

**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
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In the Matter of)	
)	
U.S. DEPARTMENT OF ENERGY)	Docket No. 63-001-HLW
)	
(High Level Waste Repository))	December 7, 2009

**STATE OF NEVADA'S OPENING BRIEF
ON PHASE I CONTENTION LEGAL ISSUES**

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TABLE OF CONTENTS

TABLE OF AUTHORITIES	iv
I. NEI Contention.	1
II. Whether 10 C.F.R. § 63.305 requires DOE to project future levels of anthropogenic greenhouse gas emissions such as CO₂ and evaluate the impact of these gases on future climate at Yucca Mountain in the 10,000-year performance assessment, or whether it is sufficient under that regulation for DOE to analyze the effects of anthropogenic greenhouse gas emissions on future climate based upon the historical geologic record.	1
A. Introduction.	1
B. Regulatory Language.	2
C. Regulatory History.	4
D. Conclusion.	5
III. and IV. Whether 10 C.F.R. § 2.342(c) requires climate change processes included as FEPs in the first 10,000 years to be carried forward for the next 990,000 years.	6
A. Introduction.	6
B. Regulatory Language.	6
C. Regulatory History.	7
D. Conclusion.	8
V. Whether 10 C.F.R. § 63.342(c) requires the post-10,000-year performance assessment to include the continued effects of erosion if, assuming for purposes of legal argument, in the 10,000-year assessment erosion is shown to increase infiltration and seepage rates and thereby be potentially adverse to performance, with that potential increasing over time both before and after 10,000 years, but there is no showing that erosion causes increases in radiological exposures or releases within the first 10,000 years.	9
A. Introduction.	9
B. Regulatory Language.	10
C. Conclusion.	11

VI.	Whether, under 10 C.F.R. Part 63, DOE is required to provide and rely upon final design information in the License Application.	11
	A. Introduction.	11
	B. Regulatory Language.	12
	C. Regulatory History.	14
	D. Conclusion.	21
VII.	Whether, under 10 C.F.R. § 63.114, DOE may rely upon its quality assurance program and procedures as a basis for excluding from consideration in the TSPA potential deviations from repository design or errors in waste emplacement.	21
	A. Introduction.	21
	B. Regulatory Language.	22
	C. Regulatory History.	24
	D. Conclusion.	24
VIII.	Whether, under NWPA § 121(b)(1)(B) or 10 C.F.R. §§ 63.113(a) through (d) and 63.115(a) through (c), DOE is required to evaluate the absence or failure of all drip shields.	25
	A. Introduction.	25
	B. The Statute and Regulations.	27
	C. Regulatory History.	28
	D. Conclusion.	31
IX.	Whether 10 C.F.R. §§ 63.21(c)(7) and 63.31 allow DOE to submit in the LA a description of its retrieval plans without having a full retrieval plan available for review.	32
	A. Introduction.	32
	B. Regulatory Language.	33
	C. Regulatory History.	33
	D. Conclusion.	33

X. Whether, in making the pre-construction authorization finding required by 10 C.F.R. § 63.31(a)(2), it must be considered whether, given DOE’s plan to install drip shields only after all of the wastes have been emplaced, it will be impossible to make the pre-operational finding in 10 C.F.R. § 63.41(a) that construction of the underground facility has been substantially completed in accordance with the la, as amended, the Atomic Energy Act, and applicable NRC regulations..... 34

A. Introduction..... 34

B. Regulatory Language. 35

C. Regulatory History. 38

D. Conclusion. 40

XI. Whether, under 10 C.F.R. §§ 63.113, 63.114, and Part 63 Subpart G, the Performance Margins Analysis (PMA) can be used to validate or provide confidence in the TSPA, if its data and models are not qualified under DOE’s quality assurance program..... 41

A. Introduction..... 41

B. Regulatory Language. 42

C. Regulatory History. 43

D. Case Law..... 44

E. Conclusion. 45

**Exhibit 1 – Exerpt from DOE "Master Risk Register," dated March 22, 2007
(DN2002470358)**

TABLE OF AUTHORITIES

Statutes

Atomic Energy Act of 1954, 68 Stat. 919, 42 U.S.C. § 2011, <i>et seq.</i>	passim
Nuclear Waste Policy Act, 42 U.S.C. § 10221(b)	18, 25, 27

Regulations

10 C.F.R. § 50.34.....	13, 14, 15
10 C.F.R. § 50.35	15, 16, 17
10 C.F.R. § 60.31	17, 38
10 C.F.R. § 60.41	38
10 C.F.R. § 63.101	13
10 C.F.R. § 63.102	passim
10 C.F.R. § 63.111	13
10 C.F.R. § 63.112	13
10 C.F.R. § 63.113	passim
10 C.F.R. § 63.114.....	passim
10 C.F.R. § 63.115.....	13, 25, 28, 30
10 C.F.R. § 63.141	43
10 C.F.R. § 63.142	42, 43
10 C.F.R. § 63.143	42, 43
10 C.F.R. § 63.144.....	43
10 C.F.R. § 63.2	22
10 C.F.R. § 63.21	passim
10 C.F.R. § 63.24.....	12, 13, 35
10 C.F.R. § 63.302	22

10 C.F.R. § 63.305	passim
10 C.F.R. § 63.31	passim
10 C.F.R. § 63.311	7
10 C.F.R. § 63.321	7
10 C.F.R. § 63.342	passim
10 C.F.R. § 63.41	passim
10 C.F.R. Part 50.....	passim
10 C.F.R. Part 60.....	passim
10 C.F.R. Part 63.....	passim
43 Fed. Reg. 53869 (Nov. 17, 1978).....	16, 38, 39
44 Fed. Reg. 70408 (Dec. 6, 1979).....	17, 38, 39
46 Fed. Reg. 13971 (Feb. 25, 1981)	17
53 Fed. Reg. 44411 (Nov. 3, 1988).....	19
64 Fed. Reg. 8640 (Feb. 22, 1999)	20, 24
66 Fed. Reg. 55732, 55757 (Nov. 2, 2001).....	passim
73 Fed. Reg. 61256	8
74 Fed. Reg. 10811 (Mar. 13, 2009).....	4, 8

Cases

<i>Cincinnati Gas & Electric Company (William H. Zimmer Nuclear Power Plant),</i> CLI-82-33, 16 NRC 1489 (1982).....	44
<i>Hydro Resources, Inc. (P.O. Box 777, Crownpoint, NM 87313),</i> CLI-06-14, 63 NRC 510 (2006).....	2
<i>Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Unit 1),</i> CLI-81-30, 14 NRC 950 (1981).....	44
<i>PRDC v. International Union,</i> 367 U.S. 396 (1961).....	15

Other Authorities

American Heritage Dictionary, 3 rd edition.....	28
Encarta Dictionary: English Language (North America)	23
McGraw Hill Dictionary of Scientific Terms, 5 th edition.....	28
NUREG-1298, Qualification of Existing Data for High-Level Nuclear Waste Repositories	44

STATE OF NEVADA'S OPENING BRIEF ON PHASE I CONTENTION LEGAL ISSUES

In accordance with the Construction Authorization Board's (CAB) order dated October 23, 2009, the State of Nevada (Nevada) hereby submits its opening brief on the agreed-upon or authorized legal issues affecting its Phase I contentions. These legal issues are within the scope of admitted contentions NEV-SAFETY-009, 010, 011, 012, 013, 019, 041, 146/201, 149, 161, 162, 169, and 171. In some cases, resolution of the specified legal issue completely resolves the affected contention or contentions, but in other cases, resolution of the legal issue leaves other technical or policy issues still unresolved. This is explained in each section of the brief.

I. NEI Contention.

No opening brief submitted on the NEI contention.

II. Whether 10 C.F.R. § 63.305 requires DOE to project future levels of anthropogenic greenhouse gas emissions such as CO₂ and evaluate the impact of these gases on future climate at Yucca Mountain in the 10,000-year performance assessment, or whether it is sufficient under that regulation for DOE to analyze the effects of anthropogenic greenhouse gas emissions on future climate based upon the historical geologic record.

A. Introduction.

This issue is within the scope of NEV-SAFETY-009 through 013 and 019. NEV-SAFETY-009 through 013 all allege that the U.S. Department of Energy's (DOE) Total System Performance Assessment (TSPA) is deficient because it fails, in various respects, to account for anthropogenic greenhouse gas emissions. NEV-SAFETY-019 alleges that the TSPA does not account properly for changes in vegetative cover arising from the continued global warming that will be caused by anthropogenic greenhouse gas emissions. All of these contentions ultimately affect infiltration and radionuclide releases.

As the framing of this legal issue suggests, DOE apparently maintains that there is some special provision in 10 C.F.R. Part 63 that allows it to put sound science aside and completely ignore anthropogenic greenhouse gas emissions in specifying the climate states for the 10,000-year TSPA. No such provision exists, as explained below.¹

B. Regulatory Language.

The plain language of a regulation is controlling. *Hydro Resources, Inc. (P.O. Box 777, Crownpoint, NM 87313)*, CLI-06-14, 63 NRC 510, 516 (2006). Therefore, we begin with the plain language of the pertinent regulation. The key provision is 10 C.F.R. § 63.305. It provides as follows:

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

The plain language of subsection (c) indicates that, to perform a compliant 10,000-year TSPA, DOE must "vary factors related to . . . climate based upon cautious, but reasonable assumptions of the changes in these factors," subject only to the requirements of 10 C.F.R. §

¹ If DOE intends to argue that the effects of anthropogenic greenhouse gas emissions on climate are enveloped in the TSPA by climate changes based on the geologic record (e.g., that limiting consideration of climate change processes to those suggested by the geologic record is conservative), then the issues presented by the relevant Nevada contentions are purely technical. This is because whether the effects of anthropogenic greenhouse gas emissions on climate are in fact enveloped by climates based on the geologic record depends in important part on what the effects of anthropogenic greenhouse gas emissions on climate will be, which is the subject of Nevada's contentions.

