UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:

ASLBP BOARD
09-892-HLW-CAB04
Thomas S. Moore, Chairman
Paul S. Ryerson
Richard E. Wardwell

In the Matter of	)	
	)	
U.S. DEPARTMENT OF ENERGY	)	**Docket No. 63-001-HLW**
	)	
(High Level Waste Repository)	)	**July 3, 2009**

REPLY OF THE STATE OF NEVADA TO NRC STAFF'S ANSWER TO NEV-SAFETY 202 AND 203

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On May 12, 2009, the State of Nevada (Nevada) timely filed two new contentions designated as NEV-SAFETY-202 and NEV-SAFETY-203. These new contentions focus on "fresh grounds" arising from the Nuclear Regulatory Commission's (NRC) final rule implementing the Environmental Protection Agency's (EPA) standards for the post-10,000-year Yucca Mountain performance assessment (hereinafter referred to as "NRC final rule" or "final rule").[1] On June 11, 2009, the NRC Staff ("Staff") filed an Answer objecting to most of NEV-SAFETY-202 and to all of NEV-SAFETY-203. For the reasons given below, Staff's objections are unfounded. NEV-SAFETY-202 should be fully admitted, but if the NRC rule must be interpreted to exclude it, the matter should be certified to the Commission pursuant to 10 C.F.R. § 2.335. NEV-SAFETY-203 should be certified to the Commission, as requested.

I. INTRODUCTION

NEV-SAFETY-202 builds upon admitted contentions NEV-SAFETY-009 through 012, which address processes of climate change as they should have been included in the Department of Energy's (DOE) Total System Performance Assessment (TSPA). NEV-SAFETY-203 builds upon admitted contention NEV-SAFETY-041, which addresses erosion as it should have been included in the TSPA. In general, Nevada's original TSPA contentions were drafted without regard for any constraints a future final NRC rule might impose. In reviewing the NRC final rule and its impact on Nevada's original TSPA contentions, it appeared to Nevada that contentions related to how climate change and erosion processes should have been included in the TSPA might be uniquely affected, depending on how the NRC final rule is interpreted. NEV-SAFETY-202 and NEV-SAFETY-203 put into sharp focus the critically important processes of climate change and erosion as they should have been included in the post-10,000-year TSPA and

[1] Nevada separately filed a timely petition for review of the NRC final rule in the U.S. Court of Appeals for the District of Columbia Circuit. A briefing schedule has yet to be established.

necessarily raise questions about the effect of the NRC final rule on the scope of this licensing proceeding.

II. NEV-SAFETY-202 SHOULD BE ADMITTED AND, IF NECESSARY, CERTIFIED TO THE COMMISSION

As indicated above, and in paragraph 5 of the contention itself, NEV-SAFETY-202 builds on the climate-change processes described in NEV-SAFETY-009 through 012. Staff does not object to NEV-SAFETY-202 insofar as it alleges that the TSPA fails to include the deep percolation rates in the NRC final rule. This is the least important part of the contention. The more important parts of the contention address how climate change processes should have been included in the post-10,000-year TSPA, notwithstanding the deep percolation rate in the final rule.

10 C.F.R. § 2.309(f)(1)(vi) Genuine Dispute Regarding the Application

A. The Final Rule Requires That Climate Change FEPs Included in the 10,000-Year TSPA be Included in the Post-10,000-Year TSPA As Well

Subsection 2.2.1.2 of DOE's Safety Analysis Report (SAR) identifies certain features, events and processes (FEPs) as included in the TSPA and bearing on the application of 10 C.F.R. § 63.342(c), including the climate-change FEPs 1.3.01.00.0A, 1.4.01.01.0A, and 2.3.11.03.0A. These climate-change FEPs relate to the general consideration of climate change, increases in recharge caused by climate modification, and infiltration and recharge in general, respectively. However, SAR subsection 2.3.1.1 provides that these FEPs play no role in the performance assessment after 10,000 years. After 10,000 years, no FEPs or TSPA models are used to estimate net infiltration, and instead, the deep percolation flux specified in NRC's proposed rule is used. However, quite apart from the fact that the NRC final rule specifies a different flux, and assuming for purposes of argument that FEPs 1.3.01.00.0A, 1.4.01.01.0A, and 2.3.11.03.0A capture the appropriate kinds of climate processes, Nevada believes DOE's approach to consideration of climate-change processes after 10,000 years violates the requirement in 10

C.F.R. § 63.342(c) that FEPs included in the 10,000-year performance assessment (i.e., FEPs 1.3.01.00.0A, 1.4.01.01.0A, and 2.3.11.03.0A.) must be included in the post-10,000-year performance assessment as well. This aspect of NEV-SAFETY-202 presents a pure legal question because Staff disagrees with Nevada's interpretation of 10 C.F.R. § 63.342(c). Staff is wrong.

