments to UP be conducted through Kansas City, and through Wyoming to Yucca Mountain. Rather than passing through Nebraska where 150 trains pass a day, or along high-volume Southern routes, UP prefers that dedicated train SNF and HLW shipments take a northern route. Mr. Dolson noted that UP recommends that these shipments not travel through Colorado via the Moffat Tunnel.

As a common carrier, UP supports the shipper's choice to employ dedicated trains, and Mr. Dolson expressed support for the safety and security factors affecting the decision to use dedicated trains for SNF and HLW shipments. In summary, Mr. Dolson stated that UP is a safe option for handling SNF and HLW shipments based on its success and experience.

There were no questions or comments from the audience.

## **Plenary IV – U.S. Department of Energy Rail Shipments**

*Moderated by Ella McNeil, EM/OT*

### ***FRR SNF Rail Shipment to Idaho***

*Mark Arenaz, DOE/ID*

Mr. Arenaz provided some insight from the first shipment of foreign research reactor fuel (FRR) spent nuclear fuel (SNF) that originated in South Korea and was transported by ship to the Naval Weapons Station-Concord in California. The SNF was then shipped by dedicated train to the Idaho National Laboratory (INL) site. The shipment took place in 1998 and involved 3 NAC-LWT casks placed in ISO containers; 2 locomotives; 4 rail cars; and 2 cabooses. No additional FRR SNF rail shipments have been made from the west coast.

The Operational Plan was a key document in the success of this shipment. It identified roles and responsibilities for personnel, detailed instructions and timelines, and other important activities related to the transport of the SNF. A total of 69 meetings were held with corridor states: CA, UT, NV, and ID.

**Lessons Learned** — There was minimal impact from this shipment. Public awareness benefited from a public education trailer with dummy fuel rods and other information. Some difficulties were experienced with TRANSCOM reception. The shipment took about 34 hours. Areas of improvement included: more support of implementation of the Institutional Plan is needed from DOE HQ. It was unclear who had the decision-making lead (HQ or the Field). There were stakeholder misconceptions due to the title of the program and a redundancy related to notification timing.

### **Questions and Comments from the Audience**

One audience member commented that if DOE had not gone the extra mile in CA regarding public contact there could have been some problems. Another commenter said that Yucca Mountain shipments will require DOE to do things they don't think they have to do. For the Concord shipment, DOE went beyond what was required. For example, Rick Fawcett brought the Pyramid Lake Paiute Tribe into the process. Yet another commenter said that the shipping campaign went well. If the planning and institutional training had not been done so well, the "snafus" could have proven fatal. Someone asked how redundancy in the monitoring of radiation can be avoided or reduced? Mr. Arenaz answered that trust plays a big role. Someone else mentioned the excellent cooperation between DOE and the States and locals. The Western Governors' Association (WGA) was involved from the beginning and that smoothed the waters for States in dealing with the Department. DOE did a good job in providing radiological impact data and conducting institutional relations activities, in a shipment involving National Security implications.

### ***Fernald Closure Project Rail Status***

*Dave Lojek, DOE/Fernald*

Fernald is located 18 miles northwest of Cincinnati, OH. It was a uranium foundry that ended operations in 1989 and was decommissioned as a Superfund site. Uranium and thorium are the major concerns. The first rail shipment took place in 1999 (54 railcars) following a 4-year planning process. To date, 158 unit trains have shipped, including over 8,000 railcars and a total of over 1 million tons of waste.

The Waste Pit Project (low-level waste, LLW) involved 100 million tons of soil-like waste in 6 waste pits that was sent to Envirocare for disposal.

The Silos Project is 80-percent complete. Truck shipments of thorium residue are now being bagged into Sealand containers and shipped to Envirocare.

Approximately 100,000 tons of soil materials remain to be shipped out by train; another year's worth of rail shipments to Envirocare. More than 2 billion ton miles of shipments (.75 million train miles) have been made without incident. The railcars are sealed with polyurethane lines. There are 250 railcars in service; DOE owned 190 of those. Hard fiberglass covers are placed on each railcar after the waste is packaged in 6-mil plastic baggies, loaded, and staked down.

An exemption has been filed with DOT to allow operations to ship Low Specific Activity (LSA-2) levels of contamination.

There were no questions or comments from the audience.