63.342. The reference to § 63.342 indicates clearly that the Commission considered whether there should be further qualifications on how or what geologic, hydrologic, and climate change processes must be included, beyond the requirement that "cautious, but reasonable assumptions" be used, and decided that question by referring only to § 63.342. In 10 C.F.R. § 63.342, only subsections (a) and (b) apply to the 10,000-year TSPA, and these two subsections exclude features, events, and processes (FEPs) based on frequency or projected TSPA results. 10 C.F.R. § 63.342(a) and (b) do not include anything relevant to anthropogenic greenhouse gas emissions. Nor do these subsections grant to DOE any specific right to specify climate change processes based solely upon the historical geologic record.

Subsections (a) and (b) of 10 C.F.R. § 63.305 add little of relevance. Subsection (a) indicates that FEPs describing the "reference biosphere" in § 63.305 must be "consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site." It is not clear from the text whether the term "reference biosphere" in § 63.305(a) refers only to biosphere pathways (i.e., how the reasonably maximally exposed individual (RMEI) becomes exposed to radiation, a matter of health physics), but even if the term includes all climate change processes, the only result is that climate change FEPs must be "consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site." The relevant Nevada contentions relating to anthropogenic greenhouse gas emissions are based on "present knowledge of the conditions in the region surrounding the Yucca Mountain site." If DOE disagrees, the issue is technical, not legal.

Subsection (b) of 10 C.F.R. § 63.305 merely lays the foundation for what subsection (c) requires. Subsection (b) implies that DOE may project changes in climate, and subsection (c) requires such projections, within the limits discussed above.

Finally, the interplay between 10 C.F.R. § 63.305 and 10 C.F.R. § 63.342(c) must be considered. If DOE were legally entitled to ignore the effects of anthropogenic greenhouse gas emissions on climate change in the 10,000-year TSPA, NEV-SAFETY-009, 012, and 013 and parts of NEV-SAFETY-010, 011, and 019 would be resolved against Nevada. This would produce a bizarre and scientifically insupportable result, namely that the Commission would have devoted considerable effort to account for the effects of anthropogenic greenhouse gas emissions on climate in the post-10,000-year TSPA, through application of NRC's specified percolation rate in 10 C.F.R. § 63.342(c), but would have forbidden any consideration of these processes before then, when the effects are likely to be greater.²

In sum, the plain language of 10 C.F.R. § 63.305 indicates that how the effects of anthropogenic greenhouse gas emissions on climate change processes should be considered presents a technical question, not a legal one. Nothing in this regulation (or any other NRC regulation) gives DOE the right to specify and analyze climate change processes (FEPs) based solely upon the historical geologic record.

C. Regulatory History.

The relevant regulatory history does not offer anything that would counter the plain language of the regulation, even if that were possible as a legal matter. Some of those who commented in the first Part 63 rulemaking "questioned the Commission's basis for including climate change in the performance assessment requirements of the proposed rule," and the Commission responded by stating, among other things, that "it is important to include the

² The notice of final rulemaking for the collection of Part 63 amendments that added the percolation rate to 10 C.F.R. § 63.342(c) indicates the Commission's belief that the rate accounts for climate changes brought about by anthropogenic greenhouse gas emissions. *See* 74 Fed. Reg. 10811 (Mar. 13, 2009) ("NRC considered the effects of anthropogenic influences on climate change. Based on that evaluation, the NRC believes the range of values specified for deep percolation rates adopted in the final rule captures the range . . . expected as a consequence of future climate change"). The Commission could reach no similar conclusion for the 10,000-year TSPA, even if it could be justified scientifically, because matters affecting the 10,000-year TSPA were outside of the scope of the rulemaking.

consideration of climate change in both the geosphere and the biosphere performance assessment calculations to ensure that the conceptual model of the environment is consistent with our scientific understanding of reasonably anticipated natural events." 66 Fed. Reg. 55732, 55757 (Nov. 2, 2001). The Commission "also believes that it is important for DOE to include these processes in its performance assessment calculations and do the necessary technical analyses to ensure the processes have been adequately considered and addressed." *Id.* These statements are consistent with the above discussion of the plain language of the rule, because climate changes may be considered to be natural events and anthropogenic greenhouse gas emissions affect climate change processes in ways that may be reasonably anticipated.

D. Conclusion.

The plain language of 10 C.F.R. § 63.305, the interplay between 10 C.F.R. § 63.305 and 10 C.F.R. § 63.342(c), and the regulatory history, all indicate that DOE cannot ignore relevant and up-to-date scientific evidence and estimate climate changes processes (a subset of FEPs) based solely upon the historical geologic record. Indeed, as the Board is surely aware, the effects of anthropogenic greenhouse gas emissions on climate, and possible strategies for addressing such effects, are important matters of discussion within the Administration (including DOE), the Congress, and the international community. The Board should rule that NEV-SAFETY-009 through 013 and 019 raise fully admissible technical issues, subject only to the resolution of legal issue III/IV, which addresses the consideration of climate in the post-10,000-year TSPA and affects NEV-SAFETY-011 and 019.

If DOE is legally entitled to ignore the effects of anthropogenic greenhouse gas emissions on climate change in the 10,000-year TSPA, NEV-SAFETY-009, 012, and 013 and parts of NEV-SAFETY-010, 011 and 019 would be resolved in favor of DOE.

III. and IV. Whether 10 C.F.R. § 2.342(c) requires climate change processes included as FEPs in the first 10,000 years to be carried forward for the next 990,000 years.

A. Introduction.

This issue relates to NEV-SAFETY-011 and 019 and the first sentence of NEV-SAFETY-202. All three of these contentions address effects of climate change after 10,000 years. NEV-SAFETY-011 alleges that human-induced climate changes will lead to a delay in the earth's entry into the next glacial period, with the result that precipitation at Yucca Mountain will be in excess of what DOE predicted both before and after 10,000 years. NEV-SAFETY-019 alleges that continued global warming will lead to reduced vegetation growth at Yucca Mountain before and after 10,000 years, with the result that infiltration at Yucca Mountain will be in excess of what DOE predicted.³ NEV-SAFETY-202 (first sentence) alleges that climate change processes included as FEPs in the first 10,000 years are neither carried forward in the next 990,000 years, as 10 C.F.R. § 63.342(c) requires, nor represented by NRC's specified deep percolation rate.

The legal issue is whether the climate change and related processes identified in these contentions as applicable to at least the first 10,000 years must also be included in the next 990,000 years by operation of 10 C.F.R. § 63.342(c). As explained below, the answer to this question is yes.

B. Regulatory Language.

The literal and unambiguous language of the Commission rule disposes of any interpretation question. 10 C.F.R. § 63.342(c) provides that "[f]or performance assessments

³ NEV-SAFETY-011 and 019 were submitted based on Part 63 before it was amended (effective April 13, 2009) to be consistent with EPA's post-10,000-year rule. Thus, neither contention as submitted could rely specifically on any effective NRC requirement applicable to the post-10,000-year TSPA. Nevertheless, as written, both contentions allege failures that constitute material violations of Part 63, as amended, to be consistent with EPA's rule. This is because both contentions were drafted with EPA's rule in mind.

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.

This interpretation based on plain language is not inconsistent with the specification of climate change FEPs in 10 C.F.R. § 63.342(c)(2). The language here provides that climate change FEPs after 10,000 years "may" be limited in accordance with subparagraph (2), not that they "must" be so limited. The limited purpose of 10 C.F.R. § 63.342(c)(2) is to assure that one climate change FEP is considered in the post-10,000-year assessment even if other climate change FEPs have been excluded from the 10,000-year performance assessment based on low-consequence during that initial period.

C. Regulatory History.

The regulatory history confirms what the plain language states. The Commission explained in its preamble to the final rule 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 (Mar. 13, 2009)).

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 one 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).

D. Conclusion.

The climate change and related processes identified in NEV-SAFETY-011 and 019 and NEV-SAFETY-202, as applicable to the first 10,000 years, must be included in the next 990,000 years of the TSPA by operation of 10 C.F.R. § 63.342(c). Accordingly, the Board should rule that these contentions all raise fully admissible technical issues.

A contrary ruling would render inadmissible the post-10,000-year aspects of these contentions, except for the part of NEV-SAFETY-202 alleging that DOE's TSPA does not include the deep percolation rate specified in 10 C.F.R. § 63.342(c). The request for a rule waiver in NEV-SAFETY-202 would then appear to be the only procedural mechanism that would allow these important climate change issues to be considered on their merits.

V. Whether 10 C.F.R. § 63.342(c) requires the post-10,000-year performance assessment to include the continued effects of erosion if, assuming for purposes of legal argument, in the 10,000-year assessment erosion is shown to increase infiltration and seepage rates and thereby be potentially adverse to performance, with that potential increasing over time both before and after 10,000 years, but there is no showing that erosion causes increases in radiological exposures or releases within the first 10,000 years.

A. Introduction.

This issue relates to NEV-SAFETY-041, which alleges that land surface erosion at Yucca Mountain is an ongoing process that will significantly affect infiltration and seepage fluxes in Yucca Mountain within 10,000 years and thereafter and that, eventually, the repository drifts will be denuded and the high-level wastes will be exposed directly to the environment.

10 C.F.R. § 63.342(c) requires DOE to "project the continued effects of the features, events and processes [FEPs] included in paragraph (a) of this section [the 10,000-year performance assessment] beyond the 10,000-year post-disposal period through the period of geologic stability." The effect of this regulation is that erosion (an FEP) need not be considered in the post-10,000-year assessment unless it is considered (screened in) the 10,000-year assessment. As alleged in NEV-SAFETY-041, Nevada believes that land surface erosion will likely increase dose and releases within 10,000 years, and for that reason, it must be considered in the 10,000-year assessment and then included in the post-10,000-year assessment by operation of 10 C.F.R. § 63.342(c). However, the legal issue assumes, for argument purposes, that this 10,000-year effect is not shown. The question then is whether a process (land surface erosion) must be considered in the 10,000-year performance assessment if it will increase infiltration and seepage rates and thereby be potentially adverse to performance, with that potential increasing over time both before and after 10,000 years, but the process (erosion) is not shown to actually increase radiological exposures or releases within the first 10,000-years.

