

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

ATOMIC SAFETY AND LICENSING BOARDS

Before Administrative Judges:

BOARD CAB-01
ASLBP No. 09-876-HLW
William J. Froehlich, Chairman
Thomas S. Moore
Richard E. Wardwell

BOARD CAB-02
ASLBP No. 09-877-HLW
Michael M. Gibson, Chairman
Lawrence G. McDade
Nicholas G. Trikourous

BOARD CAB-03
ASLBP No. 09-878-HLW
Paul S. Ryerson, Chairman
Michael C. Farrar
Mark O. Barnett

In the Matter of:

U.S. DEPARTMENT OF ENERGY

(High Level Waste Repository)

Docket No. 63-001-HLW

February 24, 2009

**REPLY OF CLARK COUNTY, NEVADA
TO THE ANSWERS OF
THE U.S. DEPARTMENT OF ENERGY
AND
THE NUCLEAR REGULATORY COMMISSION STAFF**

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TABLE OF CONTENTS

I.	EXECUTIVE SUMMARY.....	1
II.	REPLY TO ANSWERS OF DOE AND NRC STAFF.....	3
A.	The DOE’s Assertions That Clark County Is Not in LSN Compliance Are Baseless.....	3
	1. Clark County’s LSN Certification and Monthly LSN Supplements...	4
	2. The DOE Misreads and Misapplies the Commission’s LSN Compliance Requirements.....	4
	a. The DOE would impose a pleading requirement that does not exist.....	4
	b. The DOE construes “all documentary material” inconsistently with the APAPO Order’s direction.....	7
	(i) Expert related documents.....	10
	(ii) Email.....	12
	(iii) Non-supporting documents.....	13
	3. The DOE selectively targeted LSN compliance challenges.....	14
B.	Applicable Standards for admission	14
	1. Brief statement.....	15
	2. Basis for contention.....	16
	3. Scope.....	16
	4. Materiality.....	16
	5. Statement of facts or expert opinion.....	17
	6. Genuine issue of material fact or law.....	17
C.	Both the DOE and the NRC Staff improperly rely upon general arguments..	18
	1. The DOE and the NRC Staff’s general arguments fail to comply with the APAPO Board’s Order.....	18
	2. The DOE’s generic claim of a “heightened burden” is baseless.....	19
	3. The DOE confuses the standard for admission of contentions with the higher standard applicable to summary judgment.	20
	a. The DOE overstates the “materiality” standard required for contention admission.....	21
	b. The DOE and the NRC Staff’s generic and baseless objection to the form of expert affidavits.....	22

TABLE OF CONTENTS

c. The DOE improperly treats this stage of the proceeding as a summary disposition.....	23
D. The DOE and NRC Staff’s Challenges to Clark County’s Contentions are Baseless.....	24
CLK-SAFETY-001 - The DOE’s Inadequate Treatment of Uncertainty	
Reply to DOE.....	25
Reply to NRC.....	38
CLK-SAFETY-002 - The DOE’s Failure to Analyze Missile Testing	
Reply to DOE	40
Reply to NRC.....	44
CLK-SAFETY-003 - The DOE Miscalculates Basaltic Magma Melting Depth	
Reply to DOE.....	46
Reply to NRC.....	51
CLK-SAFETY-004 - The DOE Ignores the Time Span of Basaltic Volcanism	
Reply to DOE.....	53
Reply to NRC.....	58
CLK-SAFETY-005 - The DOE Improperly Focuses on Upper Crustal Extension Patterns	
Reply to DOE.....	60
Reply to NRC	64
CLK-SAFETY-006 - The DOE Improperly Excludes the Death Valley Volcanic Field and Greenwater Range from Volcanism Calculations	
Reply to DOE	65
Reply to NRC	71
CLK-SAFETY-007 - The DOE Improperly Estimates Igneous Event Probability for 10,000 Years and 1,000,000 Years	
Reply to DOE	73
Reply to NRC	77
CLK-SAFETY-008 - The DOE Ignores 11-Million Year Volcanism Data and Instead Relies on Only 5-Million Year Volcanism Data	

TABLE OF CONTENTS

Reply to DOE	79
Reply to NRC	82
CLK-SAFETY-009 - The DOE Fails to Consider Alternative Igneous Event Conceptual Models	
Reply to DOE	84
Reply to NRC	88
CLK-SAFETY-010 - The DOE Ignores Igneous Event Data Evaluated Since 1996 in the Total System Performance Analysis	
Reply to DOE	90
Reply to NRC	93
CLK-SAFETY-011 - The DOE Lacks Sufficient Geophysical Data to Support Its Volcanic Model	
Reply to DOE	95
Reply to NRC	100
CLK-SAFETY-012 - The DOE's Prior Institutional Failures Render It Unfit to be Licensee.	
Reply to DOE	101
Reply to NRC	105
CLK-NEPA-001 - The DOE Ignores Impacts on Emergency Management and Public Safety	
Reply to DOE	107
Reply to NRC	116
CLK-NEPA-002 - The DOE Fails to Analyze Known and Feasible Rail Corridor Alternatives	
Reply to DOE	117
Reply to NRC	120
CLK-NEPA-003 - The DOE Ignores Socio-Economic Impacts	
Reply to DOE	122
Reply to NRC	127
III. CONCLUSIONS.....	129

TABLE OF CONTENTS

CERTIFICATE OF SERVICE..... 130

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Pursuant to 10 C.F.R. § 2.309(h)(2) and the notice published by the Nuclear Regulatory Commission ("NRC" or "Commission") at 73 Fed. Reg. 205 (October 22, 2008), Clark County, Nevada ("Clark County") respectfully submits its Reply to the U.S. Department of Energy's ("the DOE") and the Nuclear Regulatory Commission Staff's ("the NRC Staff") Answers to Clark County's Request for Hearing, Petition to Intervene and Filing of Contentions, filed in the captioned proceeding. No other parties filed an Answer to Clark County's Petition to Intervene.

I. EXECUTIVE SUMMARY

Clark County proffered fifteen narrowly-crafted contentions: twelve related to safety and three related to the National Environmental Protection Act (NEPA). The DOE and the NRC Staff filed Answers to Clark County's Petition. Neither the DOE nor the NRC Staff challenge Clark County's standing, but each raise objections to each contention that Clark County asserted. This is consistent with the DOE's remarkable position that no party has raised a single valid contention, and the NRC Staff's almost identical view. The DOE further claims that Clark County is not in substantial compliance with the NRC's Licensing Support Network (LSN) requirements, even though there is no factual basis for this attack.

Contrary to the Board's specific instructions, both Answers rely largely on generalized arguments that fail to challenge Clark County's contentions with any specificity and on baseless claims of non-compliance with the regulatory requirements for intervention. In evaluating both the DOE and the NRC Staff's Answers to all potential parties, it becomes clear that the DOE would have the Board conclude that no person should be permitted to participate in the proceeding because no person has raised even one valid issue relative to the DOE's LA. Similarly, the NRC Staff would preclude all parties except the State of Nevada, the situs state, and Nye County, Nevada, the situs county, and would admit only 21 out of 319 contentions proffered in total. Many of the objections advanced by the DOE and the NRC staff to Clark County's contentions are disagreements on the merits of Clark County's claims, but such disagreements are not grounds for dismissing a proposed contention at the contention admissibility stage.

Clark County is an Affected Unit of Local Government (AULG) that in fact will be directly affected by the outcome of this proceeding. It carefully and narrowly crafted only fifteen contentions, each of which is intended to address matters of particular significance to Clark County and its citizens, in the interest of public safety. For the reasons herein, the DOE and the NRC Staff's objections fail to defeat Clark County's contentions, all of which are proper and should be admitted for hearing.

II. REPLY

A. The DOE's Assertions That Clark County Is Not In LSN Compliance Are Baseless.

The DOE first claims that the Board should deny Clark County party status because Clark County neither pled nor demonstrated LSN compliance in its Petition to Intervene in the proceeding.¹ The DOE, citing to Section 10 C.F.R. § 2.1012(b)(1), claims that an intervenor must affirmatively plead and demonstrate compliance with the LSN regulations in the initial pleading to the proceeding. The DOE misreads and misapplies the plain language of the regulation, and then asks the Board to apply a standard that simply does not exist. Clark County is in compliance, and the DOE is aware of Clark County's certification of LSN Compliance, and of its monthly submissions, as more fully explained below.

¹ See Answer of the U.S. Department of Energy to Clark County, Nevada's Request for Hearing, Petition to Intervene and Filing of Contentions" (the DOE's Answer) filed Jan. 15, 2009, at 4.

1. Clark County's LSN Certification and Monthly LSN Supplements

Clark County filed its LSN Certification with the PAPO Board on January 16, 2008. The DOE responded with a motion to strike Clark County's certification claiming, *inter alia*, that "Clark County's limited production demonstrates its non-compliance with the applicable regulations."² The DOE claimed that Clark County's document collection as a whole was facially invalid due to the small number of documents produced, (44 documents), and apparent lack of expert related documents and emails.³ The DOE withdrew its motion after Clark County had, among other things, assured the DOE that it had already and would continue to make available on the LSN all of its Documentary Material.

As of August 2008, the DOE was aware of, and even agreed, that Clark County's LSN certification and document preservation procedures were proper.⁴ Since August of 2008, Clark County has continued posting monthly supplements to the LSN, in furtherance of Clark County's LSN Certification and Training and Compliance Manual.

2. The DOE Misreads and Misapplies the Commission's LSN Compliance Requirements

a. The DOE would impose a pleading requirement that does not exist

² The Department of Energy's Motion to Strike January 16, 2008 Certification of Clark County, ASLBP No. 04-829-01-PAPO, at 10 (filed Jan. 28, 2008).

³ *See id.* at 10-11. Clark County's volume of documents admittedly pales in comparison to that of the DOE, and understandably so. The DOE is the applicant; whereas a review of the contentions proffered by Clark County demonstrates that its focus in this proceeding is narrow.

⁴ Jointly Proposed Order on Department of Energy's Motion to Strike January 16, 2008 Certification of Clark County, at p.1, before the PAPO Board, August 13, 2008; *see also* PAPO Board Order, August 26, 2008 (resolving DOE's Motion).

The DOE alleges that, “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.”⁵ Section 2.1012(b) pertains to LSN compliance and provides, in relevant part,

[a] person, including a potential party given access to the Licensing Support Network, may not be granted party status under 10 CFR 2.309, or status as an interested governmental participant under 10 CFR 2.315, if the petitioner cannot demonstrate substantial and timely compliance with the requirements in 10 CFR 2.1003 at the time of the request for participation in the high-level waste proceeding.

The DOE misconstrues the regulation and seeks to improperly expand the scope of regulation in two respects. First, it would improperly expand the regulation to “require” the potential party to plead and demonstrate compliance in its Petition to Intervene, disregarding the fact that potential parties are separately required to obtain LSN certification and to provide monthly supplements and certifications thereafter. Second, it would improperly expand the regulation to result in an automatic denial of party status if the potential party fails to so plead or to so demonstrate in its Petition to Intervene, even if the potential party is in compliance.

The regulation states in relevant part that “a potential party...*may* not be granted party status...if it *cannot* demonstrate substantial and timely compliance...at the time it requests participation.”⁶ Clearly, the regulation requires the potential party to be in compliance with the LSN obligations, and it requires a petitioner that has access to the LSN *to be prepared* to demonstrate its compliance at the time of the request for

⁵ DOE Answer, at 2.

⁶ 10 C.F.R. § 2.1012(b) (emphasis added).

participation. But contrary to the DOE's assertion, it does not state that the party "must" demonstrate compliance "in the Petition to Intervene."

If the Commission intended for a person seeking to intervene in the HLW proceeding to include in its Petition an affirmative statement of LSN compliance backed by a demonstration of that compliance, it would have expressly required such obligation in the rules promulgating Sections 2.2012(b)(1) or 2.309 of the regulations. There is no such requirement. Further, there is no such requirement in the PAPO Board Case Management Orders ("CMOs"). The APAPO Board's Memorandum and Order dated June 20, 2008 specifically articulates the elements a potential party must include in its Petition to Intervene. Neither that order, nor any of the CMOs, require the petitioner to plead or demonstrate LSN compliance in its initial petition.⁷

The DOE also misconstrues the potential consequence of failing to comply with the LSN obligations, claiming that a potential party's failure to demonstrate compliance in its initial petition "will" result in denial of party status. According to the DOE, even if the potential party is in compliance, its failure to so plead or demonstrate in its Petition would be fatal. The DOE is again overreaching. The plain language of the regulation reads, "a potential party *may* not be granted party status...*if* it *cannot* demonstrate substantial and timely compliance..."⁸ The use of the word "may" rather than "will" is significant and provides discretion to the Board in determining whether there exists good cause to grant (or deny) party status, if that potential party can (or cannot) demonstrate good cause for failing to substantially and timely comply with the LSN requirements.

⁷ See *U.S. Dep't of Energy* (High Level Waste Repository), LBP-08-10, 67 NRC 450 (June 20, 2008), slip op. at 4-9.

⁸ 10 C.F.R. § 2.1012(b) (emphasis added).

Here, however, the DOE's argument fails because Clark County is fully compliant with the LSN obligations, has previously demonstrated compliance and can continue to demonstrate compliance, satisfying the regulation.

b. The DOE construes “all documentary material” inconsistently with the APAPO Order’s direction

The DOE claims that Clark County failed to post “all documentary material” to the LSN, citing 10 C.F.R. § 2.1003(a), but mischaracterizes the applicable standard in at least two ways. First, the standard for production is a “good faith” standard, not the literal “all” documents standard on which the DOE premises its argument. Indeed, the Atomic Safety and Licensing Board (“ASLB”) has explained that “the regulatory requirement to ‘produce all documentary material’ is not to be read literally and should be read as embodying a good faith standard.”⁹ Clark County’s initial LSN Certification and its monthly supplements satisfy the good faith standards.

Second, the DOE erroneously applies the standard of production to Clark County much in the same way it was applied to the DOE in *U.S. Dep’t of Energy*.¹⁰ The good faith standard exists to ensure appropriate collection and review efforts by all entities.¹¹ However, the DOE fails to acknowledge that in the context of the DOE’s document production, “good faith involves at least several factors,” many of which are not applicable to a potential party such as Clark County.¹² The ASLB explained:

⁹ See *U.S. Dep’t of Energy* (High-Level Waste Repository: Pre-Application Matters), LBP-04-20, 60 NRC 300, 314 (2004).

¹⁰ See DOE Answer, at 5.

¹¹ See *U.S. Dep’t of Energy* (2004), *supra*, at 314 (“We agree that a good faith standard must be applied to each participant’s document production.”)

¹² *Id.*

The fact that the DOE has had over 15 years to comply and effectively controlled the timing of its document production are key factors in assessing whether it has met its good faith duty to produce all documents.

...

The purpose and importance of the DOE's obligation to produce all documents are also factors in applying the good faith standard. The Yucca Mountain licensing proceeding is of critical importance. As the applicant, the DOE bears the burden to support all points required for a license, and the DOE's certification initiates the entire licensing process. A full and fair 6-month document discovery period, where all of the DOE's documents are to be available to the potential parties and the public, is a necessary precondition to the development of well-articulated contentions and to the Commission's ability to meet the statutory mandate to issue a final decision within 3 years. These important objectives cannot be met unless we require the DOE to make every reasonable effort to make all of its documentary material available at the start.

...

Finally, the status and financial ability of the DOE must be part of the good faith analysis. The DOE is an arm of the U.S. government. It has the resources of the Nuclear Waste Fund at its disposal in assembling its documentary material and complying with 10 C.F.R. § 2.1003. *See* 42 U.S.C. § 10222(d). As the Applicant, the DOE has the most critical role and responsibility in initiating this proceeding properly.

...

In this context, the good faith standard applied to the DOE's duty to produce all documents is a rigorous one, requiring the DOE to make every reasonable effort to gather, to assess for privilege, and to produce all documentary material at the outset . . .¹³

As similarly explained by the ASLB in an Order denying the DOE's Motion to Strike the

State of Nevada's certification:

DOE is required to produce all documentary material necessary to support its burden of meeting all points of the license application. This Board has previously discussed the breadth of DOE's obligation and determined that, "DOE bears the burden to support all points required for a license, and DOE's certification initiates the entire licensing process." On the other hand, Nevada will be filing contentions in response to the license application. Its litigation position in this proceeding will not be determined until it formulates and files its contentions.¹⁴

¹³ *Id.* at 314-15.

¹⁴ *U.S. Dep't of Energy* (High Level Waste Repository) (Denying the Department of Energy's Motion to Strike), LBP-08-5. 67 NRC 450, slip op. at 14) (April 23, 2008) (*aff'd*, *U.S. Dep't of Energy* (High Level

Only once contentions are filed, the Panel explained:

will arise the need [for a potential party] to make publicly available any documentary material in its possession that either supports or counters such contentions as, upon review of the license application, [a potential party] deems warranted in light of its position in the proceeding reflected by its filed contentions.¹⁵

Thus, comparing the volume of Clark County’s production to that of the DOE serves no practical or material purpose. The DOE is, after all, the applicant. The DOE engaged in 15 years of data collection and studies; the DOE controlled the trigger date for production of documents and LSN certification; and the DOE controlled the date on which it ultimately filed the LA. As the ASLB Panel duly noted, the DOE holds “the most critical role” and responsibility when it comes to production. Moreover, the DOE is an arm of the United States Government with millions of dollars funding, and thousands of staff members.¹⁶

Clark County’s production is in line with its resources, its policies, and the narrow scope of its contentions. The fact that the DOE feigns surprise at the small number of documents does not render Clark County out of compliance of LSN requirements. Clark County has made a good faith effort to comply with the LSN requirements, and it has posted all documentary material warranted in light of its position in the proceeding reflected by its filed contentions. As next explained, the DOE’s efforts to “prove” that Clark County has documents that it should have posted but did not are factually incorrect and premised on nothing but the DOE’s own conjecture and presumptions.

Waste Repository: Pre-Application Matters), CLI-08-22, ___ NRC ___ (September 8, 2008) (quoting LBP-04-20, 60 NRC at 315).

¹⁵ *Id.* at slip op. 11.

¹⁶ See *U.S. Dep’t of Energy* (2004), *supra* n.9, at 313, 315 and 324.

(i) Expert related documents

The DOE points to the *curricula vitae* of Clark County’s experts, Drs. Alvin Mushkatel and Sheila Conway, claiming that Clark County failed to identify and make available all material that appears on each of their respective CVs. The DOE contends that “[a] clear example of Clark County’s failure to identify and make available documentary material appears from the *curriculum vitae* (CV) of the County’s expert Dr. Alvin Mushkatel.”¹⁷ It further contends that “Dr. Conway lists 8 other papers with the words “Clark County” in the title, but . . . none of them appears to be on the LSN.”¹⁸ The DOE fails to consider that just because “Clark County” appears in the title, does not mean that the paper was in fact prepared “by or on behalf of” Clark County.

Clark County is not required to post all material that appears on its experts’ CVs. The “documentary material” that must be posted on the LSN includes “any information upon which a party, potential party, or interested governmental participant intends to rely and/or to cite in support of its position,” including “all reports and studies, prepared by or on behalf of the potential party, interested governmental participant, or party.”¹⁹ Clark County’s experts are independent contractors and are not employees of Clark County. Thus, although there is an impressive list of material on the experts’ CVs, it does not mean that the material was prepared “by or on behalf” of Clark County. The reports or studies that were prepared by Drs. Conway and Mushkatel on behalf of Clark County have indeed been posted on the LSN timely, and were cited appropriately in Clark County’s Petition.

¹⁷ See DOE Answer at 5.

¹⁸ *Id.* at 7.

¹⁹ 10 C.F.R. § 2.1001.

In addition, as explained in this Panel’s prior Order denying the DOE’s Motion to Strike Nevada’s LSN certification, documents need not be posted to the LSN by a potential party until *after* its contentions are filed.²⁰ Thus, any documents attached to Clark County’s petition that were not on the LSN at the time of certification or filing of Clark County’s petition meets the requirement.