The literal and unambiguous language of the Commission rule disposes of any interpretation question. *See Pacific Gas & Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2)*, CLI-84-5, 19 NRC 953, 969 n.5 (1984). 10 C.F.R. § 63.342(c) provides that "[f]or performance assessments conducted to show compliance with §§ 63.311(a)(2) and 63.321(b)(2) [the post-10,000-year dose standards], DOE's performance assessment *shall* project the continued effects of the features, events and processes included in paragraph (a) of this section [for the 10,000-year assessment] beyond the 10,000-year post-disposal period through the period of geologic stability" [emphasis added]. The next sentence emphasizes this point by stating that "DOE *must* evaluate *all* of the features, events or processes included in paragraph (a)," "and *also*" assess effects of seismic and igneous scenarios, climate change and corrosion [emphasis added]. The language is on-point and unambiguous: DOE "shall project" FEPs included in the 10,000-year performance assessment "beyond the 10,000-year post-disposal period through the period of geologic stability," and certain FEPs relating to effects of seismic and igneous scenarios, climate change and corrosion must "also" be included in the post-10,000-year assessment even if they were not included in the 10,000-year assessment.

Staff argues (Answer at 7) that the final rule "does not require DOE to carry its FEP analysis for climate change for the first 10,000-year period through the subsequent 990,000-year period." Staff does not even attempt to reconcile this interpretation with the actual language of

the rule, which clearly states the exact opposite. Staff's brief discussion of the history of the regulation ignores explanatory material in the preamble to the final rule that is directly on-point and supports Nevada. The Commission explains in its preamble that, in the post-10,000-year performance assessment, "DOE is required to include those FEPs that are screened into the performance assessments for the first 10,000 years after repository closure *and* the four FEPs specifically identified for inclusion, i.e., seismicity, igneous activity, climate change, and general corrosion" [emphasis in the original] (74 Fed. Reg. 10811, 10817 (March 13, 2009)).

Staff tries to support its position by citing, without explanation, to the language of 10 C.F.R. § 63.342(c)(2), as if the rule on its face supported Staff's interpretation (Answer at 7). As indicated above, the rule on its face directly contradicts Staff's interpretation. Staff then argues (Answer at 7-8) that EPA intended to limit DOE's post-10,000-year climate-change analysis to a specific effect, regardless of what kinds of climate-change analyses were included in the 10,000-year assessment and that, because NRC's final rule was intended to be consistent with EPA's rule, it must follow that NRC's final rule has the same limiting effect. Staff's minor premise is correct, but the major premise is wrong.

The EPA rule at 40 C.F.R. § 197.36(c) provides that "[f]or performance assessments conducted to show compliance with §§ 197.20(a)(2) and 197.25(b)(2) [the EPA post-10,000-year dose standards], DOE's performance assessment *shall* project the continued effects of the features, events and processes included in paragraph (a) of this section [for the 10,000-year assessment] beyond the 10,000-year post-disposal period through the period of geologic stability" and that "DOE *must* evaluate *all* of the features, events or processes included in paragraph (a) of this section," "and *also*" assess effects of seismic and igneous scenarios and climate change [emphasis added]. As can be seen, EPA's regulatory language is identical to the

NRC's, except EPA properly refers to its own rule rather than NRC's rule. As discussed above, this rule language unambiguously supports Nevada, not Staff.