In its application (SAR), DOE indicates that "to the extent that a particular FEP has no significant effect on radiological exposure, or radionuclide release, *or on an intermediate-performance measure that can be linked to radiological exposure or radionuclide release*, that FEP can be excluded (screened out) from the performance assessment on the basis of low consequence" (SAR section 2.2.1.2, at 2.2-17) (emphasis added). Nevada agrees with DOE's exclusion criterion and believes that Part 63 prohibits DOE from screening out an FEP on the basis of low consequence whenever it appears that the FEP has an effect on "an intermediate-performance measure that can be linked to radiological exposure or radionuclide release." In the case of NEV-SAFETY-041, there are two intermediate performance measures – increases in infiltration and increases in seepage.

B. Regulatory Language.

The regulatory language is dispositive, and there is no useful regulatory history. 10 C.F.R. § 63.102(j) states that "[t]he performance assessment is a systematic analysis that [among other things] identifies the features, events and processes . . . that might affect performance of the geologic repository," and "[t]hose features, events and processes expected to materially affect compliance with § 63.113(b) *or* be potentially adverse to performance are included. . . ." [emphasis added]. The "or" here is significant. An FEP must be considered if it is expected to materially affect compliance with the dose standard referred to in 10 C.F.R. § 63.113(b), *or* if it is expected to be "potentially adverse to performance." If an FEP, such as erosion, is expected to be potentially adverse to performance, it must be included regardless of whether it is expected to materially affect dose, for otherwise, the language after the "or" is rendered meaningless. An FEP which is expected to increase infiltration or seepage is necessarily one that is expected to be

potentially adverse to performance, because performance of the Yucca Mountain repository system is highly dependent on infiltration and seepage into the emplacement drifts.

C. Conclusion.

If erosion is shown to increase infiltration and seepage rates (i.e., intermediate-performance measures that can be linked to radiological exposure or radionuclide release), and thereby be potentially adverse to performance within 10,000 years, erosion cannot be screened out of the 10,000-year assessment, and it must be included in the post-10,000-year assessment by operation of 10 C.F.R. § 63.342(c). A contrary conclusion might lead the NRC to ignore a grave safety problem with Yucca Mountain. Accordingly, the Board should rule that NEV-SAFETY-041 raises a fully admissible technical issue for the post-10,000-year TSPA even if it is not shown that land surface erosion will likely increase dose and releases within 10,000 years.

Resolution of this issue against Nevada would require that land surface erosion be shown to increase dose and releases within 10,000 years in order for its effects to be considered in any time frame, notwithstanding that erosion will grow progressively more severe to the point of denudation of the repository drifts, unless the rule waiver request in NEV-SAFETY-203 is granted.

VI. Whether, under 10 C.F.R. Part 63, DOE is required to provide and rely upon final design information in the License Application.

A. Introduction.

This issue relates to NEV-SAFETY-146/201.

DOE's License Application (LA) has no final repository design for structures, systems, and components that are important to safety or waste isolation. (A final design would be a level of design detail equivalent to the level of design detail provided in a Final Safety Analysis Report for a nuclear power reactor.) Instead, the LA relies on preliminary or conceptual design

information, even with respect to repository features that are important to safety or waste isolation and are without regulatory precedent, where it would be expected that the development of the final design will pose significant technical challenges that could lead to fundamental design changes. NEV-SAFETY-146/201 alleges that this level of design detail is insufficient under Part 63.

This design completeness issue has troubled DOE for some time. A DOE "Master Risk Register," dated March 22, 2007, indicates (DN2002470358, at 1, attached as Exhibit 1) that DOE's Yucca Mountain program suffers from the risk that the "[l]evel of Design, Details and Safety Analysis at License Application Submittal is Insufficient for the NRC Acceptance Review and Docketing," noting that the NRC "may expect additional design details and supporting safety analyses greater than had been previously planned" and calling for DOE to "[c]larify with the NRC and document the level of design and safety analyses to be completed for license application submittal" and "[i]ncrease interactions with NRC to clarify expectations and allow NRC insight into the design well in advance of docketing."

B. Regulatory Language.

Resolution of this issue requires an examination of both the overall structure of 10 C.F.R. Part 63 and the language of particular sections. Part 63 does not provide for separate applications for a construction permit (or construction authorization) and an operating license (receipt and possession license). Instead, there is only one application, which is filed before construction can commence, and which is to be reviewed in sequential stages – the first stage is the construction authorization stage, and the second stage is the receipt and possession stage. *See* 10 C.F.R. §§ 63.21, 63.24, 63.31, and 63.41.

Part 63 does not refer to a "preliminary design, "a "preliminary safety analysis report," or a "final safety analysis report." Instead, the single application under Part 63 must include a "Safety Analysis Report" (the "SAR") with a "preclosure safety analysis" and a postclosure "performance assessment." 10 C.F.R. §§ 63.21(a), 63.21(c)(5), 63.21(c)(9)-(c)(15), 63.101, 63.102(j), 63.111-63.115. The preclosure and the postclosure design information must include "[d]imensions, material properties, specifications, analytical and design methods used along with any applicable codes and standards." 10 C.F.R. §§ 63.21(c)(3)(i). The preclosure safety analysis must include a systematic examination of "the design." 10 C.F.R. § 63.102(f). The postclosure safety analysis focuses on a performance assessment, which includes "information on the design of the engineered barrier system used to define parameters and conceptual models used in the assessment." 10 C.F.R. § 63.114(a). The safety analyses, the design information, and the performance assessment are not characterized as "preliminary" in any respect.

Before any waste may be received at the site, there must be an "updating" of the application in order to include "additional . . . design, and other data obtained during construction" and certain other information not available previously, and to show conformance of construction of structures, systems, and components with "the design." 10 C.F.R. § 63.24(a). There are no requirements to perform a "final" safety analysis report or to submit a "final" design before operation. In contrast to the two-step licensing process in Part 50, where eleven long paragraphs are needed to describe the requirements of the Final Safety Analysis Report (FSAR), the entire contents of the Part 63 updated repository license application are described in four short paragraphs. *Compare* 10 C.F.R. § 50.34(b) with 10 C.F.R. § 63.24.

Finally, there is nothing in Part 63 like 10 C.F.R. § 50.35, which allows construction to proceed with "non-confirmatory" safety issues left unresolved. The safety findings required by

10 C.F.R. § 63.31 before issuance of a construction authorization are stated in unqualified terms – it must be found that "the site and design" are in compliance with the regulations.

The clear import of the regulatory language is that there is only one license application, which is subject to NRC review at sequential stages, and which must merely be updated at the receipt and possession stage of review. The only additional design information expected to be supplied in the updated application is "design . . . data . . . obtained during construction," the clear implication being that the design data in the original application must be of sufficient detail to allow actual construction to commence without the need for significant additional design development. There is no such thing a "preliminary design" followed later by a "final design." There is only one design level, and it must be included with the original application and be essentially final in nature. The construction authorization stage of review is where the key final design and other safety information must be submitted and reviewed and where the definitive safety findings must be made. An application with only preliminary or conceptual design information for structures, systems, and components that are important to safety or waste isolation is clearly insufficient under Part 63.

C. Regulatory History.

Reliance on preliminary design information was a notable feature of the two-step licensing process for nuclear power plants that was followed in the late 1950s and early 1960s. 10 C.F.R. Part 50 required a construction permit application as a first step in a two-step licensing review process. This application included a "Preliminary Safety Analysis Report" (PSAR). 10 C.F.R. § 50.34(a). The PSAR included the "preliminary design" of the plant, which included "principal design criteria," "design bases and the relation of the design bases to the principal design criteria," and "[i]nformation relative to materials of construction, general arrangement,

and approximate dimensions, sufficient to provide reasonable assurance that the final design will conform to the design bases with adequate margin for safety." 10 C.F.R. § 50.34(a)(3). The PSAR also included a "preliminary [safety] analysis and evaluation," 10 C.F.R. § 50.34(a)(4), and identified structures, systems, and components of the facility, if any, which required research and development to "confirm" the adequacy of their design. 10 C.F.R. § 50.34(a)(8). A construction permit could be issued with design and safety questions left unresolved provided there was a research and development program to resolve them before operation was authorized. 10 C.F.R. § 50.35(a).

The second step in the old nuclear plant licensing process was the review of an entirely separate operating license application, which was filed during actual construction. The operating license application contained a "Final Safety Analysis Report" or FSAR." The FSAR provided a description and a final safety analysis of "structures, systems, and components and of the facility as a whole." 10 C.F.R. § 50.34(b). The level of design detail in a FSAR is usually referred to as a "final" design.

This approach to the licensing of the construction of nuclear power plants led to the first important U.S. Supreme Court decision interpreting the Atomic Energy Act. *PRDC v. International Union*, 367 U.S. 396 (1961) upheld the approach. However, this two-step approach to licensing of nuclear power plants was extremely controversial, despite its having passed legal muster. Many believed that the agency's assurance that the hundreds of millions of dollars of investment in the facility would be ignored when it came to decide whether operation would be allowed could not be accepted at face value. Moreover, the nuclear industry came to believe that the practice was undesirable because deferring the submission of the final design and the final resolution of safety questions until the operating license stage led to regulatory

uncertainty and expensive retrofitting. The practice of relying on a preliminary design information and delaying the definitive safety finding until the operating license stage, and the problems with this approach to licensing of a major facility were well known to the NRC when it first began to develop licensing procedures for a high-level waste repository in 10 C.F.R. Part 60. As explained below, the old approach whereby construction was allowed based on preliminary design information was firmly rejected.