Further, in the DOE’s Motion to Strike Nevada’s certification, the DOE took aim at Nevada’s expert related documents and emails without providing a “solid evidentiary showing” that Nevada’s production was deficient.²¹ Reviewing the DOE’s motion, the Panel determined that the DOE had provided “little more than the suspicion of DOE counsel, based upon what is offered as circumstantial evidence.”²² The Panel issued an Order striking the DOE’s Motion on the grounds that DOE’s counsel’s suspicions offered as circumstantial evidence were “little more than rank speculation and conjecture” and an “impermissible fishing expedition.”²³

The DOE’s arguments here and in the next subsection are identical to the arguments it made in its Motion to Strike Nevada’s certification, where the Panel was provided with “little more than the suspicion of DOE counsel, based upon what is offered as circumstantial evidence.” As with the DOE’s challenge to Nevada’s certification, the

²⁰ *U.S. Dep’t of Energy* (April 23, 2008) *supra*, n. 14 (quoting LBP-04-20, 60 NRC at 315); *see also*, *U.S. Dep’t of Energy* (High Level Waste Repository: Pre-Application Matters), CLI-06-05, slip op. at 5 (2006) (“Further, since both Class 1 and Class 2 materials are subject to a ‘reliance’ criterion, it is not reasonable for any participant to be expected to anticipate all documents that will qualify as either Class 1 or Class 2 documentary material prior to the filing of contentions. In fact, the Commission’s stated expectation is that Class 1 and Class 2 documentary material will not be completely identified until *after* contentions are accepted”) (citing 69 Fed. Reg. at 32,843).

²¹ *Id.* at 3-4, 6 (quoting LBP-04-20, 60 NRC at 315).

²² *Id.* at 6-7.

²³ *Id.* at 7-9.

Panel here should find that these suspicions offered as circumstantial evidence are “little more than rank speculation and conjecture” and an “impermissible fishing expedition.”

(ii) Email

The DOE complains of the absence of any emails from Clark County on the LSN, presuming, without proof, that emails subject to LSN posting exist. Clark County does have measures in place to address the posting of email on the LSN, but it cannot post documents that do not exist. The absence of emails is a function of the proximity of the personnel at Clark County’s Nuclear Waste Oversight Program - they work in the same building and on the same floor. They simply discuss issues in person rather than via electronic mail. Consequently, the emails that the DOE presumes exist do not exist because substantive discussions relative to the HLW were not conducted in this manner. This very issue was addressed previously with the DOE.

The DOE also complains that Clark County’s non-production of internal memoranda indicate a failure to comply with LSN obligations.²⁴ For this proposition, the DOE cites to Dr. Mushkatel’s grants, arguing that “it seems certain that in this day and age that he did not spend the \$2 million dollars conferred on him by the County or produce the 15 monographs he has produced over the last 4 years without exchanging emails with his staff.”²⁵

The DOE misconstrues the facts. Grants for Dr. Mushkatel’s work from Clark County Nuclear Waste Oversight Board were not to him personally, but were to Urban Environmental Research; and such grants were not necessarily for the production of

²⁴ See DOE Answer at 9.

²⁵ *Id.* at 9 n.9.

documentation. The DOE's presumption is mere conjecture. Nor were many of the monographs produced by Dr. Mushkatel "by or on behalf of" Clark County. Further, Dr. Mushkatel and his staff are not Clark County employees. Thus, any emails exchanged between Dr. Mushkatel and his staff on projects not "by or on behalf of" Clark County need not be produced. Finally, like the employees of the Clark County Nuclear Waste Oversight Program office, Dr. Mushkatel's office does not use email in a substantive way that would require production on the LSN.²⁶

(iii) Non-supporting documents

Finally, the DOE complains that Clark County failed to mention in its Petition that it had conducted a review of non-supporting documents and that there was "no indication that such a review has been done."²⁷ The DOE cites to the relatively small number of documents posted to the LSN by Clark County (25 since July 2008) in support of this argument.²⁸ Clark County does not owe a duty at this stage to actively seek material that does not support its position;²⁹ nor does it owe a duty to identify for the DOE which of those documents it has posted that may or may not support Clark County's position. The duty to post non-supporting documents to the LSN applies to "information that is known to, and in the possession of, or developed by the party that is relevant to,

²⁶ Instead of e-mail, information is exchanged between Clark County and its experts via teleconference or face-to-face meetings. Clark County holds regular meetings with its consultants and staff to discuss issues.

²⁷ See DOE Answer at 8.

²⁸ See *id.* at 9.

²⁹ *U.S. Dep't of Energy* (High-Level Waste Repository: Pre-Application Matters), CLI-08-12, 67 NRC ____ (slip op. at 4) (June 17, 2008) ("§ 2.1003's reference to 'all documentary material (including circulated drafts but excluding preliminary drafts) generated by, or at the direction of, or acquired by' clearly 'conveys that possession or control of the documentary material is a pre-requisite to the duty to produce it.'" (citations omitted).

but does not support, that information or that party's position."³⁰ Clark County met this burden, and if there are any such documents, they exist on the LSN. The materials are there for the DOE to review and to determine whether they support or do not support Clark County's positions.

3. The DOE selectively targeted LSN compliance challenges

The DOE challenged only seven of the twelve potential parties that filed contentions.³¹ Of the five potential parties that the DOE did not challenge, at least two of those petitioners did not plead or demonstrate LSN compliance, as the DOE claims is required. Clark County has no reason to believe that those parties are not in LSN compliance, and takes no position on their respective compliance. Clark County only points out the DOE's subjectivity in applying its own extra-regulatory requirement.

B. Applicable Standards for Admission

The DOE and the NRC Staff each claim that Clark County's proposed contentions fail to meet the requirements for admission for one or more of the six parts that are required to be addressed under 10 C.F.R. § 2.309(f). However, both the DOE and the NRC Staff fail to adhere to the applicable standards for admission on each of the six parts and would require Clark County to either prove the contention before it is admitted or

³⁰ 10 C.F.R. § 2.1001.

³¹ The DOE challenged seven petitioners, including Caliente Hot Springs Resort, Clark County, Nevada, Inyo County, California, State of Nevada, Native Community Action Council, Timbisha Shoshone Yucca Mountain Oversight Program, Timbisha Shoshone Tribe. The DOE did not challenge five petitioners including, Nye County, Nevada, Eureka County, Nevada, Nevada Counties of Churchill, Esmeralda, Lander and Mineral (4NC), White Pine County, Nevada, the State of California or the NEI.

deny that Clark County has raised genuine issues of fact or law. However, all that is required for a contention to be acceptable for litigation is that it be specific and have a basis. Whether or not the contention is true is left to litigation on the merits in the licensing proceeding.³² The applicable standards are identified in this section and referenced in this Reply as necessary.

1. Brief statement

10 C.F.R. § 2.309(f)(1)(i) requires a petitioner to provide a specific statement of the issue of law or fact to be raised or controverted directed at demonstrating that one or more of the acceptance criteria in the combined license have not been, or will not be met, and that the specific operational consequences of nonconformance would be contrary to providing reasonable assurance of adequate protection of the public health and safety. The APAPO Board recognized that it was difficult to define what this means, but provided further guidance stating:

Potential parties shall also strive to frame narrow, single-issue contentions, notwithstanding that this may result in the filing of an increased number of contentions and some duplication in drafting. Although difficult to define, what this means is that, while at the same time placing other potential parties on notice of the claims they will be either supporting or opposing, 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. In addition, each contention that raises a legal issue or is a contention of omission shall so state.

Contentions raising purely legal issues may be easier to parse into single-issue contentions, and potential parties shall do so to the maximum extent

³² *Washington Public Power Systems* (WPPS Nuclear Project No. 2), ALAB-722, 17 NRC 546, 551 n. 5. (1983); *Vermont Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-869, 26 NRC 13, 23-24 (1987), *reconsid. denied on other grounds*, ALAB 876- 26 NRC 277 (1987); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), LBP-89-28, 30 NRC 271, 282 (1989), *aff'd on other grounds*, ALAB-940, 32 NRC 225 (1999)); *Arizona Public Service Co.* (Palo Verde Nuclear Generating Station, Units 1, 2 and 3)LBP-91-19, 33 NRC 397, 411 (1991), *appeal denied*, CLI-91-12, 34 NRC 149 (1991).

possible. Contentions that raise factual or mixed factual and legal issues, however, should also be framed as single-issue contentions. For example, a contention that identifies a single alleged error or omission that petitioner believes independently demonstrates that DOE has failed to meet one or more closely related regulatory requirements would be a single-issue contention. A contention can allege that more than one regulatory requirement is violated and still be a single-issue contention if it identifies only a single factual (or legal) rationale and the regulatory requirements are closely related. A contention that identifies a single set of facts, but alleges violations of more than one closely-related section of a single statute, would also be a single-issue contention. Conversely, a contention that identifies a single set of facts but alleges violations of more than one statute (e.g., Atomic Energy Act, Nuclear Waste Policy Act, or NEPA) generally would not be a single-issue contention.³³

2. Basis for contention

This item requires the petition to provide a statement explaining the basis for the contention. As the APAPO Board noted, “rarely should this require more than a sentence or two.”

3. Scope

The petition must show that the issue raised is within the scope of the proceeding. The scope of the proceeding is defined in the Commission’s initial hearing notice and order.³⁴

4. Materiality

This item requires the petitioner to show that the issue of fact or law is material to the findings the NRC must make to support the action that is involved in the proceeding. the APAPO Board provided further guidance on this item, stating that “this requires

³³ *U.S. Dept of Energy*, LBP-08-10, 67 NRC at 453.

³⁴ *Id.* at 455.

citation to a statute or regulation that, explicitly or implicitly, has not been satisfied by reason of the issue raised in the contention.”³⁵

5. Statement of facts or expert opinion

This item requires a petitioner to set forth the facts or expert opinion on which it intends to rely. Mere "notice pleading" is insufficient under these standards. A petitioner's issue will be ruled inadmissible if the petitioner "has offered no tangible information, no experts, no substantive affidavits," but instead only "bare assertions and speculation." However, the Commission's requirement for specificity and factual support is not intended to prevent intervention when material and concrete issues exist. If the application lacks necessary detail, a petitioner may meet its pleading burden by providing "plausible and adequately supported" claims that the data are either inaccurate or insufficient. "If the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief" would constitute sufficient information to show that a genuine dispute exists.”³⁶

6. Genuine issue of material fact or law

This item requires the petitioner to show that there exists a genuine dispute of material fact or law. Factual support necessary to show that a genuine dispute exists need not be in formal evidentiary form, nor be as strong as that necessary to withstand

³⁵ *Id.* at 450, 455.

³⁶ *Fansteel Inc.*, (Muskogee, Oklahoma, Site) CLI-03-13, 58 N.R.C. 195 (2003).

summary disposition motion. What is required is “a minimal showing that material facts are in dispute, thereby demonstrating that an ‘inquiry in depth’ is appropriate.”³⁷

C. Both the DOE and the NRC Staff improperly rely upon general arguments

1. The DOE and the NRC Staff’s general arguments fail to comply with the APAPO Board’s Order

The Advisory PAPO Board’s June 20, 2008 Memorandum and Order articulates the required elements for Petitions, Responses, Replies, and other expected proceedings before this Panel.³⁸ Therein, the Board explained:

Answers shall be limited to addressing specific, alleged deficiencies in petitions and particular contentions. . . . Nonspecific answers that provide only boiler-plate objection (e.g., “the contention fails to provide a sufficient supporting basis”) are not helpful and should be avoided.³⁹

The DOE’s Answer to Clark County’s 15 contentions spans 160 pages, arguing that not one of those contentions has merit and that all should be rejected, even at the contention stage.⁴⁰ A majority of the DOE’s Answer consists of boiler-plate objections that fail to address the specific facts and issues actually presented by Clark County’s contentions. The NRC Staff’s Answer is no different in this respect. The DOE’s and the NRC Staff’s failure to articulate with specificity its objections and its patent disregard for the Panel’s order wastes precious time and resources of both Clark County and the Board and is reason enough to reject the DOE’s and the NRC Staff’s efforts to keep Clark County’s contentions out of this proceeding.

³⁷ *Gulf States Utilities Co.* (River Bend Station, Unit 1), CLI-94-10, 40 NRC 43, 51 (1994).

³⁸ See *U.S. Dept of Energy, supra*, n. 7

³⁹ *Id.*

⁴⁰ See DOE Answer, generally.

However, Clark County must nevertheless address the DOE's and the NRC Staff's generic objections. Rather than repeating the same response to the boiler-plate arguments that the DOE and the NRC Staff essentially cut and pasted in their respective Answers to each of Clark County's contentions, Clark County dispenses with the arguments here, and in each contention refers to this section as appropriate.

2. The DOE's generic claim of a "heightened burden" is baseless

The DOE cut and pasted into the "background" section of its Answer to all but one⁴¹ of the Intervenor's the same boiler-plate argument that the Intervenor "must be held to a particularly heightened burden to proffer well-pled and adequately supported contentions."⁴² The DOE supported this allegation with only the argument that the DOE has made available more than 3.5 million documents on the LSN, beginning four years before LA submittal.⁴³

The DOE repeats this argument section of each of Clark County's contentions, but the deficiency complained of by the DOE does not explain why any of the specific

⁴¹ The DOE did not raise this argument in its Answer to the Caliente Hot Springs Petition to Intervene.

⁴² See DOE Answer to NYE Petition, at 6; the DOE's Answer to 4NC Petition, at 6; DOE Answer to CAL Petition, at 31; DOE Answer to INYO Petition, at 13; DOE Answer to NCA Petition, at 28; DOE Answer to NEI Petition, at p.31; DOE Answer to NEV Petition, at 34; DOE Answer to TOP Petition, at 29; DOE Answer to TIM Petition, at 36; DOE Answer to WHI Petition, at 6; DOE Answer to CLK Petition, at 14.

⁴³ See DOE Answer to NYE Petition, at pp.4-6; DOE Answer to 4NC Petition, at 4-6; DOE Answer to CAL Petition, at pp.29-31; DOE Answer to INYO Petition, at 11-13; DOE Answer to NCA Petition, at 26-28; DOE Answer to NEI Petition, at 29-31; DOE Answer to NEV Petition, at 29-34; DOE Answer to TOP Petition, at 27-29; DOE Answer to TIM Petition, at 34-36; DOE Answer to WHI Petition, at 4-6; DOE Answer to CLK Petition, at 11-14.

contentions fails to meet this so called “heightened burden.” Rather, the DOE simply launches this blanket objection towards all of Clark County’s contentions.⁴⁴

It should not go unnoticed that the DOE claims that, out of 319 total contentions proffered by 12 total parties, there is not a *single* contention that would meet the regulatory requirements of admission, even at the contention stage. Almost as disturbing is the fact that the NRC likewise opposes *all* but 4 contentions as proffered, and only 17 contentions in part.⁴⁵ Apparently the DOE and the NRC Staff believe that a license as complex, controversial, and important as this can be issued summarily without the need for examination and scrutiny, particularly by non-federal interests.

3. The DOE confuses the standard for admission of contentions with the higher standard applicable to summary judgment

The DOE turns the standard for admissible contentions on its head, relying on case citations taken out of context and without a full and honest review of the true standards for admissibility. The DOE’s contorted standard for admissibility probably explains why, in its view, not one of the 319 contentions filed by potential parties is worthy of admission. The DOE’s standard for admissibility, has, in effect turned the contention rules into a “fortress to deny intervention,” a purpose for which the rules were not intended.⁴⁶

⁴⁴ See DOE Answer, at 13-14 (“DOE’s extensive production substantially heightens Clark County’s ability-*and its corresponding obligation*--to proffer focused and adequately supported contentions in this proceeding”) (emphasis in original).

⁴⁵ The NRC staff took issue with, but allowed for admissibility purposes 21 contentions of the 319 filed. 18 from the State of Nevada and 3 from Nye County. See “NRC Staff Answer to Intervention Petitions (the NRC Staff’s Answer) filed Feb. 9, 2009.

⁴⁶ *Duke Energy Corp.*, (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328, 335 (1999).

a. The DOE overstates the “materiality” standard required for contention admission

In the name of “materiality,” the DOE argues that a proposed contention is not material if it is not conclusively proven at this stage. The fact that a contention has not yet been established on the merits does not render the contention immaterial. Indeed, under that standard, the LA itself is immaterial inasmuch as it has not been determined by the Board to be an application that should be granted.

Take for example, the DOE’s interpretation of the materiality requirement as applied in its Answer to CLK-SAFETY-003. This contention, as with several of Clark County’s safety contentions, addresses the DOE’s significant understatement of the probability of volcanic activity in the Yucca Mountain region. In its Answer, the DOE argues that Clark County’s contention “fail[s] to demonstrate an increase in the mean dose [of exposure to radioactivity] above regulatory limits” and is therefore “inadmissible because they would not make a difference in the outcome of the licensing proceeding,” (citing *Duke Energy Corp.* for support).⁴⁷

The DOE twists the standard by taking the *Duke Energy Corp.* citation out of context. The standard for contentions at this initial stage of the licensing proceeding does not require Clark County to provide ultimate proof of its contentions by actually demonstrating an increase in the mean dose above regulatory limits. That said, an issue of whether the DOE has significantly underestimated or downplayed the likelihood of volcanic activity that could disrupt the repository and result in releases is a safety issue

⁴⁷ See DOE Answer, at 61 (citing *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 and 3), CLI-99-11, 49 NRC 328, 333-34 (1999)).

that is material to the outcome of this licensing proceeding.

b. The DOE and the NRC Staff's generic and baseless objection to the form of expert affidavits

Both the DOE and the NRC Staff claim that, for many of Clark County's contentions, Clark County's expert opinion suffers from one of two deficiencies. Either the contention has no supporting expert opinion,⁴⁸ or that the supporting expert's affidavit is too conclusory.⁴⁹

Each of Clark County's contentions is supported by an expert in the germane discipline who prepared or supervised the preparation of each of Clark County's contentions.⁵⁰ Rather than copying the text of each contention into the expert's affidavit, each expert testified in his or her affidavit that she or he prepared or supervised the preparation of the contention that the expert is supporting and that the contention is true; or, that the expert adopts as his own the opinions and statements expressed in the contention.⁵¹

The DOE and the NRC Staff fail to cite any authority in support of its position that the form of the affidavits is deficient. Clark County's contentions meet the requirement that the expert can and does adopt the statements as his own.⁵² Moreover, the NRC has consistently recognized that "technical perfection is not an essential element

⁴⁸ See DOE Answer at 46, 52, 139, 156, 163 and 170.

⁴⁹ See DOE Answer at 61, 69, 77, 85, 91, 99, 106, 116 and 125.

⁵⁰ See CLK Petition, at Attachments 1-4, collectively supporting each of Clark County's contentions.

⁵¹ See *id.*

⁵² See *Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station) 60 NRC 548, 563, LBP-04-28 (2004); *Consumers Power Co. (Midland Plant, Units 1 and 2)*, 16 NRC, 917-19, ALAB-691 (1982).

of contention pleading and that the sounder practice is to decide issues on their merits, not to avoid them on technicalities.”⁵³ In other words, “[a]rguments about the validity of the expert opinion [] are for the merits, and cannot be assessed here at the contention admissibility stage.”⁵⁴ Each of Clark County’s 15 contentions is supported by an expert on the particular subjects discussed therein, rendering the DOE’s argument baseless.

c. The DOE improperly treats this stage of the proceeding as a summary disposition

The intent of the DOE’s Answer is clear - it seeks to achieve summary disposition on every contention proffered, refusing to acknowledge that the facts and expert opinion presented by Clark County (or any other party) have any merit. The DOE’s position at this stage contradicts the very purpose of the contention stage of the licensing proceeding. The standard imposed at the admissibility stage requires that a contention must directly controvert a position taken by the applicant in the application, and explain why the application is deficient.⁵⁵ The potential party must support its contentions with documents, expert opinion, or at least a fact-based argument.⁵⁶ It is well settled that a petition is not required to prove its case at the contention stage.⁵⁷ As even the NRC Staff admit:

A petitioner is not, however, required to prove its case at the contention stage, and need not proffer facts in formal affidavit or evidentiary form, sufficient to withstand a summary disposition motion. . . . [A] petitioner

⁵³ *Crow Butte Resources, Inc.* (License Amendment for the North Trend Expansion Project), 67 NRC 241, ASLBP No. 07-859-03-MLA-BD01, (slip op. at 30) (2008) (citations omitted).

⁵⁴ *Entergy Nuclear* at 563.

⁵⁵ *See* 10. C.F.R. § 2.309(f)(1)(vi).

⁵⁶ *See id.* at § 2.309(f)(1)(v).

⁵⁷ *Crow Butte*, at slip op. 30.

must present sufficient information to show a genuine dispute and reasonably indicating that a further inquiry is appropriate. Some sort of minimal basis indicating the potential validity of the contention is required. *A petitioner is not required to provide an exhaustive list of possible bases, but simply to provide sufficient alleged factual or legal bases to support the contention.*⁵⁸

Thus, contrary to the DOE's claim, the Board should not lose sight that what is required at this stage is "some sort of minimal basis" indicating the validity of Clark County's contentions. Each of Clark County's contentions goes beyond the "minimal" basis standard by providing expert support for each of its contentions and facts and documents to support those experts' conclusions.