Moreover, consistent with Nevada's interpretation, EPA explained in its final rule preamble that "we explicitly required that FEPs included in the 10,000-year analysis must continue to be included for the longer-term (10,000 years to 1 million years) assessment. That is, FEPs included in the initial 10,000-year assessments will continue to operate throughout the period of geologic stability" (73 Fed. Reg. 61256, 61282). EPA's specification of particular kinds of seismic, igneous activity, climate change, and corrosion FEPs in 40 C.F.R. § 197.36(c)(1), (2) and (3) was merely intended to "bolster" the post-10,000-year assessment by accounting for the possibility that these kinds of FEPs would be screened out of the 10,000-year assessment based on low consequence, but would prove to be significant in the post-10,000-year period (*id*). That is, paragraphs (1), (2) and (3) of 40 C.F.R. § 197.36(c) do not eliminate FEPs that otherwise would have been included, but rather define additional FEPs that must be included. Nothing in Staff's limited selection of quotes from the EPA rule preamble (Answer at 7) supports the contrary.

B. <u>The Commission's Deep Percolation Values Do Not Incorporate Nevada's Climate-Change FEPs</u>

Staff argues (Answer at 8) that the deep percolation values specified in 10 C.F.R. § 63.342(c)(2) already incorporate the climate change FEPs identified by Nevada. Staff's argument here falls under the heading "*10 C.F.R. § 2.309(f)(1)(vi)*." If Nevada's reading of Part 63 is correct, then NEV-SAFETY-202 clearly presents a material dispute with DOE within the meaning of 10 C.F.R. § 2.309(f)(1)(vi) for, as explained above, DOE's SAR relies on an entirely different interpretation. If Nevada is incorrect, then Nevada's principal dispute is with the NRC rule, a matter governed by 10 C.F.R. § 2.335, not 10 C.F.R. § 2.309(f)(1)(vi) cited by Staff.

Nevada's Waiver Claim under 10 C.F.R. § 2.335

A. Nevada Presents Significant New Information Not Considered in the NRC Rule

Staff argues that NEV-SAFETY-202 does not comply with the requirements for a waiver in 10 C.F.R. § 2.335 because it does not set out a "major shift in scientific understanding" or demonstrate that "future scientific advances show the regulation is no longer sufficiently protective of public health and safety and the environment" (Answer at 10). In support of these conclusions, Staff argues that the factors cited by Nevada, the "complex, changing interactions between insolation changes driven by orbital characteristics . . . , natural variations . . . and slow reduction in greenhouse gas concentrations . . . , and internal variability within the climate system at sub-orbital timescales," were in fact considered in developing the final rule, including in responding to Nevada's comments on the proposed rule (Answer at 11-12). These Staff arguments are supported by an affidavit of Mr. Eugene Peters.

It is elementary that the validity of an agency rule stands or falls based solely on the grounds invoked by the agency in its rulemaking. *See, e.g.*, *SEC v. Chenery Corp*., 332 U.S. 194 (1947); *Camp v. Pitts*, 411 U.S. 138 (1973). An important corollary is that "[i]f the administrative action is to be tested by the basis upon which it purports to rest, that basis must be set forth with such clarity as to be understandable." *SEC v. Chenery, supra* at 196. Therefore, the critical first step in deciding whether the information presented in NEV-SAFETY-202 (and NEV-SAFETY-009 through 012 upon which it relies) describes a "major shift in scientific understanding," or demonstrates that "future scientific advances show the regulation is no longer sufficiently protective of public health and safety and the environment," is determining whether the final rulemaking itself (not Mr. Peters' affidavit) includes a clear and understandable

evaluation and conclusion of the scientific factors and studies cited by Nevada. The answer to this question is no.

As indicated in the cited contentions, greenhouse warming has the potential to push the climate system across thresholds (or tipping points) beyond which the atmospheric and oceanic circulation patterns are reorganized in a way that it is difficult to reverse. Thus, restructuring of the climate system in the first 10,000 years may give rise to consequences that lie outside the historical envelope of climate variations for long after that period. This possibility, by definition, cannot be evaluated by consideration of the palaeoclimatic record. Rather, it must be explored through the application of climate models. Nevada's contention cites BIOCLIM to show that such models (Earth Models of Intermediate Complexity (EMIC)) can be used for this purpose. The issue is that such models, including developments of them that have been made since the BIOCLIM project was completed, could and should have been used to explore the range of possible climates at Yucca Mountain at more than 10,000 years into the future. However, this was not done. Thus, as the palaeoclimatic data are not relevant to this no-analog situation and relevant modeling studies have not been undertaken, the range of future climates and hence deep percolation rates has not been bounded by any scientific studies, indicating that the range given by NRC has no adequate scientific justification.