Initially, the NRC proposed repository licensing standards were virtually the same as those for power reactors in 10 C.F.R. § 50.35 because, under the licensing framework then under consideration, a construction authorization would be required before sinking of the main repository shaft, and it was considered probable that important safety issues would need to be deferred because important site characterization information could not be supplied until the shaft was sunk and the repository site was studied at depth. "Licensing Procedures for Geologic Repositories for High-Level Radioactive Wastes, Proposed General Statement of Policy," 43 Fed. Reg. 53869, 53871 (Nov. 17, 1978). However, when it came time to propose the actual rules, the NRC "now perceive[d] two grounds for questioning our previous thinking." A construction authorization would no longer be required before sinking of the main shaft because "the quality of the data that will be available before completion of site characterization as currently envisioned is unlikely to provide a satisfactory basis for arriving at the technical judgments. . . ." Moreover, while the Commission adhered to the policy announced in the Proposed General Statement of Policy that safety issues could be deferred only "so long as the increased financial investments and institutional commitments do not thereby reduce the stringency of the subsequent safety reviews," the Commission believed that "the commitment of resources involved is not so great nor the environmental impacts so large as to lead the

Commission to exercise its licensing authority in advance of site characterization." 44 Fed. Reg. 70408, 70410 (Dec. 6, 1979).

Accordingly, the proposed Part 60 departed from the previous Proposed General Statement of Policy and included nothing like the provision in 10 C.F.R. § 50.35, allowing safety issues to be deferred until the operating (receipt and possession) phase of licensing. *See* 44 Fed. Reg. at 70418 (proposed 10 C.F.R. § 60.31). The Commission proposed a one-application licensing process, and an unqualified finding would need to be made before issuance of the construction authorization that (among other things) "the site and design comply with the criteria contained in Subparts E and F of this Part."

The final Part 60 followed the approach in the proposed rule. In response to a comment that the proposed rule failed to reflect the preliminary nature of some of the information that would be available at the construction authorization stage, the Commission replied that no change in the rule language was needed because of 10 C.F.R. § 60.24(a), which stated that the application shall be as complete as possible in light of information that is reasonably available at the time of docketing. 46 Fed. Reg. 13971, 13974 (Feb. 25, 1981). Precisely what the Commission meant here is explained in the analysis of public comments attached to SECY- 80-474 (NRC000024671), the Commission decision paper on the final rule. At Enclosure B (at 86), the NRC explains that "if the issue is one that is important at the construction authorization stage, the 'reasonably available' standard [in § 60.24(a)] is intended to require DOE to develop and provide information in detail." A broader reading, that no information (including final design information) need ever be included in the license application if it was not "reasonably available at the time of docketing" would completely eviscerate 10 C.F.R. § 60.21 as well as numerous other provisions of Part 60 specifying what information an application must include. And as

explained below, later interpretations of Part 60 by DOE and NRC confirm the narrow reading of 10 C.F.R. § 60.24(a).

DOE's and NRC's early efforts to implement Part 60 are completely consistent with the concept that the one application licensing process in Part 60 was a deliberate departure from the two application licensing process in Part 50 and recognized that the new approach in Part 60 would not allow a construction authorization to be granted based only on preliminary design information. In its July 31, 1984 formal comments to DOE on its draft "Mission Plan," contemplated by Section 301(b) of the Nuclear Waste Policy Act, 42 U.S.C. § 10221(b), the NRC advised DOE as follows (NRC000021287 at Enclosure 2, at 3-4):

The Mission Plan (3-A-22) states that a repository construction authorization application will be submitted to NRC "based on Title I design of the repository and on the preliminary (Title I) waste package design." Title I is equated with a "preliminary" level of design information both here and in Vol. II (2-26). Furthermore, the Mission Plan states that "[t]he repository design (Title II) will be finalized during the Nuclear Regulatory Commission's review of the construction authorization application" (3-A-23). Title I/Title II design information may or may not be sufficient for licensing purposes; however, based on the discussion presented in the draft Mission Plan, NRC is not in a position to conclude that the content of Title I/Title II would satisfy 10 CFR Part 60 requirements.

We recognize that even after the license application is submitted, refinements on design in some areas will continue to be developed. However, all design information that is necessary to make findings on compliance with 10 CFR Part 60 performance objectives and requirements must be provided at the time of submittal of a license application. We note that the Congressionally-mandated evaluation by NRC of recent reactor construction and licensing experience ("Improving Quality and the Assurance of Quality in the Design and Construction of Nuclear Power Plants," NUREG-1055) points to incomplete design at the construction permit stage as an important root cause of the serious problems and delays which have been encountered. We are concerned that use of "preliminary designs" of the repository and waste package for licensing reviews would result in similar problems.

NRC elaborated upon this interpretation and understanding of Part 60 shortly thereafter, in a December 17, 1984 transcribed meeting with DOE (DN2002050708 at 49):

MR. PURPLE [NRC Staff]: But it was clear as it was described, and as Part 60 was formulated, that the NRC was heading more toward a one-step licensing on this licensing than it does on nuclear powerplants, is that not so?

I mean, the expectation is that you'd have essentially gone over designs of everything there, and that it would only be a very limited scope of issues expected to be present at the time we update the application to get the permit. I mean, it's not as if you're approving -- "Yes, we will follow your criteria" Type CP application.

MR. MILLER [NRC Staff]: No, that's a mistake we don't want to make.

MR. PURPLE: Yeah; the intent I'm gathering, the general approach was: let's try to get as close to a one-step licensing process on this procedure as we can, recognizing that you really do have to come back and take a look at it before you actually let us put fuel in the ground.

The Commission itself reiterated this point somewhat later in a 1988 notice of proposed rulemaking on what was then called the Licensing Support System, now called the Licensing Support Network (53 Fed. Reg. 44411, 44414 (Nov. 3, 1988)):

In the view of the Commission, the information it needs in order to be able to consider the issuance of a construction authorization is generally the same as will be needed prior to the issuance of a license to receive and possess HLW. For this reason, the Commission regulations call for the application to be as complete as possible.

DOE soon adopted a similar understanding of what Part 60 meant. DOE's YMP/97-03, Rev. 0, "Technical Guidance Document for License Application Preparation," December 1998 (DN2002071681 at Introduction pg. 7), is an early (perhaps the earliest) effort to put in place plans to develop the design for the LA (construction authorization stage) in accordance with the Commission's regulations. It provided specifically that "[p]re-closure accident analyses should

also be at the level of detail of the accident analysis in a typical nuclear power plant Final Safety Analysis Report," and similarly, for repository items that are important to safety or waste isolation and are without regulatory precedent, design information would likely need to be "to the level of detail for items of similar importance in a commercial nuclear power plant Final Safety Analysis Report."

The basic licensing framework of Part 63 is the same as the one in Part 60. The Commission's discussion of 10 C.F.R. § 63.21 ("Content of Application") offers no suggestion that the basic approach in Part 60 would be changed. *See* 64 Fed. Reg. 8640, 8655 (Feb. 22, 1999). The notice of final rulemaking includes an extensive discussion of 10 C.F.R. § 63.21(a) (the counterpart to 10 C.F.R. § 60.24(a)), which concludes that, notwithstanding this subsection, "DOE must provide sufficient information at each stage of the licensing process to support that stage, and DOE must provide sufficient detail necessary to allow NRC to review DOE's design." 66 Fed. Reg. 55732, 55739 (Nov. 2, 2001). The term used here is "design," not "preliminary design."

In sum, the regulatory history confirms that Parts 60 and 63 were deliberate departures from Part 50. They both embodied a staged approach to licensing of construction and operation that involved only one application. The design of structures, systems, and components that are important to safety or waste isolation would be fully reviewed and approved at the construction authorization stage, and preliminary design information alone would not support the issuance of a construction authorization. This was especially true with respect to repository items that were important to safety or waste isolation and were without regulatory precedent.

D. Conclusion.

10 C.F.R. Part 63 requires that the design of structures, systems, and components important to safety or waste isolation be fully reviewed and approved at the construction authorization stage, and provides that preliminary design information alone cannot support the issuance of a construction authorization. This is especially true with respect to those repository items that are important to safety or waste isolation and are without regulatory precedent. Accordingly, the Board should decide NEV-SAFETY-146/201 in favor of Nevada.

There are other admitted Nevada contentions, such as NEV-SAFETY-128, which allege that there is not sufficient design information to permit an adequate safety review. Resolution of NEV-SAFETY-146/201 in Nevada's favor should resolve these contentions in Nevada's favor as well, because these contentions address a subset of the structures, systems, and components addressed by NEV-SAFETY-146/201. However, resolution of NEV-SAFETY-146/201 against Nevada would leave these other contentions to be resolved as a technical dispute.

VII. Whether, under 10 C.F.R. § 63.114, DOE may rely upon its quality assurance program and procedures as a basis for excluding from consideration in the TSPA potential deviations from repository design or errors in waste emplacement.**A. Introduction.**

This issue relates to NEV-SAFETY-149, which alleges that deviations from the repository design or errors in waste emplacement were wrongly excluded from the TSPA (as FEPs) on purely legal grounds. NEV-SAFETY-149 does not allege that DOE will deliberately depart from the approved design if construction of the repository is authorized or that DOE will deliberately depart from the approved waste emplacement plan if repository operation is allowed. Instead, NEV-SAFETY-149 addresses the possibility that the circumstances of the as-built repository and the as-emplaced wastes will deviate from what was authorized and intended

because of human error. It alleges that such errors must be screened in (or out) using the same frequency or consequence screening criteria that apply to other FEPs, instead of being screened out on purely legal grounds, with no technical analysis of probability or effects.

As the statement of issue indicates, DOE believes that these human errors may be ignored (screened out) in conducting the TSPA, no matter how likely they may be and no matter what their consequences may be, because excluding them is one of the legal benefits that supposedly flow from having a compliant and properly functioning quality assurance program. As explained below, DOE is wrong.

Moreover, DOE's legal position with respect to NEV-SAFETY-149 is at odds with its licensing practice and legal position with respect to NEV-SAFETY-147 and 148, both of which address human errors in installing the drip shields, a subset of the human errors addressed in NEV-SAFETY-149. In its LA-SAR, DOE screened out human errors in installing the drip shields based on low probability, not some legal theory based on a quality assurance program (SAR Subsection 2.3.6.8.4.3.2.4, at 2.3.6-82 to 83), and in its Answer to Nevada's Petition, DOE did not object to the admission of either NEV-SAFETY-147 or NEV-SAFETY-148 on the legal ground that a compliant and properly functioning quality assurance program screened these FEPs out (DOE Answer at 1359-76).