D. The DOE and the NRC Staff's Challenges to Clark County's Contentions are Baseless

Clark County's reply to the DOE and the NRC Staff's Answers to each contention follows:

⁵⁸ *Id.* (citations omitted) (emphasis added).

This contention challenges the DOE's treatment of uncertainty in the Safety Analysis Report ("SAR") providing conclusory results without also providing the requisite technical bases to support the DOE's conclusions in contravention of Part 63 of the regulations. The DOE challenges parts 1, 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of the contention.

REPLY TO THE DOE:

1. A brief statement of the contention

According to the DOE, "[i]t is impossible to discern what precisely the focus of this contention is and which section of the LA it is that Clark County seeks to challenge."⁵⁹ The DOE goes on to state that Clark County's broad reference to SAR sections 1 and 2 and examples of the DOE's deficiencies that do not indicate specific SAR sections make this contention deficient under 10 C.F.R. § 2.309(f)(1)(i).⁶⁰ The DOE misconstrues the contention and the applicable standard for admission. The applicable standard for this item is articulated *supra*, Section II.B.1. As explained herein, Clark County's contention meets the requirements of 2.309(f) and is properly admitted.

Clark County's contention explains that the DOE's failure to provide the bases for its treatment of uncertainty in the Safety Analysis Report ("SAR") is so pervasive and

⁵⁹ See DOE Answer at 42.

⁶⁰ See DOE Answer at 42.

inadequate that it causes the DOE's evaluation of risk to be unreliable and non-compliant with the Commission's safety requirements of 10 C.F.R. Part 63. The statement demonstrates that one or more of the acceptance criteria in the combined license have not been, or will not be met, and that the specific operational consequences of nonconformance would be contrary to providing reasonable assurance of adequate protection of the public health and safety.

Part 63 pertains to the treatment of uncertainty and prescribes the risk-informed analyses that must not only be performed by the DOE, but must also be included in the DOE's application. Clark County's contention explains that, despite the specific requirements of part 63, the DOE's SAR provides only conclusory statements, with a chain of references that lead only to other conclusory statements. The DOE's systemic omissions throughout the SAR render its evaluation of risk unreliable and contrary to the reasonable assurance of adequate protection of the public health and safety.

The DOE argues that Clark County's contention lacks focus. To the contrary, Clark County's contention is specifically focused on the treatment of uncertainty. Clark County recognizes and appreciates that the guidance in the Board's June 28, 2008 CMO was provided, in part, to avoid where possible requiring the parties or licensing boards to devote substantial resources to narrow or to clarify them. However, Clark County should not be criticized for asserting a contention that challenges the DOE's failure to comply with multiple, but closely related regulations, particularly when the reason for the scope of the contention is the pervasiveness of the very problem being raised.

Clark County further identified specific portions of the SAR demonstrating the DOE's non-compliance, and demonstrating that the omissions identified to date are

illustrative of omissions throughout the SAR. The specific sub-sections of Part 63 which the DOE's application fails to address were in fact identified in Item Nos. 4, 5 and 6 of Clark County's contention.

Even if the specific sub-parts of Part 63 are deemed required for inclusion in the "statement of contention," failure to include them in the statement of contention is harmless and does not render the contention inadmissible. The Commission has explained that when evaluating the admissibility of a contention, the "failure of an intervenor or petitioner to dot an "i" or cross a "t" should not necessarily undermine the acceptability of a contention, particularly where a significant health and safety or environmental issue is attempted to be raised."⁶¹

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's objection to Clark County's response here consists of its boiler-plate objection in which it misstates what a petitioner must actually show or state for this item. Clark County's response to the DOE's boilerplate objection on materiality is addressed *supra*, Section II.C.3.a. As articulated by the APAPO Board, this item "requires citation to a statute or regulation that, explicitly or implicitly, has not been satisfied by reason of the issue raised in the contention."⁶² Clark County's petition meets this standard and identified 10 CFR Sections 63.10, .31, .111, .112, .113, and .114 as those parts with which the DOE has failed to comply due to the improper treatment of uncertainty.

⁶¹ *Pacific Gas & Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2) LBP-93-1, 37 NRC 5, 13 (1993).

⁶² *U.S. Dept of Energy*, *supra* n. 7 at 450, 455.

The DOE's additional objections go beyond the question of whether the contention is admissible. Nevertheless, Clark County here responds to the extraneous arguments.

First, the DOE claims that merely reciting the regulations that the DOE has failed to meet is insufficient to prove materiality. According to the DOE, what materiality means for this contention is that if proven true, the contention must demonstrate 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. Even if the DOE's interpretation of the petitioner's burden is correct, which it is not, this contention demonstrates that the burden could not possibly be met due to the DOE's failure to provide the technical bases for its treatment of uncertainty. Absent the information required under 10 C.F.R. Parts 63.10, .21, .101, .114 and .311, such a demonstration would be impossible, and no person could challenge the DOE's unsupported conclusions.

But, the DOE's Answer also would improperly reverse the burden at this stage. The DOE must first demonstrate that it has met the applicable regulatory requirements in proffering its license application. This contention demonstrates the DOE has not met its initial burden. Clark County's contention raises a valid and serious concern that, because of the failure to treat uncertainty properly, the DOE has failed to demonstrate that radioactive materials can be disposed of without unreasonable risk to the health and safety of the public.

Second, the DOE also claims that it is not required to provide "complete" assurances that "each performance objective" specified in Part 113 will be met. The

DOE relies on 10 C.F.R. § 63.101 (a)(2) for its defense. However, the DOE misconstrues this contention and the Commission's technical requirements.

Clark County is not asserting that the DOE must provide *complete* assurances for *each* performance objective. Rather, Clark County contends that the DOE has failed *completely* to provide any *reasonable* assurances, by providing only conclusory statements in the SAR that it evaluated uncertainty, and by failing to provide the requisite technical bases which underlie its alleged evaluations. An unsupported assertion that the DOE evaluated uncertainty fails to meet the technical requirements of Parts 63.10 (accuracy of information), 63.21 (content of application), 63.101 (purpose and nature of findings), and 63.114 (requirements for performance assessment); and it cannot be demonstrated that it meets the individual protection standards after permanent closure as required under 10 CFR part 63.311. These regulations exist to provide transparency in the risk analyses, and to document the conclusions upon which the DOE rely. 10 CFR Part 63.101(a)(2) acknowledges that uncertainties do in fact exist, but the DOE would read this acknowledgement to be a broad excuse to omit from the SAR any meaningful discussion of the DOE's treatment of uncertainty. The express technical requirements of 63.112 and 63.114 belie this assertion.

This contention identifies specific examples of the DOE's failure to provide even a reasonable degree of transparency in evaluating uncertainty; in fact, Clark County's examples demonstrate that the DOE's references are string together opaque references that lead nowhere meaningful.

Finally, the DOE's Answer actually admits that contentions raising questions of the DOE's compliance with Part 63 are in fact material.⁶³ This admission renders moot the DOE's argument that this contention is not material.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The DOE's Answer simply states, "for the reasons set forth in c and f, this contention fails to sufficiently set forth alleged facts or expert opinion supporting the contention; and therefore, must be dismissed."⁶⁴ Clark County's response to this boilerplate argument is discussed *supra* at Section II.C.3.b. The contention is supported by facts and expert opinion, as required for a contention to be admitted.

Clark County presented the cleanest presentation of its factual bases in CLK-SAFETY-001, TABLE 1. However, given the DOE and NRC Staff's objection of the presentation of the deficiencies in table format, Clark County restates the deficiencies here as the factual bases supporting its contention:

Basis 1. (identified as 1.1.1 in CLK-SAFETY-001, TABLE 1) Clark County noted that "[i]t is not clear that any thorough outside review of the databases used in the SAR was performed." This raises an uncertainty issue because the data collected from events may differ from the cases being modeled. This violates preclosure safety regulations requiring a "systematic analysis" of hazards at the proposed repository. See 10 C.F.R. § 63.112(b). It also violates postclosure safety regulations that require an accounting of uncertainties such as the uncertainty presented here. See 10 C.F.R. § 63.114(b). Finally it does not allow for verification of the database used in the analysis of the SAR, in violation of the regulation that requires the applicant to provide "complete and accurate" information "in all material respects." 10 C.F.R. § 63.10.

⁶³ DOE Answer at 44.

⁶⁴ *Id.* at 46.

Basis 2. (identified as 1.1.2 in CLK-SAFETY-001, TABLE 1) Clark County identifies that the analysis supporting SAR 1.6.3.4.1 (LSN# DEN001592183) in BSC 2007c (LSN#DN2002406192) cites unavailable references for an assumed exponential decay factor in the Solomon model for flights through the Beatty Corridor and fails to justify truncated range for the factor. This violates preclosure safety regulations requiring the “technical basis” for “exclusion of specific, naturally occurring and human-induced hazards in the safety analysis.” See 10 C.F.R. § 63.112(d). It also violates postclosure safety regulations that require data for “disruptive processes and events” because said data is missing from the analysis. See 10 C.F.R. § 63.114(a). Finally, it violates the requirement for “complete and accurate” information. 10 C.F.R. § 63.10.

Basis 3. (identified as 1.1.3 in CLK-SAFETY-001, TABLE 1) Clark County identifies that the analysis supporting SAR 1.6.3.4.1 (LSN # DEN001592183) in BSC 2007c (LSN#DN2002406192) provides no basis for the claim that all midair collisions and flights into terrain occur during maneuvering. The DOE’s failure to provide an uncertainty analysis here violates the regulations for the same reasons described for 1.1.2, *supra*.

Basis 4. (identified as 1.1.4 in CLK-SAFETY-001, TABLE 1) Clark County identifies that the analysis supporting SAR 1.6.3.4.1 (LSN # DEN001592183) in BSC 2007c (LSN#DN2002406192) uses its Table 10 to support the analysis of aircraft crash, without providing a technical basis for the table. The DOE’s failure to provide the data or modeling to support this analysis violates the regulations for the same reasons described for 1.1.2, *supra*.

Basis 5. (identified as 1.2.1 in CLK-SAFETY-001, TABLE 1) Clark County explained that the DOE’s analysis supporting SAR 1.6.3.4.1 in BSC 2007c LSN#DN2002406192 “censors data for mishaps with unknown distances to crash and unknown glide ratios, without developing a suitable uncertainty approach to account for them. The DOE’s data censoring here lacks a physical and statistical basis, which may have lead to overly optimistic results. This violates preclosure safety regulations requiring a “[d]ata pertaining to the Yucca Mountain site, and the surrounding region.” See 10 C.F.R. § 63.112(c). It also violates postclosure safety regulations that require an accounting for “uncertainties and variabilities in parameter valued” and that also require the technical basis for “exclusion of specific features, events, and processes in the performance assessment.” See 10 C.F.R. § 63.114(b) and (e). Finally, it violates the requirement for “complete” information. 10 C.F.R. § 63.10.

Basis 6. (identified as 1.3.1 in CLK-SAFETY-001, TABLE 1) Clark County explained that the DOE improperly screened out oxide wedging from risk analysis due to conservative modeling of stress corrosion cracking. This violates preclosure safety regulations that require the DOE to include, identify and systematically analyze naturally occurring or human-induced hazards of the area, which included a comprehensive identification of potential event sequences when it improperly screened out oxide wedging. See 10 C.F.R. § 63.112(b) and (c). It also violates postclosure safety regulations that require an accounting for “uncertainties and variabilities in parameter

valued” and that also require the technical basis for “exclusion of specific features, events, and processes in the performance assessment.” See 10 C.F.R. § 63.114(b) and (e). Finally, it violates the requirement for “complete and accurate” information. 10 C.F.R. § 63.10.

Basis 7. (identified as 2.1.1 in CLK-SAFETY-001, TABLE 1) Clark County explained that the DOE assumed that delinquency would not occur at the site of the proposed repository based on improper modeling and partial treatment of uncertainty that contradicted the NWTRB’s conclusions. See Minutes of the May 29, 2008 NWTRB meeting (LSN# NEN000000714). This violates preclosure safety regulations requiring a “systematic analysis” of hazards at the proposed repository. See 10 C.F.R. § 63.112(b). It also violates postclosure safety regulations that require consideration of “alternative conceptual models of features and processes that are consistent with available data and current scientific understanding” and evaluation of “the effects that alternative conceptual models have on the performance of the geologic repository.” See 10 C.F.R. § 63.114(c). Finally it violates the regulation requiring “complete and accurate” information “in all material respects.” 10 C.F.R. § 63.10.

Basis 8. (identified as 2.1.2 in CLK-SAFETY-001, TABLE 1) Clark County explained that the DOE failed to explain the data and model uncertainty accounted for in the final numbers for infiltration (the amount of water that would fall on drip shields) or provide a technical basis for abandoning an original analysis for a second analysis. This violates preclosure safety regulations requiring:

- A “systematic analysis” of hazards at the proposed repository (see § 63.112(b));
- The “technical basis” for exclusion of hazards in the safety analysis (see § 63.112(d)); and
- An analysis of the performance of “the structures, systems, and components to identify those that are important to safety” (see § 63.112(e)).

It also violates postclosure safety regulations that require:

- An accounting of “uncertainties and variabilities in parameter values” (see § 63.114(b));
- Consideration of “alternative conceptual models of features and processes that are consistent with available data and current scientific understanding” (see § 63.114(c));
- The “technical basis for either inclusion or exclusion of degradation, deterioration, or alternation processes of engineered barriers” (see § 63.114(f)); and,
- The “technical basis for models used in the performance assessment” (see § 63.114(g)).

Finally, it violates the regulation requiring “complete and accurate” information “in all material respects.” 10 C.F.R. § 63.10.

Basis 9. (identified as 2.1.3 in CLK-SAFETY-001, TABLE 1) Clark County points to various operational uncertainties not considered by the DOE where it failed to model more than a single scenario with additional optimistic assumptions. This violates preclosure safety regulations requiring a “systematic analysis” of hazards at the proposed repository and the “technical basis” for exclusion of hazards in the safety analysis. See 10 C.F.R. § 63.112(b) and (d). It also violates postclosure safety regulations that require an accounting of “uncertainties and variabilities in parameter values,” consideration of “alternative conceptual models of features and processes that are consistent with available data and current scientific understanding,” and the technical basis for “exclusion of specific features, events, and processes in the performance assessment.” See § 63.114(b), (c) and (e). Finally, it violates the regulation requiring “complete and accurate” information “in all material respects.” 10 C.F.R. § 63.10.

Basis 10. (identified as 2.1.4 through 2.1.7 in CLK-SAFETY-001, TABLE 1) address the same concerns of uncertainty as 1.1.2 through 1.1.4, but with respect to improper modeling. Please see the responses to 1.1.2 through 1.1.4, *supra*.

Basis 11. (identified as 2.1.8 in CLK-SAFETY-001, TABLE 1) Clark County points out that the “[a]nalysis supporting SAR 1.6.3.4.1 in BSC 20007c LSN#DN2002406192 appears to have conflicting assumptions with respect to independence of crashes and over-flights on number of sorties flown.” This violates postclosure safety regulations that require an accounting of “uncertainties and variabilities in parameter values.” See § 63.114(b). It also violates the regulation requiring “accurate” information. 10 C.F.R. § 63.10.

Basis 12. (identified as 2.2.1 in CLK-SAFETY-001, TABLE 1) This mirrors 1.3.1, but with respect to improper modeling. Please see the response to 1.3.1, *supra*.

Basis 13. (identified as 2.2.2 in CLK-SAFETY-001, TABLE 1) - Clark County points out that the effects of stresses caused by surface damage to the disposal canisters introduced during handling mishaps are not considered in the SAR. The DOE’s failure to conduct an uncertainty analysis or a basis for its modeling assumption here violates the regulations for the same reasons described for 2.1.2, *supra*.

Basis 14. (identified as 2.2.3 in CLK-SAFETY-001, TABLE 1) Clark County points to various operational uncertainties not considered by the DOE where it failed to model more than a single scenario with additional optimistic assumptions. This violates the regulations for the same reasons described for 2.1.3, *supra*.

Basis 15. (identified as 2.2.4 in CLK-SAFETY-001, TABLE 1) This mirrors 2.1.4, but with respect to inappropriate screening analyses. Please see the response to 2.1.4, *supra*.

Basis 16. (identified as 2.2.5 in CLK-SAFETY-001, TABLE 1) This mirrors 2.1.5, but with respect to inappropriate screening analyses. Please see the response to 2.1.5, *supra*.

Basis 17. (identified as 2.3.1 in CLK-SAFETY-001, TABLE 1) This mirrors 1.3.1, but with respect to improper modeling. Please see the response to 1.3.1, *supra*.

Basis 18. (identified as 2.3.2 in CLK-SAFETY-001, TABLE 1) Clark County points out that “SAR p. 2.1-40 states that naval SNF are conservatively modeled as commercial SNF, without demonstrating that this is always conservative.” This violates the regulations for the same reasons described for 1.1.1, *supra*.

Basis 19. (identified as 2.3.3 in CLK-SAFETY-001, TABLE 1) Clark County points out that “SAR 2.4.2.2.1 claims that drip shield and waste package early failure mechanisms are represented by conservative assumptions, without demonstrating that specific assumptions are always conservative.” This violates the regulations for the same reasons described for 1.1.1, *supra*.

Basis 20. (identified as 3.1.1 in CLK-SAFETY-001, TABLE 1) Clark County notes that “Appendix I of TSPA Vol. 3 (LSN#: DEN001579005), which lists all of the FEPs and the reasons for their inclusion or rejection, does not consider uncertainties as promised in Chapter 1 of the SAR.” Ignoring steps in a method that search for sources of uncertainty will underestimate risk. The DOE’s failure to consider uncertainties here violates preclosure safety regulations requiring a “systematic analysis” of hazards at the proposed repository. See § 63.112(b). It also violates postclosure safety regulations that require an “accounting of uncertainties and variabilities in parameter values” and the “technical basis for models used in the performance assessment.” See § 63.114(b) and (g). Finally, it violates the regulation requiring “complete and accurate” information “in all material respects.” 10 C.F.R. § 63.10.

Basis 21. (identified as 3.1.2 in CLK-SAFETY-001, TABLE 1) Clark County explains that the DOE’s failure to use unsaturated zone water and the uncertainty in the water composition on the long-term corrosion effects of the drip shield and waste package are not included in its analysis. The DOE’s assumption in a method that searches for sources of uncertainty improperly underestimates risk and violates the regulations for the same reasons described for 2.1.2, *supra*.

Basis 22. (identified as 3.1.3 in CLK-SAFETY-001, TABLE 1) This mirrors 2.1.2, but with respect to improper methods assumptions. Please see the response to 2.1.2, *supra*.

Basis 23. (identified as 3.1.4 in CLK-SAFETY-001, TABLE 1) This mirrors 2.2.2, but with respect to improper methods assumptions. Please see the response to 2.2.2., *supra*.

Basis 24. (identified as 3.1.5 in CLK-SAFETY-001, TABLE 1) Clark County outlines that “SAR 1.7.2.5 human reliability analysis does not discuss dependencies among human failure events that are incorporated into fault trees.” The DOE’s failure to identify and model dependencies among human failure events can substantially underestimate risk

from human-involved event sequences. Further, a review of the analysis reports cited by the DOE (e.g., LSN#DEN001578955), do not appear to address this issue. This violates preclosure safety regulations requiring a “systematic analysis” of hazards at the proposed repository and the “technical basis” for exclusion of hazards in the safety analysis. See § 63.112(b) and (d). It also violates postclosure safety regulations that require an accounting of “uncertainties and variabilities in parameter values,” consideration of “alternative conceptual models of features and processes that are consistent with available data and current scientific understanding,” and the technical basis for the exclusion of specific events in the performance assessment.” See § 63.114(b), (c) and (e). Finally, it violates the regulation requiring “complete and accurate” information “in all material respects.” 10 C.F.R. § 63.10.

Basis 25. (identified as 3.2.1 in CLK-SAFETY-001, TABLE 1) Clark County explains that the “[a]nalysis supporting SAR 1.6.3.4.1 (LSN # DEN001592183) in BSC 2007c (LSN#DN2002406192) assumes that, for flights outside the restricted zone, pilots will eject outside the zone.” Thus, there is no allowance for entry into the zone as the pilot tries to control or uncertainty and no convincing technical basis for this optimistic assumption. This violates the regulations for the same reasons described for 2.1.3, *supra*.