In summary, an evaluation of how climate at Yucca Mountain will respond to climatic forcings that have no analog in the historical record must rely upon a mechanistic understanding of the whole climate system, encompassing the atmospheric and oceanic circulations, ice-sheet characteristics, global patterns and vegetation, and the global carbon cycle. As this system is highly complex and non-linear, such an evaluation requires the application of suitable climate models. These comprise EMICs complemented by snapshot studies with Global Climate Models

(GCMs) and embedded Regional Climate Models (RCMs). There is no clear and understandable indication in the final rulemaking that this was done to support the Commission deep percolation flux specifications or even that any consideration was given to doing so. Nor does the rulemaking include any clear and understandable evaluation of the studies Nevada cited in paragraph 5 of contentions NEV-SAFETY-009, 010, 011, and 012.[2]

Accordingly, NEV-SAFETY-202 (and the four contentions it relies upon) demonstrate "a major shift in scientific understanding" and "scientific advances" not accounted for in the final rulemaking, at least not accounted for "with such clarity as to be understandable." *SEC v. Chenery, supra* at 196. Furthermore, NEV-SAFETY-202 states clearly that this failure "results in a performance assessment that does not contribute meaningfully to the safety finding required by 10 C.F.R. § 63.31(a)(2)" (NEV-SAFETY-202 at 7). Thus, the final rule is no longer sufficiently protective of public health and safety and the environment.

B. NRC Staff Confuses *Prima Facie* with the Merits

10 C.F.R. § 2.335 and Commission case law are clear that a waiver request is adequately supported by the making of a *prima facie* case and that the merits of a waiver petition are reached only after the petition is granted. *Pacific Gas & Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2)*, CLI-81-5, 13 NRC 361 (1981). Staff argues that the European studies cited by Nevada have limitations (Answer at 11, relying on ¶ 9 of the Peters affidavit). However, as discussed above, NEV-SAFETY-202 clearly presents a *prima facie* case for a waiver. Staff's protestations to the contrary notwithstanding (Answer at 11 n.7), Staff's arguments here address the merits, not the existence of a *prima facie* case.

[2] It is noteworthy that in the rulemaking the Commission offers a 1995 NAS study as the sole support for its initial conclusion that a future climate regime is bounded by the observed range of conditions over past glacial-interglacial cycles (74 Fed. Reg. 10811, 10818). This approach is decades old and includes no apparent consideration of global warming.

In any event, Mr. Peters' affidavit misstates BIOCLIM (2004). Where it refers to the first question to be addressed as whether biosphere system change has to be considered, it is referring to the underpinning BIOMASS methodology. In the BIOMASS methodology, this question relates not to the issue of whether or how climate change will occur, but rather whether the assessment context requires it to be considered. In particular, the regulatory framework may explicitly state that climate change should not be represented in the reference assessment calculations. The following quotation from page 25 of BIOCLIM (2004) gives the general context:

> Step 1 requires that the assessment context should be reviewed to determine whether biosphere systems are pre-defined by explicit legislation or guidance. As the aim of BIOCLIM is to explore the influence of climate change on the evolution of biosphere systems and hence on their characterization for the purposes of PA, prescriptive definition of the biosphere systems of interest would be inappropriate. Therefore, following the BIOMASS methodology through to Step 2, it is next necessary to address the identification and justification of components of biosphere systems of interest. Here, the first question to be addressed is whether biosphere system change has to be considered. In the context of the aim of BIOCLIM, such change does have to be considered.

Moreover, page 38 of BIOCLIM (2004) does not use the words 'cascade of uncertainty' as claimed by Mr. Peters. These words actually occur on page 39. The full quote is relevant and shows that Mr. Peters has taken the phrase out of context:

> many of the references cited above, refer to a cascade of uncertainty related to:
> • the emissions or radiative forcing scenarios, i.e., inter-scenario variability;
> • the use of different climate models, i.e., inter-model variability;
> • different realizations under a given emissions scenario with a given climate model, i.e., internal model variability (which is, in part, a reflection of natural climate variability); and,
> • sub-grid scale forcings and processes.
>
> Appropriate techniques for handling the first three sources of uncertainty are widely recognized (see references above, also Andronova and Schlesinger, 2001; Wigley and Raper, 2001; Katz, 2002; Stott and Kettleborough, 2002), although they are not yet routinely or comprehensively applied in impacts assessments:

> • uncertainties due to inter-scenario variability can be handled by using more than one emissions scenario;
> • uncertainties due to inter-model variability can be handled by using output from more than one climate model; and,
> • uncertainties due to internal model variability and thus, in part, natural variability, can be handled by using ensembles of simulations with each model (i.e., simulations performed with the same climate models and forcing, but starting from different initial conditions).