B. Regulatory Language.

FEPs are a necessary part of a "performance assessment" as defined in 10 C.F.R. § 63.2 and are referred to in 10 C.F.R. §§ 63.21(c)(1), 63.21(c)(9), 63.102(j), 63.114(a)(4) and (5), 63.302, 63.305(a), and 63.342(a), (b) and (c). The FEPs "concept" is described in 10 C.F.R. § 63.102(j) as "specific conditions or attributes of the geologic setting, degradation, deterioration, or alteration processes of engineered barriers, and interactions between the natural and

engineered barriers." However the description here is manifestly incomplete. "FEPs" clearly include "events" (such as seismic or igneous "events"), but the "concept" in 10 C.F.R. § 63.102(j) relates only to "features" ("conditions or attributes of the geologic setting") and processes ("degradation, deterioration, or alteration processes of engineered barriers, and interactions between the natural and engineered barriers").

Because 10 C.F.R. Part 63 does not define "event," conceptually or otherwise, the normal dictionary definition of an "event" as an "occurrence" should apply ("Encarta Dictionary: English Language (North America)" available in Word). Human errors clearly are "occurrences."

10 C.F.R. § 63.102(j) excludes "events (event classes or scenario classes)" that are "very unlikely," meaning "less than one chance in 10,000 over 10,000 years." 10 C.F.R. § 63.342(a) uses different phraseology, but to the same effect – DOE's 10,000-year performance assessment "shall not include consideration of very unlikely features, events, or processes, i.e., those that are estimated to have less than one chance in 100,000,000 per year of occurring." The same subsection also allows FEPs to be excluded if the results of the performance assessment would not be changed significantly in the initial 10,000-year period, although it is not explained what "results" would be controlling, or how this exclusion would apply without doing at least some of the very assessment it purports to exclude. 10 C.F.R. § 63.342(b) allows exclusion of certain "unlikely" FEPs from the assessment for compliance with human intrusion and groundwater standards. Finally, 10 C.F.R. § 63.342(c) goes to great length to describe what FEPs should be included in the post-10,000-year performance assessment.

It is apparent from the above that the Commission paid considerable attention to the subject of what FEPs may be excluded, devoting no less than four separate subsections in 10

C.F.R. Part 63 to the matter. Therefore, it should be assumed that the grounds for exclusion of FEPs specified in the regulations are inclusive – that no other grounds are permitted. There is no indication in these regulations that human errors are excluded *per se* or that quality assurance *per se* may be a basis for excluding any event.

Accordingly, the regulations are clear. Deviations from the repository design or errors in waste emplacement caused by human error can only be excluded if their estimated frequency is less than one in 100,000,000 per year, or their estimated effects are so minimal that they may be screened out for this reason.

C. Regulatory History.

What is apparent from the regulatory language is also apparent from the regulatory history of Part 63. The February 22, 1999 notice of proposed rulemaking on Part 63 includes an extensive discussion of FEPs, including a discussion of what FEPs may be excluded and why. *See* 64 Fed. Reg. 8640 at 8650. The November 2, 2001 notice of final rulemaking includes a brief discussion of FEPs and an extensive and detailed discussion of quality assurance issues. *See, e.g.*, 66 Fed. Reg. 55732 at 55748 ("Section 63.114 requires DOE to consider all FEPs pertinent to a repository at Yucca Mountain and fully justify how they are treated in the performance assessment"); 55763-65 (detailed and extensive discussion of quality assurance). Neither human error nor quality assurance is ever mentioned as a basis for exclusion (screening out). The figurative silence here is deafening.

D. Conclusion.

Deviations from the repository design or errors in waste emplacement caused by human error must be screened in (or out) using the same frequency or consequence screening criteria that apply to other FEPs, instead of being screened out on purely legal grounds, with no technical

analysis of probability or effects. They may not be excluded just because DOE will have a compliant and functioning quality assurance program. Accordingly, the Board should decide NEV-SAFETY-149 in favor of Nevada.

VIII. Whether, under NWPA § 121(b)(1)(B) or 10 C.F.R. §§ 63.113(a) through (d) and 63.115(a) through (c), DOE is required to evaluate the absence or failure of all drip shields.

A. Introduction.

This issue relates to NEV-SAFETY-161. The issue here is not whether, in evaluating DOE's LA, the NRC should presume that DOE will renege on its promise to install drip shields, but whether DOE must evaluate the postulated absence or failure of all drip shields in order to ascertain their contribution to total system performance and thereby determine whether the multiple barrier requirements of section 121(b)(1)(B) of the NWPA and 10 C.F.R. Part 63 are satisfied. By analogy, applicants for licenses for nuclear power plants must evaluate postulated failures of important defensive measures and barriers. No one would maintain that such an evaluation necessarily presumes that the applicant would deliberately install defective equipment, but nonetheless the applicant must evaluate the occurrence of such scenarios.

Nevada's interpretation of the relevant statutory and regulatory provisions is remarkably similar to DOE's interpretation shortly after the proposed text of Part 63 became available to DOE in late 1998. DOE's analysis, incorporated in a draft white paper intended to be the basis for planning the elements of DOE's postclosure safety case (DN2001037869, dated December 3, 1998), is worth quoting at some length. It explains the relationship between multiple barriers and defense-in-depth, the role of both in a passive repository system, and the function of postulated failures (i.e., neutralization analyses) in measuring defense-in-depth and deciding whether the requirement for multiple barriers is satisfied.

In the design and licensing of commercial nuclear facilities, defense in depth is a fundamental safety philosophy that employs multiple protective measures to prevent accidents or to mitigate damage and consequences if a malfunction or accident occurs. The use of multiple protective measures ensures that safety will not be wholly dependent on any single element of the design, construction, maintenance, or operation of a nuclear facility and that failure of any one barrier does not result in failure of the entire system. A characteristic statement about the design of such a system is, "Even if XXX improbably occurs, the consequences will be acceptable because YYY will prevent or mitigate. . . ."

* * *

The postclosure repository system differs from the preclosure system and commercial reactor systems in two important ways. First, a closed repository is a passive system in which the principal safety issues are the exposure of waste to water and the movement of mobilized radionuclides to the accessible environment. Active safety measures do not apply in this case. For this reason, the focus of defense in depth for the postclosure repository system is on multiple natural and engineered barriers against the movement of water or radionuclides.

The second difference is that the evaluation of postclosure safety over thousands of years is to be accomplished by means of theoretical predictions of long-term performance, i.e. Total System Performance Assessments (TSPAs). . . . There are large uncertainties that introduce error and limit the precision of the performance assessment. These uncertainties arise from incomplete data, the complexity of the natural processes and geohydrological characteristics of the repository system, and from the use of simplified models of the behavior of the geologic system. Consequently there are significant uncertainties in characterizing and modeling the individual natural elements and engineered components of the repository system and the system as a whole.

One way to compensate for these uncertainties is to ensure that each barrier is backed up by one or more other barriers such that failure of any one barrier does not result in failure of the system to meet the required performance objective. This is what defense in depth means with respect to the postclosure safety case.

* * *

A set of calculations, each analogous to the base-case calculation, is now conducted to determine the contribution each barrier makes to the base-case estimate of performance. A calculation is conducted for each of the barriers and combinations of barriers identified in Step 2. In each case, the barrier or barriers at issue are neutralized, i.e. the barriers at issue in the calculation are assumed not to inhibit the movement of water or radionuclides. The difference in the result for a neutralization calculation from the base-case result indicates the contribution of the neutralized barriers to system performance. If the difference is large, then the neutralized barriers are important and are not fully

compensated by other barriers. If the difference is small, then the neutralized barriers are adequately compensated by other barriers.

This is precisely what Nevada believes is required – a performance analysis in which a barrier (the drip shields) is neutralized (assumed not to inhibit the movement of water or radionuclides), and a determination is made of the difference in result from the base case (drip shields all properly installed). DOE has already performed one or more drip shield neutralization analyses (*see e.g.*, "Total System Performance Assessment Model/Analysis for the License Application," DN2002424629 (08/15/2007), at 8.5-1 to 8.5-2 and "Total System Performance Assessment Model/Analysis for the License Application," DN200435897 (08/15/2007), Figure 8.5-1), but none of them are included in the LA.

B. The Statute and Regulations.

Section 121(b)(1)(B) of the NWPA, 42 U.S.C. § 10141(b)(1)(B), provides simply that the NRC's regulations for licensing Yucca Mountain must "provide for the use of a system of multiple barriers in the design of the repository." No further definition or explanation of "multiple barriers" is supplied.

The Commission's regulations in Part 63 address the requirement for multiple barriers in several places. 10 C.F.R. § 63.113(a) provides that the geologic repository "must include multiple barriers, consisting of both natural barriers and an engineered barrier system." 10 C.F.R. § 63.102(h) has a long narrative explanation of the multiple barrier "concept" that includes a few interpretative nuggets. The performance assessment must include a "description of each barrier's capability" and that description must be "as reflected in the performance assessment." It is also intended that multiple barriers will "enhance the resiliency of the geologic repository." Thus, it is not sufficient just to describe the capability of a barrier. The barrier, as described, must perform the important function of enhancing resiliency.

Because the definitions of "performance assessment" in 10 C.F.R. §§ 63.2 and 63.102(j) are clear that a performance assessment must be quantitative in nature, it follows that the "description of each barrier's capability" as "reflected in the performance assessment" should be quantitative. "Resilient" in both scientific and ordinary usage means ability to recover to an original shape or position after being stressed. *See* "McGraw Hill Dictionary of Scientific Terms," 5th edition, at 1693, and "American Heritage Dictionary," 3rd edition, at 1535. In our context, an ability of the repository system to return to an original position after being stressed must mean an ability of the system to comply with performance requirements even when stressed by postulating an absence of particular barriers. It implies redundancy.