Basis 26. (identified as 3.2.2 in CLK-SAFETY-001, TABLE 1) Clark County identifies that “SAR 1.6.3.4.1 (LSN # DEN001592183) in BSC 2007c (LSN#DN2002406192) lacks justification for the technical basis for screening analysis of ordnance.” Thus, there is no support for the DOE’s screening analysis of ordnance, despite the proposed repository’s proximity to Department of Defense operations in the region. This violates preclosure safety regulations requiring a “[d]ata pertaining to the Yucca Mountain site, and the surrounding region.” See § 63.112(c). It also violates postclosure safety regulations that require data for “disruptive processes and events” because said data is missing from the analysis. See 10 C.F.R. § 63.114(a). Finally, it violates the requirement for “complete and accurate” information. 10 C.F.R. § 63.10.

Basis 27. (identified as 3.3.1 in CLK-SAFETY-001, TABLE 1) This mirrors 3.1.5, but with respect to unsubstantiated claims of conservatism. Please see the response to 2.1.2, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. The DOE objects to this part of the contention on two grounds. First, the DOE claims that contention is premised upon a “fundamental misunderstanding of ‘uncertainty,’” claiming that the DOE is not required to meet any particular level of

uncertainty, and that it need not address uncertainties both qualitatively and quantitatively. The DOE relies upon the Commission's purported focus of "the capability of the DOE to account for such residual uncertainties in its performance assessment" in adopting the Final Rule for Disposal of High-Level Radioactive Wastes. DOE Answer at 46. The DOE's Answer then states that the LA, and its supporting documentation, account for uncertainties. The DOE's Answer engages in a discussion of the technical bases concerning the treatment of uncertainty, thereby demonstrating that there exist genuine issues of material fact and law, which in turn, necessarily means that this contention is properly admitted for hearing.

As the DOE's Answer points out, the DOE must "account" for its treatment of uncertainty. To be admitted, Clark County must state its belief that the application fails to contain information on a relevant matter as required by law. It is well established that the petitioner meets its burden of proving admissibility of the contention if it identifies the failure and the supporting reasons for the petitioner's belief.⁶⁵ The contention very clearly states that the DOE has failed to provide the accounting that even the DOE admits is required, and it provides the requisite technical discussion supporting the belief.

The DOE's second objection on this part states that Clark County failed to point out the ramifications of the alleged errors and ignores the TSPA's conservatisms and margins of safety. Its third objection states that the contention is speculative. In support of these objections, the DOE claims that the contention provides no qualitative or quantitative information regarding whether and the extent to which the DOE's inadequate treatment of uncertainty affects doses to the RMEI. But that is precisely the point of the

⁶⁵ *Fansteel, Inc., supra*, n. 36 at 203 (internal citations omitted).

contention. It is first the DOE's burden to demonstrate that it has met the regulatory requirements, and that includes providing the requisite technical bases for its treatment of uncertainty. Without that information, no party may challenge the DOE's conclusions. And, it would place upon the petitioner the task of independently gathering and analyzing information that took the DOE over fifteen years to amass and analyze.

The DOE also claims that Clark County relies "solely" upon on the NRC Staff's Requests for Additional Information as the bases for its contention, and then claims that Clark County is challenging the purpose of the RAI process. Clark Count's contention does not rely solely on the RAI process, and it makes no claim regarding the purpose or intent of the RAI. That said, "the bases for a contention need not originate with the petitioner...a petitioner seeking to challenge the adequacy of an application may base its contention on information contained in an NRC Staff letter to an applicant which requests additional information based on a regulatory guide citation."⁶⁶ Clark County recognizes that the RAI process is an integral part of the NRC review process. As Clark County stated in its contention, there are a growing number of RAIs which state that the DOE has failed to provide a technical basis for its assumptions in the analyses, alteration of methods for calculations, claims of conservatism and use of inappropriate data. Clark County's contention explained that the issuance of the RAIs on the issue of the treatment of uncertainty demonstrated that the issue is material to the proceeding, and that there exists a genuine dispute of material fact and law regarding the treatment of uncertainty. The DOE believes it has treated uncertainty appropriately; Clark County contends that it has not.

⁶⁶ *Louisiana Energy Services L.P.* (Claiborne Enrichment Center), LBP-91-41, 34 NRC 332, 338-339 (1991).

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The NRC Staff claim that Clark County has not provided facts or expert opinion to support the contention and that the table provided in Clark County's contention does not demonstrate the DOE's inadequate treatment of uncertainty, and does not have specific references. The NRC Staff criticize the contention for failing to provide an explanation for each, stating that "mere conclusory statements or bald assertions are inadequate." But that is precisely the point of the contention - the DOE cannot provide mere conclusory statements or bald assertions in concluding that its treatment of uncertainty meets the applicable requirements. The contention identifies areas where the DOE has provided only conclusory statements, and has not articulated the bases for its conclusions.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted.

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. The NRC staff claims that the DOE need not quantify all events that have probabilities greater than 1×10^{-8} . In fact, the NRC Staff state that the DOE need not quantify any event if it meets the threshold probability, if the results of the performance assessments would not be changed significantly. Clark County's contention demonstrates that the DOE has failed to provide sufficient technical bases, in

contravention of the regulations, to support its conclusion that the events meet the threshold probability.

The NRC Staff also state that the issues raised by Clark County have in fact been addressed by the DOE in the SAR.⁶⁷ But, Clark County's contention explains that, although DOE's application purports to address the technical bases, it in fact merely recites the words that the DOE evaluated risk, and cites to a string of supporting documents. But following the thread of the DOE's citations leads only to further conclusory statements that cite yet another document. This pattern repeats, leading the reader on a trail to find where X marks the spot; but there is no ultimate "spot" under which the actual technical bases supporting the conclusion exist.

⁶⁷ NRC Staff Answer at 46.

This contention states that the SAR improperly failed to analyze the risks to the proposed repository at Yucca Mountain associated with ground-to-ground missile testing at the Nevada Test Site (“the NTS”), and that it is clear that future ground-to-ground missile testing at NTS is reasonable and likely within the pre-closure period. The DOE and the NRC Staff each challenge parts 5 and 6 of this contention.

REPLY TO DOE:

- 5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials.**

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The DOE claims that Clark County’s factual support and expert opinion do not support the contention raised. As explained below, Clark County’s contention meets the applicable standard for admission.

The DOE claims first that ground-to-ground missile testing was discussed in the SAR, referencing SAR Subsection 1.1.1.3.1.7. The DOE states that this section concludes that there are no forecasts for future ground-to-ground missile testing. However, Clark County’s contention takes issue with this conclusion explaining first that that the single piece of information upon which the DOE relies to support this contention is not reliable, and identifying additional documentary support with expert opinion that the DOE’s conclusion is unsupported. The DOE’s Answer engages in a discussion of the facts and opinion proffered by Clark County, thereby demonstrating that Clark County meets the pleading requirements of 2.309(e).

The DOE's Answer challenges the evidence upon which Clark County relies. But, in doing so, the DOE merely points to the very same informal email that it relies upon in the LA. As explained in Clark County's Petition, that single, informal email from one staff member at the NTS to the DOE simply asks, "is ground-to-ground missile testing still ongoing at the NTS?" That email states that "no future launches are anticipated in the near future." LSN DEN000328287. This email is not an "official" communication on official agency letterhead from one agency to another, but rather is an informal email that simply answers an overly simplistic question asked in the abstract. The email does not identify what "the near future" means or who establishes what "the near future" means, nor does it state that the staff member that authored the email can make any such representation. The email does not state that missile testing has been permanently terminated or prohibited. There is no formal memorandum, no formal letter from the head of the agency, nor any official communication confirming the basis for the DOE's conclusion. The risk of further testing exists, which in turn presents substantial risks to the safety of the proposed repository at Yucca Mountain. As noted in Clark County's petition, the DOE makes an unsupported leap of faith on a vague and qualified phrase.

Clark County also proffered additional evidence, which the DOE challenges. Clark County explained that in 1992, President Clinton issued a moratorium on all nuclear testing while directing the USDOE/NNSA to maintain the safety and reliability of the United State's nuclear arsenal. However, that moratorium also directed the USDOE/NNSA to maintain a test readiness program in the event that resumption of nuclear weapons testing becomes necessary. Clark County proffered a document titled

“National Security and Nuclear Weapons: Maintaining Deterrence in the 21st Century,” which is a joint statement by the Secretary of Energy, Secretary of Defense, and Secretary of State.

The DOE admits that this document contemplates that there exists the prospect of having to return to testing, but claims that the documentation proffered by Clark County focuses on underground missile testing and therefore is not relevant to the issue of ground-to-ground missile testing presented in this contention. Although this document does pertain to underground testing, which Clark County plainly pointed out in its contention,⁶⁸ these documents were proffered to demonstrate that future missile testing at the NTS is contemplated.

Of greater concern than Clark County’s alleged lack of evidence here, is the DOE’s lack of evidence in the LA to support its conclusion that missile testing will never again be conducted at the NTS and therefore, analysis of the risks associated with such testing is not necessary. The DOE’s Answer improperly shifts the focus of the lack of evidence with respect to missile testing from the DOE to Clark County. The DOE could have and should have shown that no such risk exists by producing documentation of its own. Instead, it refers to the SAR, where admittedly missile testing is mentioned, but clearly not analyzed.⁶⁹ The documents speak for themselves and certainly raise the issue that the risk of new missile testing exists, as Dr. Conway asserts.⁷⁰

⁶⁸ See CLK Petition at 26.

⁶⁹ See the DOE’s Answer at 53.

⁷⁰ See CLK Petition at Attachment 2.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. For this factor, the Commission has held that, "[i]f the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief would constitute sufficient information to show that a genuine dispute exists."⁷¹ The DOE claims that there exists no genuine dispute of material fact or law. However, Clark County's contention meets this standard for admissibility.

According to the DOE, it has the authority to preclude any potential future threat to the repository from missile testing on the NTS, which eliminates any possible dispute of fact or law.⁷² However, merely alleging it can preclude testing is not the same as confirming that it has precluded and will preclude all testing at the NTS.

The DOE also confuses control of airspace with the control of missile testing, which is the subject of Clark County's contention. The DOE claims that it maintains "exclusive, continuous control over R-4808," which area includes the NTS. This is an overstatement of the DOE's authority and use of that land. As made evident in the documents cited for this contention,⁷³ the Department of Defense ("DOD") has authority over the use of the NTS. The DOE fails to provide a single document or expert authority supportive of its sweeping assertion of authority for use of the NTS land. Nor does it produce an agreement with DOD that the land will not be used for missile testing. As

⁷¹ *Fansteel, Inc.*, *supra*, n. 36.

⁷² *See* DOE Answer at p.56.

⁷³ *See* CLK Petition at 26.

such, the DOE cannot provide reasonable assurances that DOD will not resume missile testing on the NTS land. Given the proximity of the NTS to the proposed repository at Yucca Mountain, the risk of missile accidents, and the fact that these risks were not analyzed in the SAR, this contention should be admitted.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The NRC Staff's Answer raises the same issues as the DOE's Answer. NRC Staff first challenge this part of the contention stating that the document relied upon by Clark County in support of its position pertains to underground testing, whereas the contention itself pertains to ground-to-ground missile testing. The NRC Staff then posits that even if the United States were to conduct nuclear testing in the future, such testing would be underground because of a ban on atmospheric nuclear weapons testing. Please refer to Clark County's response to subsection 5 to the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. The NRC Staff's Answer raises the same issues as the DOE's Answer. Please refer to Clark County's response to subsection 6 to the DOE's Answer, *supra*. The NRC Staff's Answer also references an RAI it issued on this matter.⁷⁴ NRC Staff state that the DOE provided a response on December 31, 2008. But the NRC Staff provide

⁷⁴ NRC Staff Answer at 51.

absolutely no discussion of the response or how the response “might” render this issue moot. The NRC Staff merely states that, “to the extent this response addresses the issue raised [by this contention], the contention may be moot.” But the NRC Staff’s claim is a non sequitor. The DOE’s response to the RAI must do more than “address” the issue, it must resolve the issue before it can conceivably render Clark County’s issue moot. But neither the DOE nor the NRC Staff state that the DOE’s responses to the DOE’s response to the RAI resolves this issue.

Nevertheless, Clark County has reviewed the responses to the RAI. A review of the DOE’s response to the NRC Staff’s RAI provides no more information than the DOE’s Answer to Clark County’s contention, which is addressed *supra*.

CLK-SAFETY-003
The DOE Miscalculates Basaltic Magma Melting Depth

This contention states that SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections, which indicate the probability of igneous activity disrupting a repository drift, underestimates that probability, likely by two or more orders of magnitude, because it assumed incorrectly that melting to produce basaltic magma will be in the shallow lithospheric mantle and not in the deeper asthenosphere. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussion *supra*, Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

Clark County nevertheless addresses the DOE's arguments. the DOE alleges:

Clark County does not explain how considering these data and interpretations would increase the probability of an igneous event affecting a repository drift. Clark County is equally silent, and fails to demonstrate, that any increase in probability of an igneous event would cause any increase, let alone a violation of the repository performance standards.⁷⁵

⁷⁵ DOE Answer at 61.

The DOE's Answer ignores Clark County's lengthy explanation of published data and interpretations that indicate that melting to produce basalt occurs in the asthenosphere and not in the lithosphere.⁷⁶ Supported by this data and expert Dr. Eugene I. Smith, Clark County explained that melting of asthenosphere implies a more active igneous future for Yucca Mountain and a higher probability (by as much as two or more orders of magnitude) of igneous activity disrupting repository drifts than that predicted in the SAR. That the DOE fails to acknowledge the materiality of this contention does not render it immaterial. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The DOE claims that this contention does not reference any supporting expert opinion.⁷⁷ Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.⁷⁸ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.⁷⁹ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's

⁷⁶ See CLK Petition at 30-33.

⁷⁷ See the DOE's Answer at 61.

⁷⁸ See *id.* at 62.

⁷⁹ See *id.* at 61; CLK Petition at Attachment 3.

affidavit is discussed *supra* in Section II.C.3.b. Its reply to the DOE’s boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c. Accordingly, the DOE’s Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. The DOE claims there exists no genuine dispute of material fact, alleging that the facts upon which Dr. Smith relies are the result of his “misreading” of SAR and scientific articles.⁸⁰ The DOE’s argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

Clark County’s contention states that the DOE fails to consider the asthenospheric mantle as the source for basalts near Yucca Mountain and by doing so underestimates the volcanic hazard to Yucca Mountain. The DOE responds by arguing that several of the PVHA experts “mentioned” that asthenospheric mantle could be the source for these basalts and consequently there is no dispute between Clark County and the DOE.

There is an important difference between mentioning a word or concept and analytically integrating it into a petrologic or probability model. By “consider,” Clark County is referring to the analytical integration of a concept into a model. Although

⁸⁰ See DOE Answer at 63.

several PVHA experts “mentioned” the concept of asthenospheric melting, none “considered” it using this definition.

It is critical to understand and consider the process of volcanism in any probability model because the process of volcanism is a major factor in controlling the timing and nature of future volcanic eruptions. The assumed location of melting in the earth’s mantle results in two completely different future scenarios for volcanic activity at Yucca Mountain. If melting is presumed to be shallow in the lithospheric mantle, then volcanism may be waning and the probability of future volcanism will be low. Conversely, if melting is presumed to be deep in the asthenosphere, then another peak of volcanic activity could occur and the probability of future volcanism is higher. Analytical integration of volcanic process is critical for understanding which of these future paths is more likely. The DOE not only does not consider asthenospheric mantle sources, it does not analytically integrate volcanic processes into its models.

The DOE asserts that Clark County’s expert, Dr. Eugene I. Smith, agrees that the deep melting model is controversial and on that basis alone, the DOE’s interpretations are correct. To reach this conclusion the DOE must have misread two articles by Dr. Smith, basing its argument on only one short quote from each. In terms of the quote from the Smith, Keenan and Plank (2002) paper,⁸¹ the DOE ignores the fact that the article was prepared nearly seven years ago and in that seven year period a considerable amount of data has accumulated that supports the deep melting model. The DOE’s misuse of the quote indicates that the DOE is unaware of the work done since the article was published

⁸¹ See DOE Answer at 64 (quoting 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 LSN# NEV000002718).

and that the DOE is not familiar with or up-to-date on the scientific literature for this important subject. The quoted article clearly compares the DOE's model to deep melting and plainly lists reasons why the DOE's model is unreasonable. The DOE could only offer this article as support for the DOE's position by completely misreading it.

The second quote from the recent Smith and others (2008) article was also misinterpreted by the DOE.⁸² The quote was intended to explain that the arguments used to develop lithospheric mantle models were considered valid *in the 1980s, when those models were first proposed*. Further, the DOE ignored this quote from that paper that clearly states Clark County's position:

These observations are difficult to explain by shallow melting in the lithospheric mantle or by utilizing crustal structures to control volcano location. A better solution to understanding the geographic distribution and timing of volcanism in this region requires a more complete knowledge of mantle volatile content, flow patterns, lithospheric thickness, and distribution of low-viscosity pockets. We suggest that melting of the asthenospheric mantle controlled by upwelling associated with low-viscosity pockets, and a step in lithospheric thickness explain both the reoccurrence of volcanic activity in the Yucca Mountain area for the past 11 m.y., and the episodic nature of volcanism. An implication of this model is that a new episode of volcanism may occur near Yucca Mountain, thus inferring a higher risk to the proposed waste repository.⁸³

For these reasons, the DOE's Answer to this section should be rejected.

⁸² 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 at 156. (2008) (LSN# CLK000000085).

⁸³ 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 at 8 (2008).

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The NRC Staff raise the same issues as the DOE, and do not raise any additional issues. Please refer to Clark County’s response to subsection 5 to the DOE’s Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. The NRC Staff raise the same issues as the DOE in this section. Please refer to Clark County’s response to subsection 6 to the DOE’s Answer, *supra*.

The NRC Staff Answer also discusses Clark County’s citation of “related” SAR sections.⁸⁴ The NRC Staff contends that “[t]o the extent that Clark County seeks to raise an issue with a ‘related’ SAR subsection, the contention is inadmissible with respect to those unspecified SAR sections.”⁸⁵ For support, the NRC Staff rely on NRC cases that provide that “[t]he burden of setting forth a clear and coherent argument for standing and intervention is on the petitioner,” and “that one of the purposes of the contention rule is

⁸⁴ See NRC Staff Answer, 54-55 (this additional argument by the NRC Staff is essentially cut and pasted into the NRC Staff’s Answer for subsection 6 in the next eight contentions (CLK-SAFETY-004-11)).

⁸⁵ *Id.* at 54.

to put ‘other parties in the proceeding on notice of the petitioners’ specific grievances and thus give [] them a good idea of the claims they will be either supporting or opposing.’”⁸⁶

The NRC Staff fail, however, to cite to the Advisory PAPO Board Panel’s Memorandum and Order, which explained that when citing to the application to satisfy Section 2.309(f)(1)(vi), “references to specific portions” are not required for “contentions of omission.”⁸⁷ The Memorandum and Order went on to state that for contentions other than contentions of omission, “citing to the most specific portion of the document that is practicable” would suffice.⁸⁸ Thus, the NRC Staff’s position is unfounded because the crux of Clark County’s contention is focused on SAR Subsections 2.2.2.2.2.3.1 and 2.3.11.2.2. Clark County already explained in its Petition that the reason for this focus is that the “[t]he SAR discusses the assumption that basaltic magmas were generated in the shallow lithosphere mantle *mainly* in [those subsections].”⁸⁹ Clark County’s citation of those specific SAR subsections certainly satisfies the requirement of a “clear and coherent argument” and puts the “other parties in the proceeding on notice of [Clark County’s] specific grievances.” Thus, Clark County’s citation to the “most specific portions of the application,” with general references to “related” sections meets the requirements of Section 2.309(f)(1)(vi), especially when considering the fact that this is a “contention of omission.”

⁸⁶ *Id.* at 55 (quoting Commonwealth Edison Co. (Zion Nuclear Power Station, Units 1 & 2), CLI-99-4, 49 NRC 185, 194 (1999); Duke Energy Corp., (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 334 (1999)).

⁸⁷ Advisory PAPO Board Memorandum and Order (Case Management Order Concerning Petitions to Intervene, Contentions, Responses and Replies, Standing Arguments, and Referencing or Attaching Supporting Materials) (June 20, 2008) at p.8.