Thus, the BIOCLIM authors properly recognize important uncertainties, but make it clear that these can be handled in assessment studies. Indeed, a large component of the BIOCLIM work was directed to explicit and quantitative investigation of such uncertainties in a European context.

Although it could be argued, as Mr. Peters does (Affidavit at ¶ 6), that the effects of global warming are likely to be greatest in the first 10,000 years, this is not proven. This is because the climate at any time depends not only on insolation and greenhouse-gas concentrations at that time, but also upon the previous variations in those characteristics. Specifically, greenhouse warming over the next few thousand years is likely to melt most (or all) of the Greenland ice cap. This will, in turn, change the amount of solar radiation absorbed (since much less is reflected from rock than ice) and will continue to influence the global climate even though atmospheric carbon dioxide concentrations may be decreasing.

C. Nevada's Affidavit is Compliant

Staff argues (Answer at 12-13) that Nevada's affidavits are inadequate because they "make no mention of this contention or its waiver petition; nor do they articulate that special circumstances exist."

While 10 C.F.R. § 2.335 requires a waiver petition to include or reference an affidavit, it does not require that the affidavit specifically reference the petition. There is no logical reason

why a proper and sufficient petition cannot rely on an affidavit that was prepared for another purpose, provided the affidavit contents are sufficient.

Under 10 C.F.R. § 2.335(b), an affidavit is sufficient if it "identifies the specific aspect or aspects of the subject matter of the proceeding as to which the application of the rule or regulation (or provision of it) would not serve the purposes for which the rule or regulation was adopted" and "state[s] with particularity the special circumstances alleged to justify the waiver . . . ." Here the relevant and specific "aspect of the subject matter of the proceeding" is "the inclusion of appropriate FEPs in the performance assessment" (NEV-SAFETY-202 at 7). FEPs include "processes," "processes" indisputably include climate change (*see* 10 C.F.R. § 63.342(c)), and paragraphs 5 of NEV-SAFETY-009 through 012 (appropriately incorporated into affidavits) all discuss how climate-change processes (FEPs) have not been appropriately included in the performance assessment. The relevant studies and evaluations are also discussed and referenced in these same paragraphs, including BIOCLIM, 2004 (*see* paragraph 5 of NEV-SAFETY-009, Petition at 94). These are the "special circumstances." There is no need for the affidavits to label these studies and circumstances as "special circumstances" so long as that is, in fact, what they constitute. Tying it all together into a persuasive waiver petition is the purpose of a legal argument, and legal argument does not need to be supported by an affidavit. It is noteworthy that Staff's Answer, which includes legal argument addressed to Nevada's waiver request, does not include any affidavit from a lawyer even though 10 C.F.R. § 2.335(b) allows a contrary affidavit to be filed.

III. NEV-SAFETY-203 SHOULD BE CERTIFIED TO THE COMMISSION

A full understanding of NEV-SAFETY-203 requires some discussion of admitted NEV-SAFETY-041. Both contentions address land surface erosion at Yucca Mountain. NEV-SAFETY-041 provides that DOE's exclusion of land-surface erosion (FEP 1.2.07.01.0A), as reflected in SAR Subsections 2.2.1.1 and 2.2.1.2 and similar subsections, is incorrect. Nevada is confident that it will eventually prevail on the merits of this contention, which addresses both the 10,000-year and the post-10,000-year performance assessment. However at this early stage of the proceeding, there are three possible merits outcomes on NEV-SAFETY-041. Nevada could prevail on the proposition that land surface erosion (a FEP) should be included in the 10,000-year TSPA, in which case it would be included in the post-10,000-year TSPA as well by operation of 10 C.F.R. § 63.342(c). Or proof could show that land-surface erosion is of no significance for either the initial 10,000-year period or the 990,000-year period thereafter. NEV-SAFETY-203 focuses on the third possibility, that proof would show land-surface erosion may be screened out of the 10,000-year performance assessment (based on low consequence), but has high (even grave) consequences in the post-10,000-year period. However, in this event, land-surface erosion would apparently be screened out purely by operation of 10 C.F.R. § 63.342(c), notwithstanding its safety significance. NEV-SAFETY-203 focuses on this perverse effect of 10 C.F.R. § 63.342(c).

