

Petitioners have filed a Motion for Summary Reversal of a decision by Allison M. Macfarlane, Chairman of the U.S. Nuclear Regulatory Commission (“NRC” or “Commission”), declining to recuse herself from the adjudicatory proceedings related to the Yucca Mountain license application process. This Court has already declined to grant Petitioners’ requests for (1) a writ of mandamus, (2) a preliminary injunction, and (3) expedited treatment and has ordered the case to proceed as a petition for review. Petitioners now argue that the merits of their claim are “so clear” as to obviate the need for further proceedings and, once again, ask this Court to grant relief on an expedited basis, summarily reverse the Chairman’s decision, and disqualify her from any further participation in the Yucca Mountain adjudicatory proceeding. But they rely on (and improperly incorporate) the very same motion papers that this Court previously found insufficient to establish their right to immediate relief. Their arguments are not suitable for summary reversal and their motion should be denied.

BACKGROUND

On August 13, 2013, this Court issued a writ of mandamus directing the NRC to resume reviewing an application submitted by the U.S. Department of Energy (“DOE”) to construct the Yucca Mountain facility. *In re Aiken County*, 725 F.3d 255 (D.C. Cir. 2013) (“*Aiken County II*”). Petitioners (who have been admitted to the NRC’s Yucca Mountain adjudicatory proceeding and who were

among the Petitioners in *Aiken County II*) filed a motion seeking the Chairman's recusal from the resumed proceeding. The Chairman denied the recusal motion, *see* Exhibit 1, and Petitioners filed this lawsuit.

Petitioners originally styled this action as a petition for expedited review or, in the alternative, as a petition for writ of mandamus. *See* Petition at 5-6 (invoking Section 119 of the Nuclear Waste Policy Act and citing this Court's authority to issue writs of mandamus in cases where it has jurisdiction). They also sought a preliminary injunction to prevent the Chairman from taking any action related to the proceeding until this Court ruled on the petition. NRC responded, asserting both that any arguments that the Chairman was required to recuse herself were properly brought after a final decision in the proceeding and that Petitioners had not demonstrated that the Chairman should be recused in this matter.

After expedited briefing, this Court: (1) denied the petitioners for a writ of mandamus (noting that Petitioners had "not shown a 'clear and indisputable right' to mandamus relief" and that mandamus was warranted only in the absence of other adequate remedies); (2) denied the motion for a preliminary injunction (noting that Petitioners had "not satisfied the stringent requirements for injunctive relief"); and (3) deferred the request for expedited treatment. *See* Order in this Docket (Oct. 22, 2013), Exhibit 2.¹ This Court then issued an order governing

¹ Judge Henderson would have granted the motion for expedited treatment.

review of the filing as a petition for review under Section 119(a)(1)(A) of the Nuclear Waste Policy Act, 42 U.S.C. § 10139(a)(1)(A) directing, *inter alia*, that the parties file any dispositive motions by December 6, 2013.² Petitioners filed this motion on December 5, 2013, and Respondents now oppose the motion.

STANDARD FOR GRANT OF SUMMARY REVERSAL

This Court's Handbook states that:

Summary reversal is rarely granted and is appropriate only where the merits are “so clear, plenary briefing, oral argument, and the traditional collegiality of the decisional process would not affect [the Court's] decision.”

D.C. Circuit Handbook of Practice and Internal Procedures (Nov. 2013 online edition) (“Handbook”) at 35-36 (citation omitted). A party seeking summary disposition must show that “the merits of his case are so clear that expedited action is justified” and that “no benefit will be gained from further briefing and argument of the issues presented.” *Taxpayers Watchdog, Inc. v. Stanley*, 819 F.2d 294, 297–98 (D.C. Cir. 1987). The “standard for obtaining a summary reversal of a lower court’s judgment is strenuous.” *United States v. Brookins*, 345 F.3d 231, 237 n.6 (4th Cir. 2003). Summary reversal “does not decide any new or unanswered question of law, but simply corrects a lower court’s *demonstrably erroneous* application of federal law.” *Maryland v. Dyson*, 527 U.S. 465, 466 n.1 (1999)

² Respondents filed a motion on December 3, 2013, asserting that this Court lacks jurisdiction over the petition for review in the absence of a final order.