⁸⁸ *Id.*

⁸⁹ CLK Petition at 29 (emphasis added).

CLK-SAFETY-004
The DOE Ignores the Time Span of Basaltic Volcanism

This contention states that SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections, which indicate the probability of igneous activity disrupting a repository drift, underestimates that probability, likely by two or more orders of magnitude, because the DOE ignored the entire 11 million year span of basaltic volcanism near Yucca Mountain. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE's Answer ignores Clark County's explanation of published data and interpretations that indicate that volcanism near Yucca Mountain does not record a single waning system, but instead represents igneous activity that periodically starts and stops and is possibly in the beginning of a third super-episode.⁹⁰ Supported by this data and expert Dr. Eugene I. Smith, Clark County explained that the beginning of this potential third super-episode implies a more active

⁹⁰ See CLK Petition at 37-38.

igneous future for Yucca Mountain and a higher probability (by as much as two or more orders of magnitude) of igneous activity disrupting repository drifts than that predicted in the SAR. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The DOE claims that this contention does not reference any supporting expert opinion.⁹¹ Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.⁹² As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.⁹³ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.C.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c.

⁹¹ See DOE Answer at 69.

⁹² See *id.* at 70.

⁹³ See *id.* at 69; CLK Petition at Attachment 3.

The DOE also takes issue with Clark County's references to the "core."⁹⁴ Clark County inadvertently omitted the reference that describes the core in this particular contention, but it was included in later contentions.⁹⁵

The DOE also states:

[Clark County] cites to the SAR and to "Valentine, G.A. and Perry, F.V., 'Tectonically Controlled, Time-Predictable Basaltic Volcanism from a Lithospheric Source' (2007), LSN# DN2002382703 at 201-216," Petition at 37, but solely to explain why these documents are wrong. Accordingly, there is literally no appropriate support for the contention.⁹⁶

The DOE misreads Clark County's position here. It actually stated:

Unlike previous work that limits analysis to post-5 million-year basalts (see Valentine, G.A. and Perry, F.V. "Tectonically Controlled, Time-Predictable Basaltic Volcanism from a Lithospheric Source," (2007), LSN# DN2002382703 at 201-216), the core provides a record from the beginning of basalt volcanism 11 million years ago.⁹⁷

Clark County is not referencing this article for the purpose of showing that it is wrong. The reference is used instead to specifically demonstrate that the DOE focuses on the last 5 million years of the geological record at Yucca Mountain and does not adequately consider long term trends of basaltic volcanism. Although Clark County also references SAR Subsection 2.3.11.2.1.1 at 2.3.11-16, again it is only to demonstrate the DOE's reliance on only the last 5 million years of the geologic record.

Although some of the PVHA experts did include events earlier than 5 million years in their probability models, none considered long term trends or patterns of

⁹⁴ See DOE Answer at 70.

⁹⁵ See CLK Petition at 51-52 (CLK-SAFETY-006) and 61 (CLK-SAFETY-008) (citing "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" (July 8, 2008), LSN#CLK000000071 at 14-17).

⁹⁶ DOE Answer at 69.

⁹⁷ CLK Petition at 37.

volcanism. The philosophy of using data from post-5 million year old basalt has continued to the present as evidenced by the work reported in Valentine and Perry (2007).⁹⁸ The data in this paper uses geochemical indices that reflect the degree of partial melting of the mantle and shows that in the last 5 million years basaltic volcanism resulted from a steady decrease in the degree of partial melting. This evidence is used to suggest that basaltic volcanism in the Yucca Mountain area is dying and that future events will be rare. Clark County does not disagree with the conclusion that the degree of partial melting is decreasing (contrary to the misinterpretation of Clark County's contention in the DOE's Answer). The point here is that if the full 11 million year record were used, two such trends would be evident. Therefore, volcanism at Yucca Mountain is periodic, raising the possibility of another peak of activity in the future. If the DOE would have looked at the entire record using the same techniques they used for the post-5 million year period, they would have observed these same trends. The DOE chose not to do so. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The applicable standard for this part of the contention is discussed *supra*, Section II.B.6. The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his misreading of the SAR and scientific articles.⁹⁹ The DOE's argument defeats its own claim when it engages in a

⁹⁸ See Valentine, G.A. and Perry, F.V., "Tectonically Controlled, Time- Predictable Basaltic Volcanism from a Lithospheric Source," (2007), LSN# DN2002382703 at 201-216 (discussed and cited in CLK Petition, at p.37 and 37 n.34).

⁹⁹ See the DOE's Answer at pp.71-72.

discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

In this section, the DOE contends that it did in fact consider the entire 11 million year history of volcanism, contesting Clark County's contention that it "ignored" this history. The DOE quotes statements from the SAR for support:

- 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 2.3.11-18.¹⁰⁰

As similarly stated in a previous section of this Reply,¹⁰¹ there is an important difference between mentioning a word or concept and analytically integrating it into a petrologic or probability model. It was Clark County's intent that the word "ignore" refer to the DOE's failure to analytically integrate a concept into a model or a calculation.

¹⁰⁰ See DOE Answer at 72.

¹⁰¹ See Reply to DOE Answer to CLK-SAFETY-003, Section 6, *supra*.

Clark County accepts that the DOE mentioned pre-5 million year volcanism in the SAR, but because this information was not used to determine long term trends, important data regarding the episodic nature of volcanism was lost. It was critical to understand and analyze the full span of volcanism in any probability model because the process of volcanism is a major factor in controlling the timing and nature of future volcanic eruptions. As future volcanic eruptions are of critical importance to the proposed repository at Yucca Mountain, this contention should be admitted in this proceeding.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as those raised by the DOE, and do not raise any additional issues. Please refer to Clark County's response to subsection 5 to the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as those raised by the DOE. Please refer to Clark County's response to subsection 6 to the DOE's Answer, *supra*. The NRC Staff also briefly discuss Clark County's reference to "related sections" of the SAR. The NRC Staff's argument is identical to the argument it raised in its Answer to CLK-SAFETY-

003.¹⁰² Please refer to Clark County's response to subsection 6 to the NRC Staff's Answer for CLK-SAFETY-003.

¹⁰² Cf. NRC Staff Answer at 54-55.

The DOE Improperly Focuses on Upper Crustal Extension Patterns

This contention states that SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections understate the likelihood of disruptive volcanic activity because the DOE focuses improperly on upper crustal extension patterns to explain volcano location and the timing of volcanic events. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE’s response to this section consists of a boiler-plate objection regarding the DOE’s interpretation of “materiality”, and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County’ contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE’s Answer ignores Clark County’s lengthy explanation of published data and interpretations that indicate that the earth’s mantle, not upper crustal structures and extension rates (which are the focus of the DOE’s analysis in the SAR) controls the location and timing of volcanism.¹⁰³ Supported by this data and expert Dr. Eugene I. Smith, Clark County explained that a proper study of the earth’s mantle instead of reliance on upper crustal extension patterns implies a more active igneous future for Yucca Mountain and a higher probability (by as much as two or more

¹⁰³ See CLK Petition at 42-47.

orders of magnitude) of igneous activity disrupting repository drifts than that predicted in the SAR. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part is discussed *supra*, Section II.B.5. The DOE claims that this contention does not reference any supporting expert opinion.¹⁰⁴ Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.¹⁰⁵ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹⁰⁶ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.C.3.b. Clark County's reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

¹⁰⁴ See DOE Answer at 77.

¹⁰⁵ See *id.*

¹⁰⁶ See *id.* at 77; CLK Petition at Attachment 3.

The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his misreading of the SAR and scientific articles. The DOE's argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

Clark County's contention states that the DOE fails to consider the asthenospheric mantle as the source for basalts near Yucca Mountain and by doing so underestimates the volcanic hazard to Yucca Mountain. The DOE responds by arguing that several of the PVHA experts "mentioned" that asthenospheric mantle could be the source for these basalts and consequently there is no dispute between Clark County and the DOE.

There is an important difference between mentioning a word or concept and analytically integrating it into a petrologic or probability model. By "consider," Clark County is referring to the analytical integration of a concept into a model. Although several PVHA experts "mentioned" the concept of asthenospheric melting, none "considered" it using this definition.

It is critical to understand and consider the process of volcanism in any probability model because the process of volcanism is a major factor in controlling the timing and nature of future volcanic eruptions. The assumed location of melting in the earth's mantle results in two completely different future scenarios for volcanic activity at Yucca Mountain. If melting is presumed to be shallow in the lithospheric mantle, then volcanism may be waning and the probability of future volcanism will be low. Conversely, if melting is presumed to be deep in the asthenosphere, then another peak of

volcanic activity could occur and the probability of future volcanism is higher. Analytical integration of volcanic process is critical for understanding which of these future paths is more likely. The DOE not only does not consider asthenospheric mantle sources, it does not analytically integrate volcanic processes into its models.

The DOE also asserts that Clark County's expert, Dr. Smith, agrees that the deep melting model is controversial and on that basis alone, the DOE's interpretations are correct. But, the DOE misreads an article by Dr. Smith, basing its argument on only one short quote that was then misinterpreted.¹⁰⁷ The quote was intended to explain that the arguments used to develop lithospheric mantle models were considered valid *in the 1980s, when those models were first proposed*. Further, the DOE ignored this quote from that paper that clearly states Clark County's position:

These observations are difficult to explain by shallow melting in the lithospheric mantle or by utilizing crustal structures to control volcano location. A better solution to understanding the geographic distribution and timing of volcanism in this region requires a more complete knowledge of mantle volatile content, flow patterns, lithospheric thickness, and distribution of low-viscosity pockets. We suggest that melting of the asthenospheric mantle controlled by upwelling associated with low-viscosity pockets, and a step in lithospheric thickness explain both the reoccurrence of volcanic activity in the Yucca Mountain area for the past 11 m.y., and the episodic nature of volcanism. An implication of this model is that a new episode of volcanism may occur near Yucca Mountain, thus inferring a higher risk to the proposed waste repository.¹⁰⁸

For these reasons, the DOE's Answer to this section should be rejected.

¹⁰⁷ See DOE Answer at 64-65.

¹⁰⁸ 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, at 8. (2008) (LSN# CLK000000085).

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as the DOE, and do not raise any additional issues. Please refer to Clark County's response to subsection 5 to the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County's response to subsection 6 to the DOE's Answer, *supra*. The NRC Staff also argue that Clark County's contention improperly references "other sections" of the SAR. The NRC Staff include this identical argument for CLK-SAFETY-003 through CLK-SAFETY-011.¹⁰⁹ Please refer to Clark County's response to subsection 6 to the NRC Staff's Answer for CLK-SAFETY-003.

¹⁰⁹ Cf. NRC Staff Answer at 54-55.

CLK-SAFETY-006

**The DOE Improperly Excludes the Death Valley Volcanic Field
and Greenwater Range from Volcanism Calculations**

This contention states that SAR Subsections 2.2.2.2.3.1, 2.3.11.2.2 and related sections understate the probability of igneous activity disrupting a repository drift because the DOE does not include the Death Valley volcanic field in the Greenwater Range as part of the area to be considered for hazard calculations. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE's Answer ignores Clark County's explanation of published data and interpretations that indicate that volcanic rocks in the Greenwater Range have chemical, mineralogical and age similarities to those near Yucca Mountain and clearly represent the southern extension of the field of volcanoes by Yucca Mountain.¹¹⁰ Supported by this data and expert, Dr. Eugene I. Smith, Clark County

¹¹⁰ See CLK Petition at 51-52.

explained that a proper study of the Death Valley volcanic field in the Greenwater Range would demonstrate a more active igneous future for Yucca Mountain and a higher probability (by as much as two or more orders of magnitude) of igneous activity disrupting repository drifts than that predicted in the SAR.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The applicable standard for this part of the contention is discussed *supra*, Section II.B.5. The DOE claims that this contention does not reference any supporting expert opinion.¹¹¹ Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.¹¹² As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹¹³ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.C.3.b. Clark County's reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his misreading of SAR and

¹¹¹ See DOE Answer at 85.

¹¹² See *id.* at 85-86.

¹¹³ See *id.* at 85; CLK Petition at Attachment 3.

scientific articles.¹¹⁴ The DOE's argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

In this section, the DOE contends that there is no dispute because the PVHA panel did consider the Greenwater Range in their probability calculations:

Clark County's entire argument relies on the assumption that the 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 49. But the 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.* at 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 the DOE, but was considered by the PVHA expert panel members in their evaluations.¹¹⁵

While several of the PVHA experts did mention the Greenwater Range or include it in their background zone, only one (Crowe) even attempted to integrate it into a probability model. Carlson and Walker mention the Greenwater Range but do not include it in their cone count used to calculate probability.

¹¹⁴ *See* DOE Answer at 71-72.

¹¹⁵ DOE Answer at 86-87.

As similarly stated in a previous section of this Reply,¹¹⁶ there is an important difference between mentioning a word or concept and analytically integrating it into a petrologic or probability model. It was Clark County's intent that the word "ignore" refer to the DOE's failure to analytically integrate a concept into a model or a calculation. Clark County accepts that a few of the DOE's experts mentioned the Greenwater Range and one used it in a calculation, however the Greenwater Range was not properly considered and was essentially ignored by the DOE. As the Greenwater Range is in close proximity to Yucca Mountain and its basalt is closely associated with Yucca Mountain basalt, the Greenwater Range must be properly considered in any hazard analysis. In addition, even though Crowe considered the Greenwater Range, his analysis was flawed in at least a couple of areas. First, Crowe did not know the location or number of volcanic centers in the Greenwater Range. He calculated the number of centers by estimating the volume of basalt and then dividing that volume by the basalt volume normally associated with a typical cinder cone. This kind of rough approximation might be appropriate for an informal study, but not for the calculation of volcanic hazard at Yucca Mountain. Second, Crowe placed more emphasis on volcanoes close to Yucca Mountain and less emphasis or weight to those farther away. Consequently, he gave estimated cone counts in the Greenwater Range a low weight in his probability calculation. As a result the volcanoes of the Greenwater Range had little effect on his overall volcanic hazard calculation.

Third, the probability of volcanic disruption of the Yucca Mountain repository increases when one considers the Greenwater Range. The probability calculation is

¹¹⁶ See Reply to the DOE's Answer to CLK-SAFETY-003, Section 6, *supra*.

dependent on both the number of events (volcanoes) and the area selected to count the volcanoes. In its simplest form, the equation (“Equation 1”) for the probability that an igneous event will intersect the repository is:

$$V_I = \frac{N(R,T)}{T} \cdot \frac{a_r}{A_R}$$

117

Equation 1 relates the probability of repository intersection V_I to the number of volcanoes (N) in area R during time T . A_r is the area of the region used to count volcanoes, a_r is the area of the repository block. Equation 1 indicates that the probability of disruption of the repository will be larger if the number of cones in the area of interest (R) is larger. However, the probability will decrease as the region used to count cones becomes larger. Clark County estimates that by including the Greenwater Range, R will increase by a factor of about 0.33, but cone counts (N) will increase by at least 24 (a factor of 2 to 3 over cone counts used by PVHA experts). Although, the larger area used to count will partially offset the increase in cone counts, the overall probability will increase (because the cone count term increases more than the area of the region).

The PVHA experts were provided with a map showing the locations of volcanic centers in the Yucca Mountain area including the Greenwater Range. It is Clark County’s contention that volcano locations and number of volcanoes provided to the PVHA experts were incorrect for the Greenwater Range. The basis for this contention is that the reference on the map provided to the PVHA experts is Luedke and Smith (1981). This map shows the distribution of volcanic rocks of various ages and the location of

¹¹⁷ Equation from PVHA report page 3-2 of 115.

calderas and selected volcanoes. The distribution of volcanic rocks and volcano locations for the Greenwater Range were taken from two maps by McAllister¹¹⁸ and a U.S. Geological Survey Professional Paper by Drewes.¹¹⁹ These maps and report were produced to describe the borate deposits east of Death Valley, but also included a reconnaissance version of the geology of the Greenwater Range. The basalts of the Greenwater Range were mapped as Funeral Formation and separated into lava flows and areas of scoria. Vent locations were not specifically located but were interpreted to lie within areas of scoria. Drewes, however, did identify two areas of volcanic breccia as eroded volcanoes. Luedke and Smith¹²⁰ compiled the geology from the McAllister and Drewes maps and placed volcanic centers in the Greenwater Range based on the distribution of scoria and the location of Drewes' two volcanoes. The important point is that most of the volcano locations in the Greenwater Range on the Luedke and Smith map are based on interpretation; they did not field check to verify their presence. Additionally, they were not careful in precisely locating volcanoes in the Greenwater Range. PVHA experts used a copy of the Luedke and Smith map whereas for the PVHA-U, a part of the Luedke and Smith map was redrafted to show only the location of volcanoes. Unfortunately, during redrafting many of the Greenwater volcanoes were copied incorrectly and placed in the wrong location. In summary, the

¹¹⁸ James F. McAllister, Geologic map and sections of the Furnace Creek borate area, Death Valley, Inyo County, California: California Division of Mines and Geology Map Sheet MS-14 (1970); James F. McAllister, Geologic map and sections of the Amargosa Valley borate area-southeast continuation of the Furnace Creek area-Inyo County, California: U.S. Geological Survey Miscellaneous Geologic Investigations Map 1-782, scale 1:24000, 1 sheet (1973).

¹¹⁹ Harold Drewes, Geology of the Funeral Peak quadrangle, California, on the east flank of Death Valley: U.S. Geological Survey Professional Paper 413, 73 p.2 plates (1963).

¹²⁰ R.G. Luedke and R.L. Smith, Map showing the distribution, composition, and age of Late Cenezoic volcanic centers in California and Nevada: U.S. Geological Survey Misc. Invest. Ser. Map 1-1091-C (1981).

map used by the PVHA panel is a second generation product and that used by PVHA-U a third generation map. Both maps are inaccurate because they contain propagated errors induced in the process of copying information from earlier maps to new maps. In conclusion, the maps provided to the PVHA and PVHA-U are not precise in terms of the number of volcanoes or their locations. As a result, even for the PVHA expert that considered the Greenwater Range, (Crowe), the improper methodology and incorrect data he used compromised his analysis.

For the foregoing reasons, the DOE relied on the wrong information and failed to properly consider the Greenwater Range in determining potential volcanic activity in the area of the proposed repository. Accordingly, this contention should be admitted.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as DOE, and do not raise any additional issues. Please refer to Clark County's response to subsection 5 to the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County's response to subsection 6 to the DOE's Answer, *supra*. The NRC Staff also argue that Clark County's contention improperly references "other sections" of the SAR. The NRC Staff repeated this identical argument from CLK-SAFETY-003 through CLK-SAFETY-

011.¹²¹ Please refer to Clark County's response to subsection 6 to the NRC Staff's Answer for CLK-SAFETY-003.

¹²¹ *Cf.* NRC Staff Answer at 69-70 *with* NRC Staff Answer at 54-55.

CLK-SAFETY-007
**The DOE Improperly Estimates Igneous Event Probability
for 10,000 Years and 1,000,000 Years**

This contention states that the DOE has under-estimated the probability of future volcanic activity by wrongly assuming that its approach to estimating the probability of igneous events for the first 10,000 years also applies to the probability estimate for 1,000,000 years. The DOE's approach fails to consider deep melting models or the entire period of volcanism from 11 million years to the present. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE's Answer ignores Clark County's explanation of published data and interpretations that indicate that volcanism near Yucca Mountain does not record a single waning system, but instead represents igneous activity that periodically starts and stops and is possibly in the beginning of a third super-episode. Supported by this data and expert, Dr. Eugene I. Smith, Clark County explained that the beginning of this potential third super-episode implies a more active igneous future for

Yucca Mountain and a higher probability (by as much as two or more orders of magnitude) of igneous activity disrupting repository drifts than that predicted in the SAR.

The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference any supporting expert opinion.¹²² Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.¹²³ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹²⁴ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.B.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.B.3.c. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his misreading of SAR and

¹²² See DOE Answer at 91.

¹²³ See *id.* at 91-92.

¹²⁴ See *id.* at 91; CLK Petition at Attachment 3.

scientific articles.¹²⁵ The DOE's argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

In this section, the DOE claims that the PVHA panel did consider deep melting models and, consequently, there is no dispute between Clark County and the DOE. In support of this claim, the DOE argues that the following information supplied to the PVHA panel demonstrates that its experts considered 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 the 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).¹²⁶

¹²⁵ See DOE Answer at 71-72.

¹²⁶ *Id.*, at 92-93.