10 C.F.R. §§ 63.115(b) and (c) confirms that DOE must "describe the capability of the barriers" and that the description must be "based on and consistent with the technical basis for the performance assessments used to demonstrate compliance with §§ 63.113(a) and (c)." What exactly is meant by enhancing resiliency (or redundancy), and how a barrier's capability is to be described quantitatively, is explained further in the history of the regulation.

C. Regulatory History.

There were significant interactions among the Commission, the Staff, and the Advisory Committee on Nuclear Waste ("ACNW") on the subject of multiple barriers and defense-in-depth as Part 63 was being developed. These interactions culminated in a March 31, 2000 letter from the ACNW to the Commission (NRC000003289 at 4). In this letter, the ACNW summarized its understanding of what Part 63 would require with respect to multiple barriers and defense-in-depth as follows (emphasis added):

We understand that the staff's approach in the proposed regulation for demonstrating multiple barriers is to require that DOE demonstrate reliance on both natural and engineered barriers and that the repository system not depend unduly on any single barrier. *We understand that the staff plans to require use of hypothetical calculations*

wherein barriers are assumed to perform to a lesser degree than anticipated, as a way of gaining insights into the contributions of barriers to overall repository performance. In addition, the staff may require in the rule that the results of the barrier underperformance analyses be compared to a numerical dose failure criterion. The staff also plans to provide more detailed guidance on acceptable methods to demonstrate compliance of multiple barriers in the Yucca Mountain Review Plan (YMRP).

The ACNW has closely followed the development of draft 10 C.F.R. Part 63.

The ACNW then concluded that:

In past advice, the Committee has endorsed the staff's general approach to address multiple barriers in the draft rule and has commended the staff for developing a regulation that captures the intent of risk-informed, performance-based (RIPB) regulation.

Therefore, both the ACNW and the Staff endorsed the policy, to be expressed in the final Part 63 rulemaking, that a proper risk-informed approach to multiple barriers and defense-in-depth would require that there be "hypothetical calculations wherein barriers are assumed to perform to a lesser degree than anticipated, as a way of gaining insights into the contributions of barriers to overall repository performance." In addition, "the staff may require in the rule that the results of the barrier underperformance analyses be compared to a numerical dose failure criterion." Finally, it is clear that that a repository with the desired "enhanced resiliency" is one that does not depend unduly on a single barrier. This is a fair restatement of the regulatory philosophy of defense-in-depth, which implies redundancy in barriers.

The Staff said something similar in a November 2, 1999 public meeting on multiple barriers and defense-in-depth the proposed rule (*see* NRC000013643 at 25-26). It informed the public that it would require an analysis that would "quantify the reserve capacity of the barriers by assuming underperformance," with "underperformance" meaning that "we want DOE to perform whatif analysis, and one barrier at a time, and the degree of underperformance should

really be commensurate with the evidence that DOE has to support a particular barrier's capability in its safety assessment."

The notice of final rulemaking on Part 63 is in accord with the Staff's and the ACNW's recommendations. Under the heading "Multiple Barriers and Defense in Depth," the Commission stated that "a repository system should reflect the philosophy of defense in depth" and that the safety emphasis should be on "ensuring the repository system is robust, and is not wholly dependent on a single barrier." 66 Fed. Reg. 55732, 55758 (Nov. 2, 2001). It explained that the rule requires DOE to "describe quantitatively each barrier's ability to contribute to waste isolation" in a way that "illustrates the resilience or lack of resilience of the repository to unanticipated failures or external challenges." 66 Fed. Reg. 55732, 55758-59 (Nov. 2, 2001). There was no indication that the Staff's and the ACNW's prior statements and understanding of what the rule would require were no longer true.

In sum, the regulatory history offers considerable insight regarding what exactly is meant by the requirement in 10 C.F.R. §63.115(b) and (c) that DOE "describe the capability of the barriers" "based on and consistent with the technical basis for the performance assessments used to demonstrate compliance with § 63.113(a) and (c)," and by the provision in 10 C.F.R. § 63.102(h) advising that the purpose of multiple barriers was to "enhance the resiliency of the geologic repository." While various terms were used to describe what would be required – "hypothetical calculations wherein barriers are assumed to perform to a lesser degree than anticipated," and "whatif analysis, one barrier at a time," they essentially all amount to the same. As DOE aptly summarized it in its white paper, "barrier or barriers at issue are neutralized, i.e., the barriers at issue in the calculation are assumed not to inhibit the movement of water or radionuclides" and "the difference in the result for a neutralization calculation from the base-case

result indicates the contribution of the neutralized barriers to system performance." Such a calculation is necessary to determine whether the repository has enhanced resiliency, that is, whether it incorporates multiple barriers so that there is no undue reliance on a single barrier, the drip shield.

D. Conclusion.

There can be no doubt that the repository system should reflect the philosophy of defense-in-depth, that the safety emphasis should be on ensuring the repository system is robust, and is not wholly dependent on a single barrier, and that the assessment whether there is lack of robustness or an undue dependency is quantitative in nature and is a necessary part of a compliant performance assessment. The remaining question is whether the quantitative evaluation of robustness and undue reliance (or redundancy) requires a neutralization analysis, and this question is answered by referring to DOE's, the NRC Staff's, and the ACNW's contemporaneous understanding of what Part 63 would require.

In sum, the Board should rule that 10 C.F.R. §§ 63.102(h), 113(a)-(d), and 115(a)-(c) require a performance analysis in which a barrier (the drip shields) is neutralized (assumed not to inhibit the movement of water or radionuclides), and a determination made of the difference in result from the base case (drip shields all properly installed).

Resolution of this legal issue will not completely address NEV-SAFETY-161. If Nevada prevails on the legal issue, the drip shield neutralization analysis will have to be performed. Nevada believes that the results will demonstrate a violation of the requirement for multiple barriers and defense-in-depth, but other parties may disagree. If Nevada does not prevail on the legal issue, the question will remain whether a neutralization analysis should be required of DOE as a policy or technical matter, because this would be the most appropriate way to determine

compliance with the requirement for multiple barriers and defense-in-depth. And even if DOE performs no neutralization analysis, the question will remain whether the LA violates the requirements for multiple barriers and defense-in-depth requirement because postclosure safety relies unduly on the drip shield, although it would be unclear, at best, how this question would be answered.

This issue is also related to NEI-SAFETY-006, which alleges that drip shields are not necessary.

IX. Whether 10 C.F.R. §§ 63.21(c)(7) and 63.31 allow DOE to submit in the LA a description of its retrieval plans without having a full retrieval plan available for review.

A. Introduction.

This legal issue relates to NEV-SAFETY-169, which alleges that "the LA cannot be granted because it includes only a conceptual discussion of retrieval plans and no actual retrieval plans are included or referenced." NEV-SAFETY-169 refers to subsection 1.11 of the SAR, at 1.11-1 and 1.11-2, which provides that "[s]pecific plans for retrieval will be developed and defined in detail should the need for retrieval be identified."

The Commission's regulations often require that a license application include a description of various plans. The most natural reading of these regulations is that the plans must already exist, because plans that do not exist are indescribable. The purpose of requiring a description is to avoid the need to incorporate the entire plan into the application, and the related need to amend the application whenever the plans are changed in any respect. However, in some cases it may be the Commission's intent that a description would be the means to review and determine whether satisfactory plans can be developed on a timely basis in the future, although the regulatory language is awkward, at best.

10 C.F.R. § 63.21(c)(7) requires that the LA (Safety Analysis Report) include a "description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary." As explained below, the natural reading of this requirement should prevail. The retrieval plan being described must exist and must be reviewed in full before any construction authorization can be issued.

B. Regulatory Language.

10 C.F.R. § 63.21(c)(7) requires that the Safety Analysis Report (the SAR, part of the LA) include a "description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary." As indicated above, the most natural reading of this would be that the retrieval plan must already exist. As explained below, the regulatory history confirms this.

C. Regulatory History.

When Part 63 was promulgated, the Commission stated in the notice of final rulemaking that "the retrieval operation would be an unusual event, and may be an involved and expensive operation" and that "[a]s such, DOE can expect that its plans and procedures in this area will receive extensive, detailed review by the NRC staff as part of any construction authorization review." 66 Fed. Reg. 55732, 55743 (Nov. 2, 2001). The Commission could not have been clearer – the plans and procedures themselves, not merely descriptions of them, would be reviewed at the construction authorization stage. Obviously, the retrieval plans and procedures must actually exist at this stage of review in order to be reviewed in detail.

D. Conclusion.

10 C.F.R. § 63.21(c)(7) requires that the LA (SAR) include a "description of plans for retrieval and alternate storage of the radioactive wastes, should retrieval be necessary." The

regulatory language suggests, and the regulatory history of this provision compels the conclusion that the retrieval plan being described must exist and be reviewed in full before any construction authorization can be issued. Accordingly, the Board should decide NEV-SAFETY-169 in favor of Nevada.

X. Whether, in making the pre-construction authorization finding required by 10 C.F.R. § 63.31(a)(2), it must be considered whether, given DOE’s plan to install drip shields only after all of the wastes have been emplaced, it will be impossible to make the pre-operational finding in 10 C.F.R. § 63.41(a) that construction of the underground facility has been substantially completed in accordance with the la, as amended, the Atomic Energy Act, and applicable NRC regulations.