(emphasis added). Petitioners' motion ignores this standard and does not meet the high threshold required for a grant of summary reversal. It also ignores the fact that this Court has already expressly rejected the underlying premise of their motion – that they have demonstrated a “clear” right to relief.

ARGUMENT

I. This Petition for Review Is Not Properly Resolved By Summary Disposition

1. Initially, this Court has repeatedly held that litigants cannot “incorporate” prior pleadings in an attempt to avoid the page limits imposed by the Federal Rules – especially when they failed to seek an extension of the page limits. *E.g.*, *Davis v. PBGC*, 734 F.3d 1161, 1166-67 (D.C. Cir. 2013); *see also* Handbook at 28 (“All legal arguments must be presented in the body of the motion; a separate brief or memorandum supporting or responding to a motion may not be filed.”). Here, Petitioners repeatedly rely on the previous filings in this case to avoid the page limits (*i.e.*, 20 pages) imposed by Rule 27(d)(2) of the Federal Rules of Appellate Procedure; yet they never sought an extension of page limits from this Court. They should not now be allowed to ignore the Federal Rules.

Petitioners emphasize from the outset that this Court must read the prior pleadings in this case to reach a decision. *E.g.*, Motion at 2 (“The pleadings of Petitioners and Respondents, and attachments thereto, comprise a basis adequate to allow the Court to give ‘the fullest consideration necessary to a just determination’

without further briefing or oral argument.”); *id.* at 7-8 (“The parties have fully briefed the weight and importance of the undisputed facts ... [and listing the pleadings already filed in this case.]”). Petitioners then buttress their arguments with frequent citations to those pleadings. *See, e.g., id.* at 4 n.5 (“Petitioners [sic] detailed analysis of this issue is found in Petition at 17-21; *id.* at Ex. B, pp.4-7; Reply at 3-4.”); *id.* at 4-5 n.6 (“Petitioners [sic] detailed analysis of this issue is found in Petition at 17-21; *id.* at Ex. B, pp. 4-7; Reply at 3-4.”); *id.* at 5 n.7 (“Petitioners [sic] detailed analysis found in Petition at 21-23; *id.* at Ex. B, pp. 8-10; Reply at 5-6.”); *id.* at n.8 (“Petitioners [sic] detailed analysis of this issue is found in Petition at 18, 23; *id.* at Ex. B, pp. 9-10.”); *id.* at 6 n.12 (“Reply at 2-7”); *id.* at 7 n. 15 (“*See* detailed analysis of this issue in Petitioners’ Reply at 3-5”).

Simply put, Petitioners have not presented – and cannot present – a cogent argument supporting summary reversal in the space allocated by the Federal Rules to that purpose (20 pages). Instead, they “incorporate by reference” their prior pleadings in violation of both this Court’s Handbook and the rule set forth in *Davis* in order to make their arguments. Thus, they clearly fail to meet the Handbook’s requirement that “[a]ll legal arguments must be presented in the body of the motion.”

2. Petitioners’ extensive reliance on the arguments presented in the additional pleadings illustrates the fundamental infirmity of their motion: this case

is not suitable for summary reversal because the issues involved are too complex to be resolved without a full treatment by this Court. Summary reversal is – by definition – a “*summary*” proceeding. It is only appropriate when the decision challenged is so clearly erroneous that the issue can be decided without resort to full briefing. But here, as we noted above, Petitioners have not made and cannot make their argument within the bounds set by the Federal Rules and this Court’s guidelines, *i.e.*, the 20-page limit for motions. Thus, because Petitioners have failed to show that the Chairman’s recusal decision is a “demonstrably erroneous” application of the law, *Maryland v. Dyson*, that issue deserves full briefing and oral argument under this Court’s normal procedures.

3. Furthermore, Petitioners ask this Court to review and accept arguments it has already expressly rejected. As noted above, Petitioners have *already* asked this Court to grant expedited relief in the earlier phase of this case when they sought (1) a writ of mandamus, (2) a preliminary injunction, and (3) expedited treatment. And this Court declined to grant any of these requests. *See* Exhibit 2. Simply put, this Court has already reviewed and rejected Petitioners’ arguments that they are “clearly” entitled to relief.