None of the information mentioned above relates to deep melting. In fact, the definition of an “event” clearly states that magma ascends from the “mantle” and does not specify whether it is a deep or shallow mantle. The DOE’s statements above do not support its assertion that deep melting models were considered by the PVHA panel.

The DOE further argues that it considered the entire 11 million year history of volcanism, citing several statements from the SAR including:

- 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 2.3.11-18.¹²⁷

There is an important difference between mentioning a word or concept and analytically integrating it into a petrologic or probability model. It was Clark County’s intent that the phrase “essentially ignore” refer to the DOE’s failure to analytically integrate a concept into a model or a calculation. Clark County accepts that the DOE mentioned pre-5 million year volcanism in the SAR, but because this information was not

¹²⁷ *Id.*, at 93-94.

used to determine long term trends, important data regarding the episodic nature of volcanism was lost. It was critical to understand and analyze the full span of volcanism in any probability model because the process of volcanism is a major factor in controlling the timing and nature of future volcanic eruptions. As future volcanic eruptions are of critical importance to the proposed repository at Yucca Mountain, this contention should be admitted in this proceeding.

In summary, the DOE fails to provide any evidence in its Answer to suggest that the PVHA expert panel adequately considered either deep melting models or the entire 11 million year long period of volcanism in the area of and surrounding the proposed repository at Yucca Mountain. Consequently, there is a genuine dispute between the DOE and Clark County on these issues, and this contention should be admitted.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as DOE, and do not raise any additional issues. Please refer to Clark County's response to subsection 5 to the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County's response to subsection 6 to the DOE's Answer, *supra*. The NRC Staff also argue that Clark County's contention improperly references "other sections" of the SAR. The NRC

Staff repeated this identical argument from CLK-SAFETY-003 through CLK-SAFETY-011.¹²⁸ Please refer to Clark County’s response to subsection 6 to the NRC Staff’s Answer for CLK-SAFETY-003.

In concluding its Answer, the NRC Staff make a final allegation that those parts of CLK-SAFETY-007 that contend that the DOE failed to consider a one million year compliance period are based on a rule that is not final.¹²⁹ Thus, the NRC Staff argue, any portions of CLK-SAFETY-007 relating to a one million year compliance period should be disregarded.¹³⁰ The NRC Staff rely on *Duke Energy Corp.* for support.¹³¹ The NRC Staff fail to point out, however, that in that case, the NRC reassured the petitioner that “[the applicant’s] license renewal application will not be granted without the resolution of this matter” and that “by all accounts” the issue would be resolved “very soon.”¹³² No such assurances have been made in this proceeding. Moreover, on February 17, 2009, three days after the NRC submitted this Answer, the NRC announced that it approved the final rule incorporating the EPA standards for the repository. (See Accession No. ML090430549). Accordingly, the NRC Staff’s argument on this point should be rejected.

¹²⁸ Cf. NRC Staff Answer at 64-65.

¹²⁹ See NRC Staff Answer at 75-76.

¹³⁰ See *id.* at 76.

¹³¹ *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, & 3), CLI-99-11, 49 NRC 328, 345 (1999) (citing *Potomac Elec. Power Co.* (Douglas Point Nuclear Generating Station, Units 1 & 2), ALAB-218, 8 AEC 79, 85 (1974); *Duke Power Co.* (Catawba Nuclear Station, Units 1 & 2), ALAB-813, 22 NRC 59, 86 (1985); *Private Fuel Storage, L.L.C.*, (ISFSI), LBP-98-7, 47 NRC 142, 179 (1998)).

¹³² *Id.* at 346.

CLK-SAFETY-008
**The DOE Ignores 11 Million Year Volcanism Data
and Instead Relies On Only 5 million Year Volcanism Data**

This contention states that the 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. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County' contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE's Answer ignores Clark County's explanation of published data and interpretations that indicate that volcanism near Yucca Mountain does not record a single waning system, but instead represents igneous activity that periodically starts and stops and is possibly in the beginning of a third super-episode. Supported by this data and expert, Dr. Eugene I. Smith, Clark County explained that the

beginning of a possible third super-episode implies a more active igneous future for Yucca Mountain and a higher probability (by as much as two or more orders of magnitude) of igneous activity disrupting repository drifts than that predicted in the SAR. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference any supporting expert opinion.¹³³ Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.¹³⁴ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹³⁵ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.B.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.B.3.c. Accordingly, the DOE's Answer to this section should be rejected.

¹³³ See DOE Answer at 99.

¹³⁴ See *id.* at 99-100.

¹³⁵ See *id.* at p.99; CLK Petition at Attachment 3.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his misreading of the SAR and scientific articles.¹³⁶ The DOE's argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

In this section, Clark County's contention specifically deals with the fact that the DOE has relied on chemistry of surface basalt over the past 5 million years to predict future trends of volcanism and has not integrated data from basalt core collected from borings in Crater Flat, Amargosa Valley, and Jackass Flat. The DOE's Answer fails to refute this contention. Accordingly, a genuine dispute exists between Clark County and the DOE.

Although some of the PVHA experts did include events earlier than 5 million years in their probability models, none properly considered long terms trends or patterns of volcanism. The philosophy of using data from post-5 million year old basalt has continued to the present as evidenced by the work reported in Valentine and Perry (2007).¹³⁷ The data in this paper uses geochemical indices that reflect the degree of partial melting of the mantle demonstrating that in the last 5 million years, basaltic volcanism resulted from a steady decrease in the degree of partial melting. This evidence

¹³⁶ See DOE Answer at 71-72.

¹³⁷ See Valentine, G.A. and Perry, F.V., "Tectonically Controlled, Time- Predictable Basaltic Volcanism from a Lithospheric Source," (2007), LSN# DN2002382703 at 19 and 201-16 (discussed and cited in CLK Petition, at pp.37, 37 n.34, 62 and 62 n.54).

is used to suggest that basaltic volcanism in the Yucca Mountain area is dying and that future events will be rare.

While Clark County does not disagree with the conclusion that the degree of partial melting is decreasing, its point is that if the full 11 million year record is used, two such trends are evident. These trends indicate that volcanism is periodic and thus raise the possibility that another peak of activity will occur. If the DOE would have analyzed the entire record using the same techniques they used for the post-5 million year period, they would have observed these same trends.

The DOE further argues that the link between chemistry and age reported by its expert Dr. Eugene I. Smith is tenuous, but fails to provide support for this conclusion or an alternative explanation. Recall that the core in question was actually obtained and catalogued by the DOE itself. Accordingly, the data used in Clark County's contention was obtained from work done by the DOE itself.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as DOE, and do not raise any additional issues. Please refer to Clark County's response to subsection 5 to the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County's response to subsection 6 to the DOE's Answer, *supra*. The NRC Staff also argue that

Clark County's contention improperly references "other sections" of the SAR. The NRC Staff repeated this identical argument from CLK-SAFETY-003 through CLK-SAFETY-011.¹³⁸ Please refer to Clark County's response to subsection 6 to the NRC Staff's Answer for CLK-SAFETY-003.

¹³⁸ Cf. NRC Staff Answer at 80-81 *with* NRC Staff Answer at 54-55.

CLK-SAFETY-009
The DOE Fails to Consider
Alternative Igneous Event Conceptual Models

This contention states that the 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. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE's Answer ignores Clark County's lengthy explanation of published data and interpretations that indicate the presence of deep melting in the region including and surrounding the proposed repository site at Yucca Mountain.¹³⁹ Supported by this data and expert, Dr. Eugene I. Smith, Clark County identified that the DOE's 1996 PVHA was outdated and has failed to substantially update its findings therein to comport with the latest scientific knowledge of the area. The

¹³⁹ See CLK Petition at 66-70.

DOE's failure to update its findings from the 1996 PVHA results in an underestimation of the probability of repository disruption, something that is plainly material to this proceeding. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference any supporting expert opinion.¹⁴⁰ Yet, in the next sentence of its Answer, the DOE complains that the expert opinion proffered for this contention is “not sufficient.”¹⁴¹ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹⁴² Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.B.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.B.3.c. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE claims there exists no genuine dispute of material fact, alleging that the facts upon which Dr. Smith relies are the result of his “misreading” of the SAR and

¹⁴⁰ See DOE Answer at 106.

¹⁴¹ See *id.*

¹⁴² See *id.*; CLK Petition at Attachment 3.

scientific articles.¹⁴³ The DOE’s argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

In its Answer, the DOE argues that “[t]his contention is another attempt by Clark County to litigate its expert’s controversial theory that the asthenosphere is the source of basaltic magma in the Yucca Mountain region.”¹⁴⁴ Clark County strongly disagrees with this evaluation of its expert’s work. The concept of deep melting is accepted as a valid concept by the scientific community, far from “controversial” as the DOE claims.

After Clark County’s expert, Dr. Eugene I. Smith, first proposed the deep melting model in Wang et al. (2002),¹⁴⁵ the concept has been published in peer reviewed journals and has been rigorously reviewed by the scientific community.¹⁴⁶ Although, when first proposed, the deep melting model was considered controversial, rigorous peer review has resulted in its acceptance as a valid method that explains the production of basaltic magma and the location of Quaternary and Pliocene volcanic fields.

The DOE also claims that Clark County is incorrect in stating that “the DOE’s volcanic hazards assessment is based on an outdated PVHA, and that the PVHA experts

¹⁴³ See *id.* at 109.

¹⁴⁴ *Id.* at p.103.

¹⁴⁵ Wang, K., Plank, T., Walker, J.D., and Smith, E.I., A mantle melting profile across the Basin and Range, southwestern USA: *Journal of Geophysical Research*, v. 107, no. B1, 10.1029/2001JB000209 (2001).

¹⁴⁶ See *e.g.*, 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, p. 4-11; Smith, E.I. and Keenan, D.L., 2005, Yucca Mountain could face greater volcanic threat: *EOS, Transactions of the American Geophysical Union*, v. 86, no. 35, p. 317; Smith, E.I., Conrad, C.P., Plank, T., Tibbetts, A., Keenan, D., 2008, Testing models for basaltic volcanism: implications for Yucca Mountain, Nevada: *American Nuclear Society, Proceedings of the 12th International High-Level Radioactive Waste Management Conference*, p. 157-164.

based their results on the assumption of shallow melting to produce basaltic magma.”¹⁴⁷

The DOE argues:

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 the DOE nor the PVHA experts assumed that shallow melting produces basaltic magma in the Yucca Mountain region, and 3) the 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.¹⁴⁸

Regarding reasons 1 and 2, Clark County agrees that the PVHA experts were introduced to alternative models. In fact, Clark County’s expert, Dr. Eugene I. Smith, presented his alternative models to the PVHA experts and helped lead a field trip to demonstrate his interpretations. The PVHA experts, although introduced to various melting models, qualitatively adopted the DOE model of shallow melting while never quantitatively integrating it into their models. All of the PVHA experts accepted the DOE’s interpretation that volcanic activity decreasing in volume and number of events over the last 5 million years was an indicator of a future marked by a low probability for eruptions. While the DOE certainly mentions the concept of asthenospheric melting in the PVHA report, none of the PVHA experts considered the consequences of deep melting in actual probability calculations. In fact, every PVHA expert based probability calculations on vent location, number of events, dike dimensions and orientation and their interpretation of a region of interest. None of the PVHA experts quantitatively considered the effects of a petrologic model in their probability estimates. Clark County considers these omissions as a major problem with the PVHA report.

¹⁴⁷ DOE Answer, at 106 (citing CLK Petition, at 64).

¹⁴⁸ *Id.* at 106-07.

Regarding reason 3: the DOE points out that “an update to the PVHA (PVHA-U) was performed.”¹⁴⁹ The DOE goes on to explain that the PVHA-U did 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.”¹⁵⁰

However, the DOE improperly cites to the PVHA-U here. The Chief Administrative Judge for the ASLB Panel has specifically ordered:

[A]ll answers filed in response to petitions containing contentions directed to the DOE’s June 3, 2008 application shall be addressed solely to the provisions of the DOE’s original June 3, 2008 application and not to any subsequent updates or supplements.¹⁵¹

The PVHA-U was not included in the DOE’s original June 3, 2008 application. In fact, it was not even posted to the LSN until September of 2008.¹⁵² Thus, the DOE’s use of the PVHA-U in its argument here is inappropriate and should be ignored.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as DOE, and do not raise any additional issues. Please refer to Clark County’s response to subsection 5 of the DOE’s Answer, *supra*.

¹⁴⁹ *Id.*, at p.111.

¹⁵⁰ *Id.* (quoting Boyle, W.J., “Transmittal of Report: Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada,” to NRC (October 17, 2008) (LSN# DEN001606520)).

¹⁵¹ ASLB Panel Before the Chief Administrative Judge Order (Addressing Procedural Matters) (Jan. 15, 2009) at p.2.

¹⁵² *See* Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada Rev. 01 (09/02/2008) (LSN# DEN001601965).

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County's response to subsection 6 of the DOE's Answer, *supra*. The NRC Staff also argue that Clark County's contention improperly references "other sections" of the SAR. The NRC Staff repeated this identical argument from CLK-SAFETY-003 through CLK-SAFETY-011.¹⁵³ Please refer to Clark County's response to subsection 6 to the NRC Staff's Answer for CLK-SAFETY-003.

¹⁵³ See NRC Staff's Answer, at pp.64-65.

CLK-SAFETY-10
The DOE Ignores Igneous Event Data Evaluated
Since 1996 in the Total System Performance Analysis

This contention states that the DOE's assessment of the frequency of igneous events in the Application ignores information and analyses since 1996 which would, if considered, have required a significant change in the TSPA and, as a result the Application is not complete or accurate in all material respects. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

In this section, the DOE's Answer ignores Clark County's explanation and citation of published data and interpretations that are pertinent to volcanic hazard analysis at Yucca Mountain but are not considered in the DOE's application.¹⁵⁴ Supported by this data and expert, Dr. Eugene I. Smith, Clark County identified that the DOE's 1996 PVHA was outdated and has failed to substantially update its findings therein to comport

¹⁵⁴ See CLK Petition at 73-74 (citing 14 reports and studies published since 1996 that were not considered in the DOE's application).

with the latest scientific knowledge on volcanic hazard analysis. The DOE's failure to update its findings from the 1996 PVHA results in an underestimation of the probability of repository disruption, something that is plainly material to this proceeding. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference any supporting expert opinion.¹⁵⁵ Yet, in the next paragraph of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.¹⁵⁶ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹⁵⁷ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.B.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.B.3.c. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

¹⁵⁵ See DOE Answer at 116.

¹⁵⁶ See *id.*

¹⁵⁷ See *id.*; CLK Petition at Attachment 3.

The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his misreading of the SAR and scientific articles.¹⁵⁸ The DOE's argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

The DOE argues that it has no legal duty to "mention or incorporate the results of studies performed, and papers published, after issuance of the PVHA in 1996."¹⁵⁹ Instead of citing to a case or regulation to support this argument, the DOE argues that the burden is on Clark County to provide legal authority that such a duty exists. The DOE's attempt to shift the burden back to Clark County is illogical when this Panel considers the fact that Clark County already presented legal authority for its position in the Petition:

10 CFR § 63.10 requires that the Application be complete and accurate in all material respects and include all information with known significant implications for the public health and safety. In addition, 10 CFR § 63.21(a) requires that the Application be as complete as possible in light of information reasonably available at the time of docketing.¹⁶⁰

The DOE nevertheless is arguing that its refusal to properly consider studies performed and papers published after 1996 still makes the Application as "complete as possible in light of information that was reasonably available at the time of docketing."¹⁶¹ This, despite the fact that 12 years passed between the PVHA's publication in 1996 and the filing of the DOE's application on June 20, 2008.

¹⁵⁸ See DOE Answer at 119.

¹⁵⁹ *Id.*

¹⁶⁰ CLK Petition at 73.

¹⁶¹ DOE Answer at 119 (citing 10 C.F.R. § 63.21(a)).

This Panel should further note that all of the papers referenced in Clark County's contention were authored by either the DOE itself or NRC employees or contractors who were doing research to help improve the knowledge base of volcanoes near Crater Flat. Many of these studies used analog studies to make conclusions about volcanoes near Yucca Mountain. Others discuss volcanoes near Yucca Mountain and the interpretation of shallow melting and the crustal control of the timing of volcanism. These articles contain important information and interpretations that should be incorporated into probability models. Because these articles discuss important concepts, all pages of each article are pertinent.

The DOE's license application is incomplete without considering these new publications produced by the DOE's and the NRC's employees and contractors. Accordingly, the issues raised in this contention present a genuine dispute and this contention should be admitted.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same issues as DOE. Please refer to Clark County's response to subsection 5 of the DOE's Answer, *supra*.

In addition, the NRC Staff mischaracterize Clark County's contention in their Answer. Referring to CLK-SAFETY-010, they argue: "The only document that it discusses and deems a 'major omission' or 'critical' is the 'Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain, Nevada Rev. 01' (09/02/2008)

(LSN#DEN001601965).”¹⁶² This is a blatant misreading of CLK-SAFETY-010. Besides the PVHA-U, Clark County also described an “important” report completed by the NRC contractors.¹⁶³ Taking all of the 14 reports cited in the contention into account, Clark County also explained: “Omission of *all the work cited above* results in an underestimation of the probability of repository disruption . . .”¹⁶⁴ Thus, the PVHA-U is not the “only document” that Clark County discusses and deems “a major omission” or “critical” as the NRC Staff suggest.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County’s response to subsection 6 of the DOE’s Answer, *supra*. The NRC Staff also argue that Clark County’s contention improperly references “other sections” of the SAR. The NRC Staff repeated this identical argument from CLK-SAFETY-003 through CLK-SAFETY-011.¹⁶⁵ Please refer to Clark County’s response to subsection 6 to the NRC Staff’s Answer for CLK-SAFETY-003.

¹⁶² See NRC Staff Answer at 86.

¹⁶³ CLK Petition, at 74 (describing “Pre-Eruptive Magmatic Temperatures, Oxygen Fugacities, and Volatile Contents for Trachybasalts from Lathrop Wells and Red Cone, Crater Flat, Nevada, USA” (2005), LSN# NEV000005025, at 1-27).

¹⁶⁴ *Id.* (emphasis added).

¹⁶⁵ See NRC Staff Answer at 64-65.

CLK-SAFEY-011
The DOE Lacks Sufficient Geophysical Data
to Support its Volcanic Model

This contention states that high-quality geophysical data is necessary to answer the fundamental question as to whether volcanoes are primarily controlled by upper crustal structure or mantle. The 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. The DOE challenges parts 4, 5 and 6 of this contention. The NRC Staff challenge parts 5 and 6 of this contention.

REPLY TO DOE:

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The applicable standard for this part of the contention is discussed *supra*, Section II.B.4. The DOE's response to this section consists of a boiler-plate objection regarding the DOE's interpretation of "materiality", and its improper expansion of the applicable standard for admissible contentions. See discussed *supra* Section II.C.3.a. Clark County's contention meets the applicable standard and is properly admitted.

Specific to this contention, the DOE's Answer ignores Clark County's lengthy explanation of published data and interpretations that are pertinent to volcanic hazard

analysis at Yucca Mountain but are not considered in the DOE's application.¹⁶⁶ Supported by this data and expert, Dr. Eugene I. Smith, Clark County explained that the DOE's approach, which relied on upper crustal structures and local stress fields, is not supportable without high-quality geophysical data. The DOE's failure to answer the substance of Clark County's contention provides no substantive grounds for rejection. Because the DOE's generic argument fails to raise any specific argument against the contention, its Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference any supporting expert opinion.¹⁶⁷ Yet, in the next sentence of its Answer, the DOE complains that the expert opinion proffered for this contention provides only conclusory statements.¹⁶⁸ As the DOE acknowledges, Clark County proffered the expert opinion of Dr. Eugene I. Smith.¹⁶⁹ Clark County's response to the DOE's boiler-plate argument on the form of Dr. Smith's affidavit is discussed *supra* in Section II.C.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c. Accordingly, the DOE's Answer to this section should be rejected.

¹⁶⁶ See CLK Petition at 78-83.

¹⁶⁷ See DOE Answer at 125.

¹⁶⁸ See *id.*

¹⁶⁹ See *id.*; CLK Petition at Attachment 3.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE claims that a genuine dispute of material fact does not exist, alleging that the facts upon which Dr. Smith relies are the result of his “misreading” the SAR and scientific articles.¹⁷⁰ The DOE’s argument defeats its own claim when it engages in a discussion of competing interpretations of technical material between or among experts. This demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding.