## ***Fernald Closure Project – Rail Operations Overview***

*Jeff Rowe, Fluor Fernald, Inc.*

Training is the key to safety. People are retrained every year. The shipments from Fernald use 110-ton gondola cars.

Lessons Learned from the shipments include:

- Diligence
- Inspections
- Contact with railroads (railroad notifications: 2 weeks, 48 hours, and 24-hour confirmation of shipments)
- Contact with disposal sites, advance notification

Inspection of railcars is very important for finding damage such as clamp failure and defective casting on bolsters. Rail inspections are key to identifying locations of heat kinks in the rails.

### **Questions and Comments from the Audience**

Mr. Rowe was asked how standing water could be avoided in the liners. He replied that the lids/covers stay on the cars.

## ***West Valley SNF Shipment***

*John Chamberlain, West Valley Nuclear Services Company*

This shipment was successfully completed in 4 days (July 13-17, 2003). DOE selected the 2,300-mile-long-route for a dedicated train comprised of 2 locomotives, 2 cask cars, 3 buffer cars, and 1 passenger car. The waste was shipping in NRC-licensed shipping casks. Planning and conduct of the shipment were in accordance with the DOE Radioactive Material Transportation Practices Manual (460.2-1). DOE-owned commercial fuel (85 boiling water reactor assemblies and 40 pressurized water reactor assemblies) were shipped from West Valley in western New York State to Idaho. Stakeholder involvement included 2 Tribes, 11 States, 4 railroads, and 5 FRA regions.

The Transportation Plan included emergency preparedness; each of the four railroads provided an emergency plan. Train-the-trainer sessions were conducted for Tribes and States along the route. Communications, tracking, security, preshipment and enroute radiological inspections were all coordinated with corridor Tribes and States.

Due to security implications, no press releases were prepared. The media and the public learned of the shipment through local emergency responder preparations.

There were no significant negative results. The press was overwhelmingly neutral to positive about the shipments. Electronic information was key: three fact sheets were developed and distributed with route maps drawn by State.

The shipment was tracked by TRANSCOM (shipping, tracking and communications system).

There were no comments or questions from the audience on this presentation.

## **Topic Group Updates**

*Moderated by Judith Holm, OCRWM/ONT*

### **180(c) Topic Group**

*Corinne Macaluso, OCRWM/ONT*

Ms. Macaluso started with a brief history of the topic group. The work for this topic group began in July 2004, and the group has met on a monthly basis since that time. Membership includes various individuals and representatives from DOE's Office of National Transportation, State Regional Groups, Oneida Nation, Umatilla Tribe, International Association of Emergency Managers, Illinois Fire Chiefs' Association, National Association of Counties, and American College of Emergency Physicians. The purpose of this topic group is to provide stakeholder input into Department of Energy's (DOE) development of policy and procedures, grant application process and package, and pilot program (which has not yet begun).

The goals of this topic group include:

- Identifying and developing issues associated with Section 180(c) policy development
- Discussing each implementation issue, options and considerations
- Developing issue papers on specific implementation issues with recommendations to the Office of Civilian Radioactive Waste Management (OCRWM)

Issue papers were a tool to help the members capture conversations and frame opinions.

The outcome of these activities by the topic group helped identify twelve issues and as a result twelve issue papers were written to reflect these discussions. From these twelve issues, the topic group was able to reach consensus on nine issues.

The nine consensus issues include:

- Proposed policy statement
- Funding distribution
- Timing and eligibility
- Allowable activities
- Pass-through of funds
- Definition of public safety official to include hospital personnel
- Contingency routing
- Rulemaking
- Matching funds

There were three non-consensus issues concerning funding allocation, state fees and funding operational activities. DOE has not announced a position on these issues at this time.

Another outcome of the topic group's activities is the grant application package. Work continues on this outcome to further refine the program goals, merit review criteria and guidance documents for the grant application package.

The next steps for this topic group are to discuss the grant application package in more detail at the topic group working session on September 22, 2005. Draft Federal Register Notices are entering the DOE concurrence process with publication to be scheduled for December 2005. Until the Draft Federal Register Notices are published, the Section 180(c) topic Group will go on a hiatus and resume after the Federal Register Notices publication. The final Federal Register Notices are scheduled for publication in the fall of 2006. The pilot program is scheduled for 2007.