Petitioners’ motion seeks the recusal or disqualification of the chairman of a federal agency, who was confirmed with the unanimous consent of the U.S. Senate after providing assurances of her objectivity on this very issue, on an expedited

basis with only truncated briefing and no oral argument. Action of the type requested is extraordinary and should only be taken in extreme situations. Given that this Court has *already* found that the same evidence presented by Petitioners was insufficient to necessitate the Chairman's removal when it previously declined to afford Petitioners mandamus or injunctive relief, it is hard to see how granting this new request for "expedited" treatment would be appropriate.

4. Additionally, Petitioners' Motion makes arguments not raised in their motion before the Chairman and relies on documents that are not part of the record on review. For example, Petitioners complain (Motion at 3) that she "reiterated her analysis and criticisms of Yucca Mountain in 2010" in a meeting of the Blue Ribbon Commission. They also challenge a statement she made in a 2012 appearance before Congress where she stated that "I believe all of the analyses that I have done [relating to Yucca Mountain] are technically defensible[.]" Motion at 6. Petitioners cite this statement as evidence that this Court should "disqualify [the Chairman] as a neutral adjudicator of the license application." *Id.*

But Petitioners never submitted these two statements to the Chairman for her response as part of the Motion for Recusal/Disqualification. Thus, she never had a chance to respond to them in her decision. Accordingly, Petitioners failed to exhaust their administrative remedies with regard to these statements and they are not properly before this Court now. *Boivin v. U.S. Airways*, 446 F.3d 148, 155

(D.C. Cir. 2006). This failure is of particular significance because the case is, at this point, a petition for *review* of the Chairman's decision and not, as Petitioners would have it, yet another opportunity for them to introduce new evidence.

In any event, without waiving the objection above, there is a simple response to the Chairman's statement about her work: the Chairman performed academic studies in the past that were in her estimation scientifically sound. The Chairman's statement is not surprising nor is it indicative of an "irrevocably closed mind" that would justify her recusal. Instead, she simply expressed her confidence in the work she performed based on the evidence before her at the time. It in no way suggests that she is incapable of assessing a new and different record that might ultimately come before her in the future.

Likewise, Petitioners attempt to compare the Chairman's prior statements with (1) positions taken by DOE in its application for a license to construct the Yucca Mountain facility, and (2) positions taken by Nevada in challenging the Application. *E.g.*, Motion at 4-5. We will address the merits of those allegations *infra*; we note here that (1) Petitioners did not raise this issue in their motion before the Chairman, and (2) Petitioners cite to the DOE application on several occasions without providing a copy of the relevant portions. Petitioners even fail to identify

which page of 8,600 page application³ supports their position. It is highly irregular – not to mention unfair – to require this Court and the Respondents to search the entire document for a “needle in a haystack,” or to require the Respondents to respond to oversimplifications of a vastly complicated document. And Petitioners’ omission of this necessary detail is yet another example of why this case deserves normal briefing and oral argument.

5. Petitioners also provide no reason for this Court to consider the petition for review on a summary basis. The Chairman will only be required to adjudicate a fact in dispute, such as whether DOE’s Total System Performance Assessment (“TSPA”) models have failed to analyze or have improperly analyzed a particular “feature, event or process” (“FEP”), if a Licensing Board decision reaches the Commission on appeal. But that event will not occur for some time – and in no event before this case can be heard after full briefing.

6. Respondents have raised a significant issue regarding whether this Court has jurisdiction over this matter as a petition for review under the Nuclear Waste Policy Act. *See* Respondents’ Motion to Dismiss (Dec. 3, 2013). Petitioners’ primary response to this argument is that the Court has jurisdiction because the Chairman’s conduct constitutes a “clear violation of the law.” Motion at 15. But

³ *See* <http://www.doe.gov/sites/prod/files/em/Dyer-IdahoHLWCorporateBoard-7-24-08.pdf> at 7.

in addition to being conclusory and incorrect, Petitioners' argument fails to address the point that we make in our motion to dismiss – that the Court's jurisdiction to correct "clear violations of law" is through the vehicle of *mandamus*, and that the Court has already denied Petitioners' request for mandamus relief. Petitioners are not entitled to summary reversal when they have not – and cannot – explain why this Court has jurisdiction over what remains of this case in the first instance.