A. Introduction.

This issue relates to NEV-SAFETY-162, which alleges that DOE’s drip shield installation plan cannot be justified as safe. Sections 1.1.3.1, 1.1.3.2, and 1.2.5 of the General Information part of the LA (at 1-10, 1-13, and 1-19) and section 4.1 of the SAR (at 4-4) provide that the drip shields will be installed near the end of the 100-year preclosure period, *many years after* 11,000 waste packages containing 70,000 MTHM of high-level radioactive waste have been buried (emplaced in the emplacement drifts).⁴

Thus, systems and components absolutely necessary for disposal safety are to be installed many years after the radiological hazards they are designed to address have already been introduced. It necessarily follows that no definitive disposal safety finding can be made until after the radiological hazards have already been introduced, because a definitive disposal safety

⁴ As explained (and supported) in NEV-SAFETY-130 (Petition at 703), the drip shields would have to be placed using remote equipment, which has not been designed, under difficult underground conditions that include high levels of radioactivity and temperatures, and under conditions where drift degradation due to corrosion of steel components, rock falls, and drift collapse, and other unforeseen conditions might have occurred. Moreover, DOE has not developed any prototype installation system or any procedures for drip shield emplacement. The LA assumes that drip shield emplacement will work as envisioned and that no foreseen or unforeseen event will occur in the time period between the placement of waste package and the installation of the drip shields that will prevent or hinder placement of the drip shields. This assumption is simply not credible given the lack of information provided in the LA and the absence of any form of prototype construction, mock-up, or demonstration.

finding would include a finding that systems and components necessary for disposal safety have been properly fabricated and installed. Nothing remotely like DOE's plan has been proposed in the entire history of the regulation of nuclear facilities in the United States.

The legal issue poses the question whether it can possibly be within the contemplation of the Commission that there would be no definitive disposal safety finding until *after* the operating license has been issued and all 70,000 MTHU of high-level waste have been emplaced, and if not, whether this must be taken into account now, at the construction authorization stage.⁵

B. Regulatory Language.

10 C.F.R. § 63.24 requires that DOE update its application in a timely manner "to permit the Commission to review, before issuance of a license . . . [c]onformance of construction of structures, systems and components with the design." Accordingly, 10 C.F.R. § 63.41(a)(2) requires that, before wastes may be received or emplaced in the repository, the NRC must find that construction "has been substantially completed in conformity with the application as amended, the provisions of the Atomic Energy Act, and the rules and regulations of the Commission." 10 C.F.R. § 63.41(a)(2) provides further that "[c]onstruction may be considered substantially complete" if, among other things, "the construction of . . . [a]ny underground storage space required for initial operation [is] substantially complete."

Putting the cited portions of 10 C.F.R. § 63.41(a)(2) together, the NRC cannot issue a license to receive, possess and dispose of wastes until it is able to find, based on information in

⁵ An analogy may be drawn between DOE's drip shield proposal and a proposal to allow full power operation of a nuclear power plant with safety features to prevent or mitigate a loss-of-coolant accident to be installed years later, after decay heat has built up in the core and core cooling is already necessary. The analogy is apt because of the distinct possibility that waste emplacement will be as irrevocable as the buildup of decay heat in the absence of core cooling. There are no actual plans for retrieval of the wastes should installation of the drip shields prove to be impossible, and even if retrieval is technically possible and plans are made available for review, it may be prohibitively expensive in terms of economic costs or person-rem. See SAR section 1.11 (at 1.11-1.12) ("Specific plans for retrieval will be developed in detail should the need for retrieval be identified.") and NEV-SAFETY-168 and 169.

an updated application, that the construction of underground storage space for initial operation has been completed in accordance with the application, as amended, the Atomic Energy Act, and the Commission's regulations.

Not a single drip shield (part of the "space") will be installed at the time this pre-operational finding must be made. In fact, the drip shields will not be installed until almost one-hundred years from then, at a time when neither DOE nor NRC may even exist. If drip shields must be constructed (installed) to protect against unreasonable disposal risk (as Nevada believes to be the case), it follows from DOE's delayed installation schedule that it will be impossible for the NRC to find, as required by 10 C.F.R. § 63.41(a)(2), that the construction of underground storage space for initial operations has been completed in accordance with the safety requirements of the Atomic Energy Act and the Commission's regulations.

Before the NRC can issue a construction authorization, 10 C.F.R. § 63.31(a)(2) requires it to find that "there is reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public." This finding obviously looks forward in time beyond construction to the safety risks posed by the actual disposal of wastes, and it previews the safety findings that must be made at the later receipt and possession (operation) stage of NRC review. What may be an "unreasonable risk" within the meaning of 10 C.F.R. § 63.31(a)(2) can be inferred generally from the suite of pre-operation safety findings required by 10 C.F.R. § 63.41. As discussed above, these pre-operation safety findings include the finding that construction "has been substantially completed in conformity with the application as amended, the provisions of the Atomic Energy Act, and the rules and regulations of the Commission."

In ordinary circumstances it would make no sense to be concerned about the status of construction completion at the pre-construction stage, because no construction is to be completed at this point. But in our circumstances we know now, at the pre-construction stage, that a factual finding related to construction completion and required to be made before operation can commence cannot possibly be made, no matter how well DOE implements its stated construction plans. Under these circumstances, it would be irrational not to read 10 C.F.R. § 63.31(a)(2) broadly so that this safety problem can be taken into account. If we know now, at the pre-construction stage, that a disposal safety finding related to construction completion and required to be made before operation can commence cannot possibly be made, it would be irrational to find, as required by 10 C.F.R. § 63.31(a)(2), that "there is reasonable expectation that the materials can be disposed of without unreasonable risk to the health and safety of the public."

The Commission's relevant intentions may also be inferred from 10 C.F.R. § 63.131(a)(2). This requires DOE to conduct a "performance conformation program" until permanent closure designed, among other things, to provide data that indicate, where practicable, whether "engineered systems and components required for repository operation, and that are designed or assumed to operate as barriers after permanent closure, are functioning as intended and anticipated." The Commission must have understood that "engineered systems or components" (such as the drip shields) would be installed well before permanent closure so that useful data about their functioning could be obtained. That cannot happen here.

This argument, relating to the finding in 10 C.F.R. § 63.31(a)(2) and the finding in 10 C.F.R. § 63.41(a)(2), makes eminent logical sense and must be consistent with Part 63 considered as a whole. The Commission cannot allow construction of a geologic repository, or allow the construction of any complex nuclear facility, if it appears that a safety finding required

to be made before operation will be impossible to make. If the opposite were true, the whole construction authorization or permitting process would serve no useful purpose.

C. Regulatory History.

There is no regulatory history directly on point, almost certainly because the NRC never imagined that an essential safety feature of the repository would be installed, and a definitive safety finding would be made, only after all of the wastes had been disposed (emplaced in the drifts). However, there are strong indications that what DOE plans to do is prohibited.

The safety findings in 10 C.F.R. §§ 63.31(a)(2) and 63.41(a) were essentially copied from 10 C.F.R. §§ 60.31(a) and 60.41(a), except for the use of "reasonable assurance" as opposed to "reasonable expectation." Part 60 had its origins in a 1978 "Proposed General Statement of Policy" entitled "Licensing Procedures for Geologic Repositories for High-Level Radioactive Wastes." 43 Fed. Reg. 53869 (Nov. 17, 1978). Therein, the Commission stated that "it should examine the methods of construction and any new information that may have been developed during construction before formally authorizing receipt and storage of radioactive materials at the repository." *Id.* at 53870. Consistent with the 1978 policy statement, the 1979 notice of proposed rulemaking for Part 60 stated that the receipt and possession stage of review would include consideration of "conformance of construction with design." 44 Fed. Reg. 70408, 70412 (Dec. 6, 1979). 10 C.F.R. § 60.41(a) of the proposed rule (identical to what is now in 10 C.F.R. § 63.41(a)(2)) proposed that no license for receipt and possession would be issued unless the Commission found that "[c]onstruction of the geologic repository operations area has been substantially completed in conformity with the application, as amended, the provisions of the Atomic Energy Act, and the rules and regulations of the Commission," and that "[c]onstruction may be deemed to be substantially complete" if, among other things, "the construction of . . . any

underground storage space required for initial operation [is] substantially complete." 44 Fed. Reg. 70408, 70419 (Dec. 6, 1979).⁶ Clearly, it was always the Commission's intention that a definitive safety finding would be made with respect to construction completion before any operating license would be issued. There was never any suggestion that a receipt and possession license could be issued with important engineered safety features yet to be installed.

Moreover, the Commission was determined that repository licensing rules would be structured to avoid, insofar as possible, substantial commitments of resources before the Commission completes its formal licensing review. *See, e.g.*, 44 Fed. Reg. at 70410 ("deferral of some specific safety findings may be desirable in order to avoid decisions based on inadequate information and analysis so long as the increased financial investments and institutional commitments do not thereby reduce the stringency of the subsequent safety reviews"). This concern surely suggests a condemnation of any DOE plan that would postpone a complete and definitive NRC safety finding until after the repository is fully constructed and loaded with 70,000 NTHM of high-level waste.⁷

Finally, the notice of Part 63 final rulemaking purports to address a question posed by a commenter that seems almost directly on point – "[s]hould DOE be allowed to begin to place waste in the repository or to store waste in surface facilities once NRC has determined that there is enough space for initial operation, or should DOE have to wait until site construction is complete?" 66 Fed. Reg. 55732, 55737 (Nov. 2, 2001). The Commission's response repeats the language of the regulation, notes generally that "part 63 provides DOE flexibility to plan for efficient repository operations for receipt and emplacement of waste because of the significant

⁶ The notice adds helpfully that the Commission interprets "storage" to include "disposal." 44 Fed. Reg. 70408, n.1 (Dec. 6, 1979).

⁷ *See also*, Proposed Statement of General Policy at 43 Fed. Reg. 53869, 53870 (Nov. 17, 1978) ("There should be a formal safety review of the main repository design features before substantial commitments are made and alterations become impracticable to implement.").

length of time required to complete excavation of the entire underground facility," and states that the regulation did not allow "early use of the surface facilities for storage of spent nuclear fuel." 66 Fed. Reg. at 55738 (Nov. 2, 2001). Had the Commission intended that all of the wastes could be emplaced underground before an important safety feature (or barrier) was installed it surely would have said so here and, at the least, attempted to reconcile such an approach with the definitive finding required before receipt and emplacement of wastes that "there is reasonable risk that the materials can be disposed of without unreasonable risk to the health and safety of the public," and with the required contents of the performance confirmation program.