In this contention, Clark County asserts that the DOE did not provide the PVHA experts with modern high-quality geophysical data required to test models of magma generation that are the critical components of a probability calculation. The DOE claims that: (1) there is no legal requirement to do so, and (2) that high-quality geophysical data was provided to the PVHA experts.

Regarding the DOE’s first claim, the DOE must provide all information to the PVHA experts as a matter of law and as a matter of good scientific practices. In addition, the Panel should note that the DOE mischaracterizes Clark County’s contention and states incorrectly that geophysical techniques must be applied to test only the deep melting model.¹⁷¹ Clark County clearly stated that geophysical techniques should be employed to test *all* melting models, not just models proposed by Clark County.¹⁷²

Regarding the DOE’s second claim, Clark County agrees that some geophysical data was provided to both the PVHA and the PVHA-U experts. The quality of this data

¹⁷⁰ See DOE Answer at 125.

¹⁷¹ *Id.* at 122.

¹⁷² See CLK Petition at 76.

can best be judged by several quotes from the PVHA-U experts who are experienced in geophysical techniques. Dr. Charles Connor, a member of the PVHA-U panel and a professor of geology and geophysics at the University of South Florida stated in his PVHA-U elicitation report:

As early as 1994, requests were made for detailed seismic tomographic studies in the YMR to assist with assessing volcanic hazards (Connor and Sanders, 1994). It is extremely unfortunate that no studies have been done. *The seismic tomographic data that are available are low in resolution and open to interpretation* (Biasi, oral communication at PVHA Workshop 1; Humphreys, personal communication). Although seismic tomographic anomalies appear to exist beneath Crater Flat and extend beneath Yucca Mountain, the DOE has not studied the YMR at the resolution available from, for instance, Northern Honshu, where such data are used in assessing potential sites for geologic high-level waste repositories (e.g., Martin et al., 2004). *I include no tomographic data in this analysis because of the low quality of available data. If high-resolution seismic tomographic data were available, the results of this hazard assessment could change considerably.*¹⁷³

Dr. Connor also states:

Volcanic hazards at YM will likely be reassessed in the future using improved information, and this information may change the hazard assessment. *Furthermore, there are techniques currently extant in the scientific community that have not been used at YM to assess volcanic hazards. For example, seismic tomography and magnetotellurics are two techniques that are used in Japan to assess long term volcanic hazards for potential HLW geologic repositories* (Martin et al., 2004; Umeda et al., 2006). Seismic tomography has revealed that along-arc variations in mantle P- and S-wave velocity correlates well with rates of volcanic activity. These data have been integrated into improved probabilistic volcanic hazard assessments. Magnetotellurics has been used to identify mid- to lower-crust magma bodies in the back-arc of Japan, in a region where no volcanism has occurred since the Mesozoic. Umeda et al. (2006) consider this to be evidence of potential future volcanic unrest, which should be factored into probabilistic assessments. *These state-of-the-art geophysical surveys have not been done at Yucca Mountain. Some seismic tomography analysis has been performed and presented to the PVHA panel* (Biasi, PVHA presentation, Humphries, written communication), but

¹⁷³ PVHA-U, at D-33 (emphasis added).

*not with a sufficiently dense network of sensors or in a dedicated experiment.*¹⁷⁴

Dr. Bruce Crowe, a member of both the PVHA and PVHA-U panel and an expert in volcanology and geophysics stated: “I examined but did not use the teleseismic tomography data for assigning frequency zones because of low resolution, coarse grid size, and ambiguous interpretations.”¹⁷⁵ Thus, two of the DOE’s own experts found that the geophysical data provided was low-resolution and not suitable for use in their probability models.

The DOE also claims that the PVHA panel did not rely solely on upper crustal models but instead considered a range of models including deep melting.¹⁷⁶ Clark County agrees that the PVHA experts were introduced to alternative models. In fact, Clark County’s expert, Dr. Eugene I. Smith, presented his alternative models to the PVHA experts and helped lead a field trip to demonstrate his interpretations. The PVHA experts, although introduced to various melting models, qualitatively adopted the DOE model of shallow melting while never quantitatively integrating it into their models. All of the PVHA experts accepted the DOE’s interpretation that volcanic activity decreasing in volume and number of events over the last 5 million years was an indicator of a future marked by a low probability for eruptions. While the DOE certainly mentions the concept of asthenospheric melting in the PVHA report, none of the PVHA experts considered the consequences of deep melting in actual probability calculations. In fact, every PVHA expert based probability calculations on vent location, number of events,

¹⁷⁴ PVHA-U, at D-2 and D-3 (emphasis added).

¹⁷⁵ PVHA-U, at D100 (emphasis added)

¹⁷⁶ See DOE Answer at 127.

dike dimensions and orientation and their interpretation of a region of interest. None of the PVHA experts quantitatively considered the effects of a petrologic model in their probability estimates. Clark County considers these omissions as a major problem with the PVHA report.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff adopted the DOE's position here. Please refer to Clark County's response to subsection 5 of the DOE's Answer, *supra*.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The NRC Staff raise the same issues as the DOE. Please refer to Clark County's response to subsection 6 of the DOE's Answer, *supra*. The NRC Staff also argue that Clark County's contention improperly references "other sections" of the SAR. The NRC Staff repeated this identical argument from CLK-SAFETY-003 through CLK-SAFETY-011.¹⁷⁷ Please refer to Clark County's response to subsection 6 to the NRC Staff's Answer for CLK-SAFETY-003.

¹⁷⁷ See NRC Staff's Answer, at 92.

This contention states that the DOE lacks the requisite institutional integrity to be granted a license to construct and operate a repository in a safe and secure manner for high level radioactive waste and spent nuclear fuel at Yucca Mountain. The DOE challenges parts 1, 2, 3, 4, 5 and 6 of this contention. The NRC Staff challenge part 3 of this contention.

REPLY TO DOE:

1. A brief statement of the contention

The DOE claims that Clark County does not explain with specificity the particular legal or factual issues it seeks to litigate. The DOE failed to read the statement. The DOE's integrity and competence are issues of concern here. The DOE's lack of integrity and competence present significant safety issues that should be determined on their merits. Accordingly, this contention should be admitted.

2. A summary of the basis for the contention

The DOE simply states that Clark County's statement of contention and the explanation for the basis of contention is "unconnected," offering no specific challenge to the basis for this contention. Nevertheless, the NRC has explained:

[T]he brief explanation of the basis that is required by § 2.309(f)(1)(ii) helps define the scope of a contention -- the reach of a contention

necessarily hinges upon its terms coupled with its stated bases. But it is the contention, not “bases,” whose admissibility must be determined.¹⁷⁸

Thus, notwithstanding the DOE’s claim, its challenge on this section is immaterial as dismissal on the bases alone is improper.

3. A demonstration that the contention is within the scope of the hearing

The DOE claims that it is immune from examination due to Congress’ choice of the DOE as the applicant, and that the DOE has been “assigned substantial national security responsibilities in this country and around the world.”¹⁷⁹ The DOE status as a federal agency fails to protect it from the scrutiny required of *every* applicant before the Commission.

That the DOE is a branch of the federal government that may be entrusted with substantial national security responsibilities in this country and around the world is neither dispositive, nor is it definitionally comforting. The issue is one of public safety and whether the DOE possesses the requisite institutional integrity to construct and operate a repository for high level radioactive waste and spent nuclear fuel at Yucca Mountain in a safe and secure manner.

The DOE also improperly, albeit curiously, argues that it should not be held to as high a standard as that which is applied to a private applicant.¹⁸⁰ In a matter as important as the licensing of a high level waste facility, the standard is that of the public interest. That standard does not adjust on a sliding scale based on the identity of the applicant -- the consequences of exposure to high level waste are not lesser when releases are

¹⁷⁸ *Crow Butte Resources, Inc.* (License Amendment for the North Trend Expansion Project), 67 NRC 241, ASLBP No. 07-859-03-MLA-BD01, (slip op. at 31) (2008).

¹⁷⁹ DOE Answer at 132.

¹⁸⁰ *See* DOE Answer at 132.

attributable to the DOE rather than to a private party. Clark County proffered facts and evidence demonstrating that the DOE has shown a patent disregard for safety and a culture of and unwillingness to abide by regulatory requirements; issues that are material here.

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The DOE argues that “Clark County’s challenge to the DOE’s general integrity and management competence go beyond the information required by 10 C.F.R. § 63.21(c)(22) and, therefore, its fitness to hold the construction authorization is not material to the findings the NRC must make in this proceeding.”

The DOE’s one sentence response is merely a recitation of its response to the previous section. Further, it fails to address the obvious fact that the applicant’s integrity is material to the NRC’s determination of whether there can be a “reasonable assurance of operation without endangering the health and safety of the public.”¹⁸¹ Having failed to adequately address the material requirement in its Answer, the DOE’s Answer to this section should be rejected.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference any supporting expert opinion.¹⁸² However, this contention is supported by expert opinion and facts sufficient

¹⁸¹ 10 C.F.R. § 63.31(a)(2).

¹⁸² See DOE Answer at 139.

to demonstrate the contention for purposes of admissibility.¹⁸³ Clark County’s response to the DOE’s boiler-plate argument on the form of its expert’s affidavit is discussed *supra* in Section II.C.3.b, and its reply to the DOE’s boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE argues that “a petitioner may not use allegations of historical DOE deficiencies or alleged management improprieties as a basis for an integrity-based contention.”¹⁸⁴ Once again, the DOE has misstated the applicable standard. The NRC has explained that historical allegations, if made, “must relate directly to the proposed licensing action.”¹⁸⁵ Thus, while this proceeding is “not a forum only to litigate historical allegations or past events,” references to those events are permissible if they have a “direct bearing on the challenged licensing action.”¹⁸⁶

As explained in Clark County’s Petition:

[T]he DOE’s lack of integrity bears directly to the issue of safety. Clark County has legitimate concerns whether the DOE can or will construct or operate the repository in a safe manner based on documented evidence of the DOE’s institutional failures. These failures include, but are not limited to, the DOE’s unwillingness to abide by agreements with states and local governments, even when ordered by a Court to comply with the terms of such agreements.

As with WIPP in Carlsbad, New Mexico, the DOE failed to provide an effective emergency management system (“EMS”) in Chapter 6 of the

¹⁸³ See CLK Petition at Attachment 2.

¹⁸⁴ DOE Answer at 142.

¹⁸⁵ *Dominion Nuclear Connecticut, Inc. (Millstone Nuclear Power Station, Units 2 and 3)*, CLI-01-24, 54 NRC 349, 366 (2001).

¹⁸⁶ *Id.*

Application or the pertinent portions of Appendices A thru H for Yucca Mountain. The DOE thus ignored the requirement to address emergency management systems and assurances of maintaining public safety. Rather than addressing such requirements, the DOE improperly relies upon the NWPA Section 180(c) (improperly alleging that the issue of safety and emergency management systems is one of post licensing funding) as justification for its failure to analyze and consider such impacts, and improperly extracted the issue as a matter to be addressed upon implementation *after* the licensing decision is made. Thus, Clark County and the public are left with no assurances or safeguards to prevent the DOE from engaging in the same practices as it has done elsewhere. As explained in Section 5 of this contention, an evaluation of the lessons learned from the DOE's behavior and actions relative to WIPP, raises a legitimate question and concern about the DOE's integrity, and whether and how AULGs can enforce such obligations.¹⁸⁷

Clark County's historical allegations and the documents cited to support those allegations are in fact directly tied to the DOE's present behavior in this proceeding. Instead of acknowledging this correlation, the DOE merely states it will "respond[] to Clark County's claims that the DOE failed to evaluate impacts of emergency management and safety in its response to CLK-NEPA-001."¹⁸⁸ This assertion is incorrect and demonstrates that a genuine issue of material fact exists that should be properly explored in this proceeding. Accordingly, the DOE's argument should be rejected and this contention admitted.

REPLY TO NRC STAFF:

3. A demonstration that the contention is within the scope of the hearing

The NRC Staff adopted the DOE's position here. Please refer to Clark County's response to subsection 3 to the DOE's Answer, *supra*. In addition, the NRC Staff allege

¹⁸⁷ CLK Petition at 89-90 (citations omitted).

¹⁸⁸ DOE Answer at 147.

that “the NRC inspection and oversight process will provide ongoing confidence into the future that DOE as the licensee will comply with applicable regulations.”¹⁸⁹ The NRC Staff fail to cite a single case or example to support this argument. Moreover, this argument demonstrates the NRC Staff’s approach to this contention and possibly each of the 319 contentions filed in this proceeding. Instead of addressing the issue of admissibility, the standard applied by the NRC Staff here is whether the NRC inspection and oversight process will be able to cure the LA so it will eventually be able to comply with the applicable regulations. This standard violates the admissibility requirements of 10 C.F.R. § 2.309(f) and should be rejected.

¹⁸⁹ NRC Staff Answer at 95.

CLK-NEPA-001
The DOE Fails to Evaluate Impacts on
Emergency Management and Public Safety

This contention states that the DOE's Final Supplemental Environmental Impact Statement ("FSEIS") fails to provide meaningful analyses concerning the effects on emergency management and public safety impacts on Clark County associated with the siting of a high level radioactive waste and spent nuclear fuel repository, in violation of NWPA and NEPA and their respective implementing regulations. The DOE challenges parts 3, 4, 5 and 6 of this contention. The NRC Staff challenge part 5 of this contention.

REPLY TO DOE:

3. A demonstration that the contention is within the scope of the hearing

The DOE mistakenly considers Clark County's contention as a challenge to the DOE's transportation decisions. At issue in this contention is not the NRC's authority over transportation facilities and activities, but on emergency response impacts associated with the transportation of radioactive material. Regardless of which rail corridor is ultimately constructed, Clark County's proximity and size render it a first responder in the event of an accident. This contention challenges the Environmental Impact Statement (the "EIS") and supplements prepared by the DOE and whether the Application satisfies the applicable requirements of NEPA and the NRC's NEPA regulations at 10 C.F.R. Part 51 and is consistent with the Commission's Notice, which provides that environmental contentions may be raised in the proceeding, and that such contentions must meet the regular requirements, as well as the factors outlined in 10 CFR 51.109(e).

The DOE's objection here is on the grounds that the NRC does not have regulatory authority over the DOE's transportation facilities and activities, and thus has no direct NEPA responsibilities with respect to those facilities. DOE Answer at 166. The DOE also mistakenly claims that any challenges to the analysis of impacts arising from the DOE transportation decisions are within the original and exclusive jurisdiction of the federal courts of appeal. The DOE's position is inconsistent with the NRC's representations to the U.S. Court of Appeals in *Nuclear Energy Institute v. Environmental Protection Agency*, 373 F.3d 1251 (D.C. Cir. 2004). Therein, "Government counsel's unequivocal representation to the court during oral argument that Nevada will not be foreclosed from raising substantive claims against the FEIS in administrative proceedings comports with the terms of the regulation and reflects a reasonable and compelling interpretation." *Id.* at 1313-1314. Thus any assertion that that parties may not challenges the FEIS in any NRC proceeding to decide whether to adopt the FEIS is without merit. The NRC has the burden of complying with NEPA and the NRC may make an independent judgment on whether the applicant's EIS satisfies the requirements under NEPA and CEQ.

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The DOE claims this contention is not material to the findings the NRC must make and that Clark County's contention fails to meet the requirements of 2.326 which requires the petition to address a significant safety or environmental issue and to demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially. Clark County's contention does in

fact meet this standard. Clark County has proffered information which addresses a significant safety and environmental issue, and it has demonstrated that the DOE's failure to analyze that information renders its evaluation deficient.

As stated in Clark County's Petition, NEPA requires the DOE to evaluate economic impacts of the federal action to the surrounding communities.¹⁹⁰ The DOE has failed to do so, notwithstanding its claims to the contrary. Clark County has a duty to its citizens and other counties relying on mutual aid agreements to provide resources for the public safety and welfare of its citizens. Due to the risk of radiological disaster created by the proposed repository at Yucca Mountain and the transportation of HLW casks through Clark County, emergency management systems must be in place *before* the DOE's Application is approved. The DOE must understand the safety impacts before it prepared an emergency management plan. Yet, the DOE has repeatedly refused to provide a meaningful analysis of the impacts to safety and it is omitted from the FEIS and the DOE's Answer.

The DOE claims that, "as a matter of law, 10 CFR 63.21 does not require that emergency plans be completed at this stage of the proceeding." DOE Answer at 153. And, that it need only contain a "description of the plan for responding to, and recovering from, radiological emergencies that may occur at any time before permanent closure, and not the detailed plan itself." *id.* The DOE's Answer misses the point. First, even if one accepts the DOE's Answer, this contention is properly admitted in that denial of contentions concerning undeveloped portions of emergency plans would unfairly ignore

¹⁹⁰ See CLK Petition at 91 (citing 10 C.F.R. § 51.91; 10 C.F.R. Part 51, Subpart A, Appendix A).

the insufficient development of these portions.¹⁹¹ But, Clark County’s contention goes beyond identifying an emergency plan. This contention concerns the DOE’s failure to properly evaluate the impacts to Clark County. The impacts, which the DOE is obligated to evaluate as part of the EIS, must be evaluated and understood before the DOE’s Application can be approved.

The DOE claims that “[r]epository-generated impacts to public services . . . would be small.”¹⁹² However, the DOE’s citation deals only with general socioeconomic impacts to the region and fails to acknowledge that Clark County’s contention focuses on specific economic and fiscal costs and impacts to the Public Safety and Emergency Management community and not on impacts to general public services. While the DOE’s analysis eventually does deal with involved and noninvolved workers (Section 4.1.7 at 4-52), this analysis fails to include first responders in the communities surrounding the proposed repository and Clark County. Thus, the material cited by the DOE here is not responsive to the research cited by Clark County in its contention.¹⁹³

In fact, the DOE has never provided any evidence that it has read or understood the research conducted by Clark County that underlies the basis of this contention. The DOE’s aggregate modeling of regional impacts on the economy does not address the fiscal and economic impacts on the Clark County public safety and first responder

¹⁹¹ See *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), LBP-84-18, 19 NRC 1020, 1028 (1984).

¹⁹² DOE Answer at 151 (quoting Section 4.1.6.1.5 of the Repository SEIS and citing 2002 FEIS, Vol. I at 4-48 and Repository SEIS Vol. I at Section 4.51 for additional support).

¹⁹³ See CLK Petition at 94 (citing “Impacts to Clark County Public Safety Agencies Resulting From the Yucca Mountain Project”, 1999, LSN #: CLK000000001; “Impacts to Clark County and Local Governmental Public Safety Agencies Resulting From the Yucca Mountain Project”, 2001, LSN #: CLK000000006; “An Update of the Projected Impacts to Clark County and Local Governmental Public Safety Agencies Resulting from the Transportation of High-Level Nuclear Waste to Yucca Mountain”, 2005, LSN# CLK000000055).

community clearly estimated and documented in the studies cited by Clark County. Thus, the DOE has failed to take a “hard look” at what additional activities must be taken to ensure that Clark County provides adequate response and mitigation in the event of a disaster.

The DOE also cites to the Rail Alignment EIS to argue that it has fully evaluated the public services impacts of constructing a railroad.¹⁹⁴ A closer look at this citation, however, reveals that once again, the impacts to the public safety community in Clark County are largely ignored, as is the response and preparedness responsibilities and necessary activities of the first response community in Clark County in the event of a large incident. As Clark County has demonstrated in its research and comments on promulgated Section 180(c) rules and policies, the DOE continues to ignore a large number of activities and impacts caused by both the facility itself, as well as rail and truck transport thereto.¹⁹⁵ Although this reference also includes statements by the DOE about education, fire protection and law enforcement services and impacts, these statements fail to address the impacts in Clark County and are therefore unresponsive to Clark County’s contention here.

The DOE also cites a Section 180(c) program to provide technical assistance to states and Native American governments (“Tribes”) for training public safety officials at the local and tribal level.¹⁹⁶ The manner it is being interpreted, along with the DOE’s failure to examine all local first responder impacts, constitutes segmenting. Clark County has documented a large number of these public safety and emergency management

¹⁹⁴ See DOE Answer at 151 (citing Rail Alignment EIS, Vol. III at 4-300 to -301).

¹⁹⁵ See n.193 *supra*.

¹⁹⁶ See the DOE’s Answer at p.154 (citing 2002 FEIS, Vol. II, Appendix M at M-20).

impacts with enormous fiscal and economic effects.¹⁹⁷ The DOE's narrow implementation of Section 180(c) results in no analysis of first responder and public safety community impacts and effects. In addition, the DOE's cited material fails to include any examination of impacts. Instead, it only speaks to a process of determining needs. Had the DOE actually examined these effects and estimated their fiscal impacts, it would be in a position to design a process to alleviate the impacts rather than suggesting a piecemeal process that will document training needs only.