### **Question and Answer Session**

A member asked if the 180(c) issue papers are available to the public at this point. Ms. Macaluso responded that there should be no reason why the issue papers could not be available for the public, but she would have to check to see where the issue papers could be posted.

### ***Rail Topic Group***

*Jay Jones, OCRWM/ONT*

Mr. Jones provided a brief summary of the topic group's activities from the last TEC meeting. Over the past year, the topic group has recommended and requested that the Office of National Transportation wait for the State Regional Groups (SRGs) to submit individual routing recommendations.

Other recommendations from the topic group include:

- Identify the need for Federal Railroad Administration (FRA) and the Association of American Railroads (AAR) to provide input into the process
- Determine the appropriate number for a suite of routes
- Integrate SRGs input on routing criteria

On August 30, 2005, Mr. Jones and various other representatives from OCRWM held a meeting with the railroad industry to discuss the OCRWM rail routing process. The purpose of the meeting was to provide an overview of the OCRWM Program and transportation planning and define and discuss information needs to develop an effective routing process. The meeting was productive allowing discussion among participants on various routing issues. It is anticipated that there will be future meetings with DOE, SRGs and railroad companies.

Recently, the topic group has reached a consensus on four activities the topic group will be pursuing in greater detail. These four activities are: inspections (States and Tribes); escorts; tracking and radiation monitoring; and rail planning process, protocols, and guidance. Additional activities are being considered.

The next steps for the Rail Topic group are:

- Prioritize the order for addressing the activities
- Develop, revise and finalize the task plan for the Rail Topic Group
- Receive input from SRGs on their specific rail routing analysis exercise at upcoming fall meetings

### **Question and Answer Session**

A member asked if barging will be included. Mr. Jones replied that the CSG/NE and SSEB SRGs are looking at that particular mode of transportation. It is still an option in the EIS, but ONT is not actively conducting any studies pertaining to barging.

A comment was made that the escort issue is not clear. There are operational components with the issue of escorts -- how are they addressed? Mr. Jones said that the issue of escorts will be deferred to the Security Topic Group.

A member commented that there could be an access issue since there are 24 reactor sites. Truck and barge may need to be used. The comment was noted. For sites that don't have rail route access, utilities will be able to specify the type of cask to be delivered to them.

A member asked for clarification on "suite of routes" versus "preferred routes." Mr. Jones replied that DOE is identifying a "suite of routes." The SRGs will identify their regional routes. A member suggested that the term "optimum routes" be used in place of "preferred routes."

### ***Security Topic Group***

*Alex Thrower, OCRWM/ONT*

Mr. Thrower has just recently been asked to lead this topic group. Previously, the topic group has concentrated on best practices. Now the topic group will begin to focus its attention on developing the process into a security plan.

With regard to information security, the topic group has identified several tasks:

- Assemble lessons learned from DOE nuclear waste shipments pertaining to protocols and procedures adopted on information sharing and graded information protection strategies. Include lessons learned from industry.
- Obtain experiences on training from State, Tribal and local representatives for handling sensitive information, especially on command and control.
- Develop a matrix identifying State, Tribal and local government authorities and human resources available for security consideration, jurisdictional interfaces, and roles.

With regard to operations security, the topic group has identified the following tasks:

- Examine security practices of railroad, truck and barge operators and determine how to apply them to Federal, State, Tribal or local nuclear waste shipping practices
- Document State, Tribal and local capabilities, human resources, laws, and roles and responsibilities on shipment security
- Evaluate Rail Topic Group recommendations related to Federal or State inspections and security of rail shipments, and identify inspector and security escort roles

- Review and comment on security “protocol” in DOE Practices Manual

There were no questions on this presentation.

## ***Tribal Topic Group***

*Jay Jones, OCRWM/ONT*

Mr. Jones presented the major priorities and activities of the Tribal Topic Group. The 2005 Tribal program priorities were:

- Initiate consultation with Native American Tribes along potential transportation corridors
- Work with Tribes, in addition to States and stakeholders, to develop the transportation system

Some of the Tribal topics to be included:

Approaches for engaging Tribes along potential transportation routes

- Distribution and allocation methods for providing technical assistance and funds for emergency response training
- Routing methodology and route identification

Several meetings and conference calls have been held with the Tribal Topic Group. In April 2005, a meeting was held that provided an overview of the transportation program. Financial and technical assistance implementation was discussed. OCRWM has distributed notification letters to 39 tribes that have reservations on or near potential routes to Yucca Mountain. On August 24, 2005 a teleconference was held to welcome new members to the Tribal Topic Group. The next teleconference will be in the fall of 2005.