Specifically, NEV-SAFETY-203 provides that even if DOE's exclusion of land-surface erosion were correct for the first 10,000 years, land-surface erosion cannot be excluded from the TSPA in the period between 10,000 years and 1,000,000 years because topography modifications will continue to the point that topography is grossly altered. Within this latter period, portions of the Paintbrush Tuff may become completely eroded, with significant affects on infiltration and

seepage, and the emplacement drifts may be exposed to the earth's surface, eliminating the upper geologic barrier entirely, with the result that doses to the RMEI will be increased significantly. Therefore, NEV-SAFETY-203 states that there are special circumstances with respect to the subject matter of this proceeding such that application of 10 C.F.R. § 63.342(c), which places limits on features, events and processes to be considered in the post-10,000-year period, does not serve the purposes for which it was adopted. This is a rule challenge under 10 C.F.R. § 2.335.

A. Nevada Makes a *Prima Facie* Case As Required By 10 C.F.R. § 2.335

Staff argues that Nevada has not presented a *prima facie* case as required by 10 C.F.R. § 2.335 (Answer at 14-17). In particular, Staff argues that the 1997 and 2003 journal articles cited in the contention are not "new scientific evidence" because "the NRC was aware of the information at the time of the rulemaking" (Answer at 15, 16). However, the key question is not whether some person within the agency knew about some information, but whether the Commission both knew of the information *and* considered it in the rulemaking. This question should be answered based upon documents in the rulemaking record. *See* S*EC v. Chenery Corp*., 332 U.S. 194 (1947); *Camp v. Pitts*, 411 U.S. 138 (1973). While it is sometimes permissible to consider supplementary explanations not a part of the rulemaking record, these explanations must relate to evidence actually before the agency and considered in making the decision. *Aguayo v. Harvey*, 476 F.3d 971 (D.C. Cir. 2007).

Staff does not and cannot cite to a single shred of evidence from the rulemaking record that the Commission in fact considered land-surface erosion in developing its final rule, much less the two studies cited by Nevada. Staff's three affiants do not refer to a single document in the rulemaking that even discusses erosion, much less one that evidences some Commission consideration of this issue or of the two studies cited by Nevada. Dr. Hill, who does not say he

was involved in the rulemaking (*see* Hill-Justice-McCartin Affidavit at ¶¶ 1 and 2), opines that "the short-term erosion observations cited by Nevada . . . were available for consideration during the post-10,000-year rulemaking process and do not represent new scientific information" (Hill-Justice-McCartin Affidavit at ¶ 14). Dr. Hill does not mention anything in the rulemaking record about erosion, and the fact that information was "available for consideration" does not establish that it was in fact considered.

Mr. McCartin states (Hill-Justice-McCartin Affidavit at ¶¶ 17) that "the NRC was aware of the process of erosion and certainly the observational information cited by Nevada . . . when the regulations were proposed and finalized, and did not consider it necessary to include erosion as a process . . . ." But like Dr. Hill, Mr. McCartin cannot support his opinion with anything from the rulemaking record. Mr. McCartin, who was involved in drafting the rule (Hill-Justice-McCartin Affidavit at ¶ 7), may have thought a bit about erosion while participating internally in the drafting of the rule, but whatever his thoughts may have been, they are not reflected in any Commission rulemaking document.[3]

B. NRC Staff Again Confuses *Prima Facie* with the Merits

Staff argues that the scientific work by Stuewe, et al., cited by Nevada "does not represent a scientific advance in the understanding of erosion at the Yucca Mountain" (Answer at 16) and has "significant limitations" (Answer at 17). Staff's argument here, based on a critique of the work by Stuewe and others presented in the Hill-Justice-McCartin Affidavit at ¶¶ 15-16, and 18, goes to the merits of Nevada's contention, not to whether the contention presents a *prima facie* case. As indicated above, 10 C.F.R. § 2.335 and Commission case law are clear that a