The DOE also cites to the Repository SEIS, Vol. II, Appendix H at H-18 where the DOE again describes its Section 180(c) program for Training of State and American Indian Public Safety Officials.¹⁹⁸ Here, the DOE apparently believes that describing some of its outreach to State Regional Groups such as the Transportation External Coordination Working Group Topic Group satisfies the NEPA requirement to document the impacts on public safety and first responders from its siting of the repository and subsequent transportation campaign. The formation of these groups, while necessary, does not result in adequate documentation and study of the effects on public safety. Interestingly, the DOE has recently informed Regional Transportation Groups, such as the Western Interstate Energy Board's High level Nuclear Waste Committee, that it will end its funding in the next fiscal year. Hence, any insights from this group about the effects of the proposed repository that might have been pointed out will be lost. Thus, the

¹⁹⁷ See n. 193, *supra*

¹⁹⁸ See DOE Answer at 154.

DOE's Answer and the references cited therein do not address the impacts and effects described in Clark County's studies of impacts on the first responder community.¹⁹⁹

The DOE also argues that it is incapable of planning for emergency response until the transportation routes are finalized. The DOE ignores its own report that 80% of the onsite Yucca Mountain Repository workers would reside in Clark County (Las Vegas).²⁰⁰ The DOE also ignores the report cited in Clark County's Petition that demonstrates that an estimated 100% of the truck casks would travel through Clark County and 8% of the rail cask shipments would traverse Clark County.²⁰¹ Even if this did not turn out to be the case, Clark County still has memoranda of understanding or mutual aid agreements with a variety of the counties and cities throughout the region that would have to be employed in the event of an emergency.²⁰² Thus, final transportation routes are not necessary for the DOE to begin emergency planning.

The DOE provides citations to their claims that the "the DOE has considered the potential impacts on counties in Nevada related to the transportation of SNF and HLW."²⁰³ Thus, the DOE alleges, "Clark County cannot demonstrate that the DOE failed to take a 'hard look' at the potential impacts on emergency services."²⁰⁴ However, upon

¹⁹⁹ See n. 193, *supra*.

²⁰⁰ See CLK Petition, at p.94 (citing DOE FSEIS, Appendix A at A-8 (2008) LSN# DEN001593557).

²⁰¹ See *id.* (citing State of Nevada Comments on DOE's Draft Supplement Environmental Impact Statement for a Geological Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, P. 8 (January 9, 2008). LSN # DEN001583031).

²⁰² See n. 193, *supra*.

²⁰³ See DOE Answer at 155 (citing 2002 FEIS, Vol. I at 6-54 to -232; Repository SEIS, Vol. I at 6-32 to -60).

²⁰⁴ *Id.*

evaluation of those citations, it is evident that the DOE fails to analyze potential impacts to Clark County and its emergency services in more than a conclusory manner.

For example, the DOE cites the 2002 FEIS, Vol. I at 6-54 to 232 where it examines many impacts from three scenarios for shipping.²⁰⁵ Here the DOE does provide some insight into the methods utilized for calculating economic impacts and the factors it used in its analyses. However, upon closer inspection, the DOE neither looked at the types of fiscal effects on the first responder community in Clark County, nor did it examine the types of activities that Clark County's first responders would have to engage in to be prepared for and to be able to respond to an incident. Rather, the DOE assumed that local government, given some training, will be adequately prepared, equipped, and have the capability and capacity to deal with an incident. Clark County categorically rejects such an assumption and has provided the DOE numerous studies demonstrating that additional examination of these potential impacts is necessary to fully understand all of the effects on the first responder community.²⁰⁶

Another example is the DOE's reference to the Repository SEIS, Vol. 1 at 6-32 to -60²⁰⁷ where the DOE discusses numerous potential impacts to air quality and climate; paleontological resources; surface-water resources; ground water resources; biological resources; cultural resources; American Indian Interests; socioeconomics; occupational and public health and safety; radiological impacts; sabotage; and numerous other impacts. Nowhere in this material is there a discussion of the types of impacts on the first responder community in Clark County. In addition, the zone of influence used by the

²⁰⁵ See DOE Answer at 155.

²⁰⁶ See n.193, *supra*.

²⁰⁷ See DOE Answer at 155.

DOE in the analysis is far too small. That discussion actually amplifies Clark County's position of the DOE's lack of understanding of how the local first response community operates. This failure of understanding is a direct result of not making an effort to examine the real potential effects from an incident and how response would occur.²⁰⁸

Accordingly, the DOE's Answer and the citations cited therein fail to address the concerns presented by Clark County's contention and it should be admitted.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference the requisite supporting facts, expert opinion, and references.²⁰⁹ However, this contention is supported by expert opinion and facts sufficient to demonstrate the contention for purposes of admissibility.²¹⁰ Clark County's response to the DOE's boiler-plate argument on the form of its expert's affidavit is discussed *supra* in Section II.C.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE's objection in this section is a two sentence summary of the DOE's response to this contention. Therefore, Clark County similarly relies on the preceding

²⁰⁸ See n. 193, *supra*.

²⁰⁹ See DOE Answer at 157.

²¹⁰ See CLK Petition at Attachment 1.

sections for support that Clark County has in fact presented a genuine dispute that warrants admission of this contention.

REPLY TO NRC STAFF:

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same objections as the DOE, and does not raise any additional objections. Please refer to Clark County's response to subsections 4 and 5 to the DOE's Answer, *supra*.

CLK-NEPA-002
The DOE Fails to Analyze Known and
Feasible Rail Corridor Alternatives

This contention states that the DOE's evaluation of rail corridors is patently deficient in its failure to evaluate known alternatives to the Caliente Rail Corridor. The Rail EIS evaluates only two of five feasible known rail corridors, the Caliente Corridor and the Mina Rail Corridor, ultimately coining the Caliente Corridor as the "preferred alternative" to the Mina Rail Corridor. The DOE's analysis sets up a false choice between a feasible and non-feasible corridor and to the exclusion of consideration of three additional feasible corridors. The DOE challenges parts 3, 4, 5 and 6 of this contention. The NRC Staff challenge parts 3 and 5 of this contention.

RESPONSE TO DOE:

3. A demonstration that the contention is within the scope of the hearing

The DOE argues that the DOE's transportation decisions are not at issue in this proceeding. This ignores that the DOE included the Rail Alignment EIS, the Nevada Rail Corridor SEIS and the FSEIS in its Application, and thus constitute fundamental components of the Application. They are intrinsically and inextricably linked to the NRC review of the overall Application. Although these arguments were made in Clark County's Petition,²¹¹ they were not addressed in the DOE's Answer. For the reasons provided to this same objection (regarding scope) in CLK-NEPA-001, and the fact that the DOE failed to address to Clark County's argument, this contention is within the scope of this proceeding.

²¹¹ See CLK Petition at 97.

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The DOE argues that it did evaluate other alternatives citing the 2002 FEIS, a 2004 ROD and the Rail Corridor SEIS.²¹² These arguments are insufficient to defeat Clark County's material argument here. As stated previously in this Reply,²¹³ Clark County's definition of "consider" seems to be a far cry from the DOE's definition. Clark County's point here is not that the DOE failed to "mention" other alternatives. But there is a difference between merely mentioning other alternatives, and engaging in a meaningful analysis of known transportation alternatives. As stated in Clark County's Petition, "courts have been 'especially quick to find a discussion of alternatives inadequate if it is conclusory.'"²¹⁴ A review of the DOE's citations reveals that while alternatives are mentioned, they lack the substantive analysis to describe them as anything else but "conclusory." Accordingly, Clark County has presented an issue that is material to the findings that the NRC must make and this contention should be admitted.

The DOE also argues that its "selection of the Caliente rail corridor . . . was upheld by the D.C. Circuit in *Nevada v. DOE*."²¹⁵ The DOE's conclusory citation to *Nevada*, without further explanation, lacks merit for at least three reasons. First, issues considered by the Court in *Nevada* were raised by the State of Nevada, not Clark County.

²¹² See DOE Answer at 161-62.

²¹³ See Reply to the DOE's Answer to CLK-SAFETY-003, Section 6, *supra*.

²¹⁴ See CLK Petition, at p.98 (citing NEPA LAW AND LITIGATION § 10.09[1], at 10-51; *Swain v. Brinegar*, 517 F.2d 766, 776 (7th Cir. 1975) (stating that discussion of alternatives in selection of "corridors" for highway was inadequate); *Chelsea Neighborhood Assoc. v. United States Postal Service*, 516 F.2d 378, 379 (2d Cir. 1975) (holding that conclusory discussion of alternatives to parking garage were inadequate under NEPA)).

²¹⁵ See the DOE's Answer at p.161 (citing *Nevada v. DOE*, 457 F.3d 78 (D.C.Cir. 2006)).

Thus, Clark County was not in privity with the State of Nevada on that appeal and the decision has no res judicata effect on Clark County.

Second, the arguments made by the State in *Nevada* (e.g., inadequacies related to environmental impacts on cultural resources and flood plains as well as archaeological and historic impacts),²¹⁶ are substantially different from the contentions made by Clark County herein (that the DOE failed to undertake a meaningful analysis of known transportation alternatives). Finally, the NRC has to make its own independent conclusions in this proceeding of whether the risks and impacts of a true reasonable and feasible alternative is rigorously explored and examined. These determinations cannot be made for the NRC by the D.C. Circuit and certainly were not in *Nevada*, where the Court merely applied an “arbitrary and capricious” standard to the DOE’s EIS. Accordingly, *Nevada* has no binding authority in the consideration of the LA here and the associated impacts.

The DOE also claims this contention fails to meet the requirements of 2.326 which requires the petition to address a significant safety or environmental issue and to demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially. Clark County’s contention does in fact meet this standard. Clark County has proffered information which addresses a significant safety and environmental issue, and it has demonstrated that the DOE’s failure to analyze that information renders its evaluation deficient.

²¹⁶ See *Nevada, supra*, at 93.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference the requisite supporting facts, expert opinion, and references.²¹⁷ However, this contention is supported by expert opinion and facts sufficient to demonstrate the contention for purposes of admissibility.²¹⁸ Clark County's response to the DOE's boiler-plate argument on the form of its expert's affidavit is discussed *supra* in Section II.C.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c. Accordingly, the DOE's Answer to this section should be rejected.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE's objection in this section is a two sentence summary of the DOE's response to this contention. Therefore, Clark County similarly relies on the preceding sections for support that Clark County has in fact presented a genuine dispute that warrants admission of this contention.

REPLY TO NRC STAFF:

3. A demonstration that the contention is within the scope of the hearing

The NRC Staff raise the same objections as the DOE. Please refer to Clark County's response to subsections 3 and 4 of the DOE's Answer, *supra*. In addition, the

²¹⁷ See DOE Answer at 163.

²¹⁸ See CLK Petition at Attachment 2.

NRC Staff stated, “[a]lthough the Notice of Hearing stated that issues related to the sufficiency of DOE’s NEPA analysis are within the scope of the proceeding, some such issues have already undergone judicial review” (relying on *Nevada, supra*).²¹⁹ By this statement, the NRC Staff seems to be saying that but for *Nevada*, Clark County’s contention would be within the scope of this hearing. Clark County herein explains why *Nevada* does not apply to this proceeding in its response to section 4 of the DOE’s Answer, *supra*. However, the NRC Staff’s statement in this section contradicts the DOE’s Answer to section 3, where the DOE argued that this contention is outside the scope of this hearing regardless of the D.C. Circuit’s holding in *Nevada*.²²⁰

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The NRC Staff raise the same objections as the DOE, and do not raise any additional objections. Please refer to Clark County’s response to subsections 4 and 5 of the DOE’s Answer, *supra*.

²¹⁹ NRC Staff Answer at 1265-66.

²²⁰ *See* DOE Answer at 159.

This contention states that the DOE ignored data and wrongly dismissed analyses of stigma related socio-economic impacts resulting from the perceived and actual risks associated with potential accidents during the course of transporting high level nuclear waste. The DOE's assertion in the EIS that the relevant impacts of the Caliente Rail Corridor as the "preferred alternative" on property values and tourism cannot be measured and thus are irreducible ignores evidence and data proffered by Clark County. The DOE challenges parts 3, 4, 5 and 6 of this contention. The NRC Staff challenge part 3 of this contention.

REPLY TO DOE:

3. A demonstration that the contention is within the scope of the hearing

The DOE claims that "the DOE's transportation decisions and the environmental impact statements upon which those decisions are based, including DOE's discussion of risk perception and stigma, is beyond the scope of this proceeding," DOE Answer at 166. As explained in Clark County's Response to this challenge in CLK-NEPA-001, this contention addresses environmental impacts associated with the transportation of radioactive material and is within the scope of the Commission's Notice. See Clark County's response to the DOE's Answer to CLK-NEPA-001, Item 3 *supra*.

The DOE improperly relies upon the *Public Citizen* case to support this objection.²²¹ In *Public Citizen*, the United States Supreme Court asserted that NEPA

²²¹ See DOE Answer at 166 (citing *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752 (2004)).

requires analysis of an effect “only where there is a reasonably close causal relationship between the environmental effect and the alleged cause.”²²² A “reasonably close relationship” was held to not exist in *Public Citizen* where “pollution from Mexican motor carriers was not an ‘effect’ that the Department of Transportation (DOT) had to consider because no ‘action’ by the DOT would ‘cause’ Mexican motor carriers to enter the United States.”²²³ Thus, the DOE is attempting to draw a parallel between the instant contention and the Mexican motor carriers’ situation in *Public Citizen*.

However, the DOE errs in relying on *Public Citizen* for support of its argument here. Since *Public Citizen* was decided in 2004, several cases addressing the requisite causality to necessitate a NEPA analysis have been decided that refine and narrow the applicable inquiry developed in *Public Citizen*.²²⁴ The proper inquiry states that “indirect impacts [when dealing with NEPA] need only to be ‘reasonably foreseeable’ to require assessment of the environmental impact.”²²⁵ Regulations promulgated by the Council on Environmental Quality (CEQ) define “indirect impacts” in the following form:

Indirect effects [] are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic,

²²² *Pub. Citizen, supra*, at 767.

²²³ *Id.* at 764-65.

²²⁴ See e.g., *Wyoming Outdoor Council Powder River Basin Resources Council v. U.S. Army Corps of Eng.*, 351 F.Supp.2d 1232 (D.Wyo. 2005), *Sierra Club v. Mainella*, 459 F.Supp.2d 76 (D.D.C. 2006); *Humane Society v. Johanns*, 520 F.Supp.2d 8 (D.D.C. 2007).

²²⁵ *Humane Society v. Johanns*, 520 F.Supp.2d 8, 22 (D.D.C. 2007).

historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.²²⁶

While the DOE attempts to confine this Panel's review in the narrowest fashion possible, CEQ guidelines and NEPA policy mandate that the Panel consider both the direct and indirect impacts of the proposed repository. Application of this principle leaves little doubt that the Panel must consider socioeconomic impacts including property values and tourism.

The DOE also claims that challenges to the DOE transportation decisions are within the original and exclusive jurisdiction of the federal courts of appeal. Clark County's response to the DOE's citation of *Nevada v. DOE* in its Reply to the DOE's Answer to CLK-NEPA-002, section 4, *supra*, and its Reply to the NRC Staff's Answer to CLK-NEPA-002, section 3, *supra*, respond to this allegation. Please refer to those sections. Moreover, the DOE included the Rail Alignment EIS, the Nevada Rail Corridor SEIS and FSEIS in its Application. Because all were included as fundamental parts of the Application they are intrinsically and inextricably linked to the NRC review of the overall Application.

4. A demonstration that the contention is material to the findings the NRC must make to license Yucca Mountain

The DOE claims that the issue is not material to the findings that the NRC must make, claiming that "risk perception and stigma are not effects on the physical

²²⁶ *Id.* (citing 40 C.F.R. § 1508.8(b)).

environment and therefore do not need to be considered under NEPA.”²²⁷ The DOE supports this sweeping statement by quoting *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766 (1983). However, the DOE’s reliance on this citation for support is misplaced and demonstrates the DOE’s fundamental misunderstanding of Clark County’s contention. In *Metropolitan*, the United States Supreme Court held that psychological health damage caused by risk is not cognizable under NEPA.²²⁸ The Court explained:

Risk is a pervasive element of modern life; to say more would belabor the obvious. Many of the risks we face are generated by modern technology, which brings both the possibility of major accidents and opportunities for tremendous achievements. Medical experts apparently agree that risk can generate stress in human beings, which in turn may rise to the level of serious health damage. For this reason among many others, the question whether the gains from any technological advance are worth its attendant risks may be an important public policy issue. Nonetheless, it is quite different from the question whether the same gains are worth a given level of alteration of our physical environment or depletion of our natural resources. The latter question rather than the former is the central concern of NEPA.²²⁹

Clark County’s contention is not concerned with psychological health damage. Rather, it is concerned with alterations to the physical environment, namely property values and tourism. These alterations are of “central concern of NEPA.” The fact that neither “property values” nor “tourism” are even mentioned in the DOE’s response is indicative of its failure to meet NEPA’s requirements to evaluate stigma here.

²²⁷ DOE Answer at 167.

²²⁸ *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 776 (1983).

²²⁹ *Id.* at 775-76.

The DOE also argues that there are no reliable methods to quantify risk perceptions.²³⁰ As explained in its Petition, Clark County implemented its own monitoring program which demonstrates that risk perceptions can be measured and quantified.²³¹ The DOE does not challenge Clark County's monitoring program - it ignores it. The DOE also fails to explain why the DOE cannot implement a similar program in communities across the transportation corridor alternatives, permitting measurement and prevention of any stigma related property value or tourism declines for each feasible alternative.

The DOE also claims this contention fails to meet the requirements of 2.326 which requires the petition to address a significant safety or environmental issue and to demonstrate that a materially different result would be or would have been likely had the newly proffered evidence been considered initially. Clark County's contention does in fact meet this standard. Clark County has proffered information which addresses a significant safety and environmental issue, and it has demonstrated that the DOE's failure to analyze that information renders its evaluation deficient.

For the foregoing reasons, the DOE has failed to adequately satisfy the governing regulations. An issue that is material to the findings the NRC must make in this proceeding. Accordingly, this contention should be admitted.

²³⁰ See DOE Answer at 169.

²³¹ See CLK Petition at 104.

5. A concise statement of facts or expert opinions supporting the contention, along with appropriate citations to supporting scientific or factual materials

The DOE claims that this contention does not reference the requisite supporting facts, expert opinion, and references.²³² However, this contention is supported by expert opinion and facts sufficient to demonstrate the contention for purposes of admissibility.²³³ Clark County's response to the DOE's boiler-plate argument on the form of its expert's affidavit is discussed *supra* in Section II.C.3.b. Its reply to the DOE's boiler-plate argument that Clark County must proffer more than expert opinion or facts is discussed *supra* in Section II.C.3.c.

6. Sufficient information to show a genuine dispute with the DOE, along with specific references to the portions of the Application being controverted

The DOE claims that there is no genuine issue of material fact or law on grounds that the NRC lacks jurisdiction. Clark County relies on the preceding sections for support that Clark County has in fact presented a genuine dispute that warrants admission of this contention.

RESPONSE TO NRC STAFF:

3. A demonstration that the contention is within the scope of the hearing

The NRC Staff adopted the DOE's position here. Please refer to Clark County's response to subsection 3 to the DOE's Answer, *supra*. In addition, the NRC Staff cut and pasted its previous argument from its Answer to CLK-NEPA-002, subsection 3. Please

²³² See the DOE's Answer, at p.170.

²³³ See CLK Petition, at Attachment 2 (Affidavit of Dr. Sheila Conway in support of this specific contention).

refer to Clark County's response to subsection 3 of the NRC Staff's Answer to CLK-NEPA-002, *supra*.

IV. CONCLUSIONS

For the foregoing reasons the DOE's and the NRC Staff's Answers fail to demonstrate that Clark County's fifteen contentions should not be admitted in this proceeding. Accordingly, Clark County should be granted party status to the proceeding, and its fifteen contentions should be admitted for hearing.

Respectfully submitted,

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February 24, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:

U.S. DEPARTMENT OF ENERGY

(High Level Waste Repository)

Docket No. 63-001

February 24, 2009

CERTIFICATE OF SERVICE

I hereby certify that on this day, February 24, 2009, the foregoing was served via the NRC's electronic information exchange server to the parties listed below.

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