Some of the Tribal Topic Group recommendation from the Spring 2005 TEC meeting included:

In the area of outreach:

- Inform Tribes before decisions are made
- Explore regional/national meetings for 39 Tribes
- Develop a Tribal outreach strategy
- Solicit greater participation of Tribes in the Topic Group

In the area of funding:

- Develop Assessment Plan for Tribal priorities for funding
- Create a simple application process
- Appoint Tribal representatives to application review board

The next steps for this topic group will be expanding DOE’s interactions with Tribes along potential transportation routes. Some of the approaches that could be taken could include:

- Evaluate existing Federal working relationships with Tribes
- Hold discussions and/or meetings to explore Tribal government preferences of what and how they want to be involved
- Develop a national and build on the current Nevada approach to consultation processes and day-to-day working relationships
- Address Tribal governments’ concerns

## **Question and Answer Session**

A member asked how many responses have been received from the initial letter. Mr. Jones replied that not many responses have been received. As part of the follow-up to the letter, DOE re-faxed letters and called Tribes to confirm receipt.

A suggestion was made that DOE go in person to these Tribes and find out who the correct point of contact should be for the Tribe. Mr. Jones said that DOE is planning on more one-on-one consultations.

## **Summary, Action Items, Next TEC, Wrap Up**

*Judith Holm, OCRWM/ONT*

Judith Holm concluded the meeting by announcing that the next TEC meeting would tentatively be scheduled for early March 2006 in the Washington, DC area. The meeting would have a Topic Group focus with only the Topic Groups meeting and there would be no plenary sessions. Judith announced that there were no action items since the Topic Groups were meeting the following day and would be working on their next steps forward as Topic Groups. Judith thanked the participants for coming and looked forward to seeing everyone at the next TEC meeting.

## **Summary of Evaluations**

A total of 49 evaluation forms were received (38 percent of the participants). The overall rating for the September 2005 TEC meeting was “good.” The majority of the agenda sessions were closely ranked between “Very Useful” to “Somewhat Useful.” However, the overall rating of the Topic Group Updates was “Somewhat Useful,” 22 percent rated them as “Not Useful.” In response to the question on what they liked about the meeting, over 30 percent of the respondents liked the TTCI Tour and remarked that it was “Very Useful.” Also, Scot Palmer’s presentation about the Brotherhood of Railroad Engineers & Trainmen was mentioned as “interesting,” “valuable,” and “compelling” by several respondents. Overall, the group liked the emphasis on rail. In answer to what they disliked about the meeting, respondents commented several presentations were “dog and pony” shows that did not belong at TEC, presentations did not offer in-depth or new information, and the program reviews were redundant. Evaluations also mentioned that no action items were generated in 2 days.

Suggestions for emerging issues included Private Fuel Storage activities concerning DOE and States, communications between Federal, State, Tribal, and local responders to the communities through which spent nuclear fuel trains will pass through, the dispute between Utah and Yucca Mountain, timelines for waste deposits and project startup, scheduling and budgets, industry and public concerns, and routing and inspections.

The respondents suggested several areas for TEC to focus on next including specific technical information about the railroads regarding transportation safety and security for shipments, revision of the *Transportation Manual*, rail routing (i.e., having rail representatives participate in Q&A sessions); lessons learned from large scale disaster responses – how systems are being improved after significant rail accidents; hurricane Katrina; accident and security technology demonstrations; interaction with local governments, city councils, mayors, county

commissioners, emergency management technicians, police, etc.; make “working group” concept a priority again, clarify funding for States and Tribes, and more Tribal involvement.

Overall, the pre-meeting announcements, registrations and information worked well for the respondents. Suggestions for improvement were to have the agenda distributed earlier, post TEC activities and updates on the TEC website, and provide better communication regarding the topic group sessions. Although most respondents were generally satisfied with the location, and it was understood the venue was selected because of the TTCI tour, preference would be to locate meetings closer to a major airport, locate guest rooms within walking distance of the meeting rooms, and to have Government per diem for lodging.