[3] Staff also argues that "even if these studies were new, Nevada fails to show how erosion during these short-term events has special significance to the average erosion rates during the 10,000-year period used by DOE to exclude land surface erosion" (Answer at 16). This goes to the merits of NEV-SAFETY-041, which is already admitted, not to NEV-SAFETY-203 which addresses the post-10,000-year assessment.

waiver request is adequately supported by the making of a *prima facie* case and that the merits of a waiver petition are reached only after the petition is granted. *Pacific Gas & Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2)*, CLI-81-5, 13 NRC 361 (1981).

In any event, Staff's technical critique is wrong. A close reading of the affidavit indicates that the conclusion in ¶ 18 that the scientific work "does not represent a scientific advance in the understanding of erosion at the Yucca Mountain," depends on the same alleged limitations discussed in ¶¶ 15-16. These relate to catchment size and historical erosion.

As to the issue of a 5 km^2 catchment, the point is that the Stuewe, et al., model is a representation of the overall tilted block system. It does not pretend to predict the development of individual detailed features of that system in a deterministic sense. Rather, it predicts how the overall morphology of the system will evolve with multiple small-scale features contributing. This of course means that there is significant uncertainty whether the area local to the repository will erode more rapidly or more slowly than the average, but this means that there is the potential for the drifts to be exposed on a shorter timescale than estimated by Stuewe, et al., since local erosion can be faster or slower than the large-scale mean estimated in the model.

Second, it is, of course, correct that the thunderstorms in 1984 and 2003 do not, in themselves, constitute good evidence of high long-term erosion rates. However, they show that high rates can occur with relatively short recurrence intervals (about a decade) and it can, therefore, be inferred that such events have the potential to dominate the overall erosion process, particularly if it is kept in mind that the rate of erosion is a non-linear function of the intensity of the event. The affidavits emphasize that the projected amount of erosion over the next 500,000 to 5,000,000 years is larger than the amount over the last 11,000,000 years. However, the comparison is based on the basis of vertical erosion rates. Examination of the figures in Stuewe,

et al., shows that this is not a proper comparison. Rather, a relatively uniform initial scarp develops into a deeply incised structure, i.e., the erosion is sub-horizontal. Thus, the model addresses erosion degrading the landscape by sub-horizontal eating back into the ridge and not a simple downward lowering. Thus, the argument is that the incised ridge is approaching the repository footprint and that it will move back through it.

C. Nevada's Affidavit is Compliant

Staff argues (Answer at 17-18) that Nevada's affidavits do not support the waiver request because they do not set forth with particularity the "special circumstances" alleged to justify the waiver request. This is not correct. The erosion processes described in the affidavits supporting paragraph 5 of NEV-SAFETY-041 set forth special circumstances. If the credible possibility, if not likelihood, that Yucca Mountain would erode to the level of the repository drifts is not a special circumstance suggesting the existence of a significant safety problem, completely unaddressed by the final rule, then 10 C.F.R. § 2.335 has no meaning. And there is no need for the affidavits to label these erosion processes as "special circumstances" so long as that is, in fact, what they constitute. Tying it all together into a persuasive waiver petition is the purpose of a legal argument, and a legal argument does not need to be supported by an affidavit, as evidenced by the fact that Staff's Answer, which includes legal argument addressed to Nevada's waiver request, does not include any affidavit from a lawyer.

Finally, it is completely irrelevant that NEV-SAFETY-041 did not assert that the proposed rule precluded consideration of erosion processes after 10,000 years (Answer at 17-18). The Commission made clear in the Notice of Hearing (at section VII.) that contentions addressing the NRC rule should be filed 60 days after that rule was issued, not within the original 60-day period.

Respectfully submitted,

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Dated: July 3, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

In the Matter of	)	
	)	
U.S. DEPARTMENT OF ENERGY	)	**Docket No. 63-001-HLW**
	)	
(High Level Waste Repository)	)	**July 3, 2009**

CERTIFICATE OF SERVICE

I hereby certify that the foregoing State of Nevada Reply to NRC Staff's Answer to NEV-SAFETY-202 and 203 has been served upon the following persons by the Electronic Information Exchange:

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