D. Conclusion.

DOE's plan is completely at odds with longstanding Commission policy and practice, incorporated in 10 C.F.R. Part 63, that a definitive safety finding must always be made before any actual radiological hazards arise, not afterwards when it may be too late, and that where complex facilities are involved, systems and components necessary for safety must be properly fabricated and installed before any radiological materials may be introduced into the facility.

We know now, at the pre-construction stage, that a factual finding related to construction completion and required to be made before operation can commence cannot possibly be made, no matter how well DOE implements its stated construction plans. Under these circumstances, 10 C.F.R. § 63.31(a)(2) must be construed and applied so that this safety problem can be taken into account, in a manner consistent with longstanding Commission policy and practice. In short, DOE's drip shield installation plan cannot possibly be deemed safe, even as a purely legal matter. Furthermore, this critical safety problem cannot be remedied just by imposing a license condition requiring that drip shields be installed in accordance with DOE's plan and schedule. Even apart from the fact that proper and effective enforcement of such a condition 100 years

from now is speculative, the license condition approach does not remedy the safety problem addressed in this brief, which is that DOE's plan will not allow the Commission to make a definitive finding that disposal will be safe before the radiological hazards arise.

Accordingly, the Board should decide NEV-SAFETY-162 in Nevada's favor. Resolving this legal issue against Nevada would still leave open the technical or policy question posed in that contention whether DOE's plan to defer installation of drip shields can be justified as safe.

XI. Whether, under 10 C.F.R. §§ 63.113, 63.114, and Part 63 Subpart G, the Performance Margins Analysis (PMA) can be used to validate or provide confidence in the TSPA, if its data and models are not qualified under DOE's quality assurance program.

A. Introduction.

This issue applies to NEV-SAFETY-171. This contention alleges that the PMA referred to in subsection 2.4.2.3.2.3.2.4 of the SAR, which is offered to validate or provide confidence in the TSPA, cannot be used for this purpose because it relies on data and models which are not qualified pursuant to DOE's quality assurance program. The PMA is a performance assessment that is based generally on the TSPA, but with modifications to purge alleged conservatisms. The intended effect is a more "realistic" calculation of probability-weighted doses to the RMEI.⁸ However, the PMA does not fully comply with DOE's quality assurance plan or NRC's quality assurance regulations. If the PMA were fully compliant, it likely would have been the TSPA.

As explained below, the essential purpose of NRC's quality assurance requirements in Part 63, as applied to scientific data and models, is to assure that such data and models possess certain minimum indicia of credibility. Without such indicia, data and models have no probative value whatsoever and cannot be used to support the LA. It should make no difference whether

⁸ NEV-SAFETY-170 alleges (with expert support) that there is no scientific basis for the assumption in the PMA that certain specific aspects of the TSPA are conservative. This would be another basis for discrediting the PMA.

they are used directly in the TSPA or are used to validate or provide a measure of confidence in the TSPA. Indeed, there is no bright line distinction between the two purposes. If the TSPA is able to stand on its own, as the regulations require, then the PMA is simply unnecessary and should be struck from the LA. However, we should assume that DOE included the PMA in the LA because it might turn out to be a necessary part of its postclosure safety case. When certain important models and data sets in the TSPA are shown to be scientifically questionable and therefore to be non-conservative (at best), the PMA will be trotted out to show that these non-conservatism are not as important as they seem to be because the PMA proves that there are other conservatisms in the TSPA that effectively cancel the non-conservatisms out. This approach to proving postclosure safety would effectively substitute supposedly conservative models and data sets in the TSPA for supposedly "realistic" models and data sets in the PMA.

B. Regulatory Language.

10 C.F.R. § 63.143 provides that "DOE shall implement a quality assurance program based on the criteria required by § 63.142." 10 C.F.R. § 63.142(a) requires that the quality assurance program apply to (among other things) "characterization of barriers important to waste isolation, and to related activities" including "site characterization; acquisition, control, and analyses of samples and data; tests and experiments; [and] scientific studies. . . ." The gathering of scientific data to support the PMA, and the conduct of the PMA itself, including the development and selection of PMA models, clearly constitute both an "analysis of samples and data" and a collection of "scientific studies." Thus, the PMA is fully subject to the quality assurance requirements in 10 C.F.R. § 63.142.

10 C.F.R. § 63.142(q) provides that "DOE shall establish measures to assure that conditions adverse to quality, such as . . . nonconformances are promptly identified and

corrected" and that "[i]f significant conditions are adverse to quality, the measures must assure that the cause of the condition is determined and corrective action taken to preclude repetition." Thus, DOE is required to take corrective action whenever there are significant conditions adverse to quality, which would include quality assurance defects in the PMA. Moreover, repetition of significant quality assurance shortcomings must be precluded. The clear effect is that the PMA must be the subject of corrective action to cure it of all significant conditions adverse to quality if it is to be a continuing part of DOE's postclosure safety case.

C. Regulatory History.

The most significant discussion of quality assurance requirements appears in the notice of final rulemaking for Part 63. The Commission states here that "[i]f data related . . . to design and characterization of barriers important to waste isolation, and to activities related thereto have not been collected in accordance with a QA program that meets these requirements [in 10 C.F.R. §§ 63.141-144], DOE would be required to show that such data have been qualified for its intended use." 66 Fed. Reg. 55732, 55763 (Nov. 2, 2001). The Commission also states that the "activities related thereto," which are fully subject to quality assurance requirements, include "acquisition and analysis of samples and data" and "scientific studies." *Id.* at 55764. This is in accord with the conclusion drawn above from the analysis of the regulatory language – data and performance assessments (scientific studies) used to support the LA must be qualified. There is not the least hint that data and performance assessments used to support the LA by validating and providing confidence in the TSPA, but not used in the TSPA itself, are exempt from quality assurance requirements. In fact, in 1999 DOE committed to the NRC "to have 100 percent of all data fully qualified by the time of license application." 66 Fed. Reg. 55732, 55765 (Nov. 2, 2001).

In its discussion of qualification of [then] existing Yucca Mountain data, the Commission also refers to NUREG-1298, entitled "Qualification of Existing Data for High-Level Nuclear Waste Repositories." 66 Fed. Reg. 55732, 55763 (Nov. 2, 2001) and DEN001093557. This guidance document offers some insight into the Commission's intentions. It provides (at 1) that "[a]ll data used in support of the license application that is important to safety or waste isolation must ultimately be qualified. . . ." The comments analysis (at 11) is even more explicit: "Data of indeterminate quality is not acceptable to the NRC."

Finally, very early in the repository program, shortly after NRC promulgated its quality assurance requirements, NRC Chairman Palladino wrote to the OCRWM Director to stress, among other things, that "[t]here is a need for the Mission Plan to demonstrate that *all* aspects of the geologic repository program and other activities that might be referenced in licensing are covered by an acceptable quality assurance program." Letter from Chairman Palladino to Ben Rusche, July 31, 1984, Enclosure 2, at 2 (NRC000021287) (emphasis added).

In sum, the regulatory history confirms that data important to waste isolation but of indeterminate quality cannot be used in any way to support the LA. There is no distinction between data and related models used directly in the TSPA and data and models used to validate or provide confidence in the TSPA.

D. Case Law.

In *Cincinnati Gas & Electric Company (William H. Zimmer Nuclear Power Plant)*, CLI-82-33, 16 NRC 1489 (1982), the Commission suspended the construction permit for a nuclear power plant because of indeterminate quality. Subsequently, the nearly completed facility had to be abandoned at a loss of hundreds of millions of dollars. In *Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Unit 1)*, CLI-81-30, 14 NRC 950 (1981), an operating

license was suspended because of a violation of quality assurance requirements. These cases (and others) stand for the proposition that the Commission takes quality assurance very seriously, and that "indeterminate quality" is simply not acceptable. The quality assurance requirements in Part 63 are based on the quality assurance requirements in 10 C.F.R. Part 50, Appendix B. *See* 66 Fed. Reg. 55732, 55753 (Nov. 2, 2001). Therefore, a performance assessment of indeterminate quality, like the PMA, should be just as unacceptable as a structure, system or component of indeterminate quality in a nuclear power plant.

E. Conclusion.

The PMA is of indeterminate quality and cannot be used to validate or provide confidence in the TSPA because it does not comply fully with quality assurance requirements in 10 C.F.R. Part 63 and the related requirements in DOE's quality assurance program. Indeed, there is no bright line between using the PMA to validate or provide confidence in the TSPA and using the PMA as a part of the TSPA itself. Allowing the PMA to be used to validate or provide confidence in the TSPA would be like allowing the proverbial camel's nose into the tent, with the likely result that important aspects of the postclosure safety analysis at Yucca Mountain would be of indeterminate quality, and the carefully constructed quality assurance framework in Part 63 would come tumbling down.

Accordingly, the Board should decide NEV-SAFETY-171 in Nevada's favor.

Respectfully submitted,

(signed electronically)

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Exhibit 1

Civilian Radioactive Waste Management System (CRWMS)
Master Risk Register

MOL. 20070724.0492

Page 1 of 7
QA: N/A

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**PRIVILEGED AND CONFIDENTIAL
DELIBERATIVE PROCESS PRIVILEGED
LITIGATION WORK PRODUCT**

	Risk ID	Group Category	Risk Title	Statement of Risk	
3	RWR-0015	1-LA Docking	Level of Design, Detail and Safety Analysis of License Application Submitted is Insufficient for the NRC Acceptance Review and Docking	IF the U.S. Nuclear Regulatory Commission (NRC) may expect additional design details and supporting safety analyses greater than had been previously planned. Prior agreements with NRC regarding design detail at license application are being reinterpreted. Performance of that work will take longer than initially expected. Therefore, either less pre-closure design and safety analyses work than the NRC currently is requesting will be available at time of license application, or the license application schedule will slip.	THEN schedule delays due to additional pre-closure safety analyses work or through additional reviews and requests of additional information will increase costs.

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**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))	December 7, 2009

CERTIFICATE OF SERVICE

I hereby certify that the foregoing State of Nevada's Opening Brief on Phase I Contention Legal Issues, has been served upon the following persons by the Electronic Information Exchange:

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