7. In sum, there is no reason for this Court to take this case up on an expedited basis without full briefing and oral argument. Petitioners' submission violates this Court's guidelines and standards by incorporating whole sections of prior pleadings by reference, and the submission clearly demonstrates that more than 20 pages must be devoted to explaining the disputed issues in this case. Furthermore, this Court has already rejected one request for expedited consideration of this case based on these same arguments; it should not grant this one when it merely recycles the same arguments and does not even comply with the applicable Federal Rules. In addition, Respondents have raised a significant jurisdictional issue that this Court must decide before reaching this motion for summary reversal. Finally, there is no reason for expedited treatment in this case because no adjudicatory issues in the Yucca Mountain licensing proceeding will be placed before the Commission for decision before the Court has an opportunity to act on a regular schedule.

II. Petitioners Have Failed to Demonstrate That the Chairman Abused Her Discretion in Declining to Recuse Herself

As discussed above, we do not believe that Petitioners' argument is properly considered as part of a motion for summary reversal because the issues are sufficiently complex to warrant full briefing in accordance with this Court's normal procedures. However, we set forth below the "highlights" of the points we would expect to make in a formal brief supporting the argument that the Chairman did not abuse her discretion in denying the motion for her recusal.

A. Standard of Review

1. Agency recusal decisions are reviewed under an abuse-of-discretion standard. *See, e.g., NIRS v. NRC*, 509 F.3d 562, 571 (D.C. Cir. 2007). But this is only one aspect of the deferential nature of the review required. Courts should "tread lightly when presented with this kind of challenge," *id.*, largely because administrative adjudicators – like federal judges – are presumed to be objective, and are allowed to have opinions (even strong ones) with respect to disputed issues. *See, e.g., United Steelworkers of America v. Marshall*, 647 F.2d 1189, 1209 (D.C. Cir. 1980) (citing *Hortonville Joint School Dist. No. 1 v. Hortonville Educ. Ass'n*, 426 U.S. 482, 493 (1976) and *United States v. Morgan*, 313 U.S. 409, 421 (1941)). This Court will set aside a Commissioner's "decision not to recuse [herself] from [her] duties 'only where [s]he has "demonstrably made up [her] mind about important and specific factual questions and [is] impervious to contrary

evidence.” *Metropolitan Council of NAACP Branches v. FCC*, 46 F.3d 1154, 1164-65 (D.C. Cir. 1995) (quoting *United Steelworkers*, 647 F.2d at 1209).

2. Petitioners seek recusal pursuant to 28 U.S.C. § 455, which by its terms governs judicial conduct. 28 U.S.C. § 455(a) provides that an adjudicator “shall disqualify himself in any proceeding in which his impartiality might reasonably be questioned.” 28 U.S.C. § 455(b)(1) provides for disqualification where the adjudicator “has a personal bias or prejudice concerning a party, or personal knowledge of disputed evidentiary facts concerning the proceedings.”⁴ Requests for recusal of NRC Commissioners based on extrajudicial knowledge are governed by *Joseph J. Macktal*, 30 NRC 85, 91 (1989) (to be disqualifying, alleged bias must stem from an extrajudicial source and result in an opinion on the merits on some basis other than what the judge has learned from participation in the case).

B. The Chairman Has Not Prejudged the Facts of This Case

1. Initially, we attempt to provide context for what is at issue in this case. From the late 1990s until the mid-2000s, Chairman Macfarlane performed research in an academic capacity related to a repository for high-level waste. In that

⁴ Petitioners state they seek the Chairman’s recusal under Section 455(a), Motion at 1, but also claim that they “do not abandon” their claim for recusal under the “extrajudicial knowledge” prong of Section 455(b)(1). *Id.* n.1. Given that most of Petitioners’ allegations appear to be claims of “extrajudicial knowledge,” and that the reason underlying Petitioners’ contention that the Chairman’s impartiality might be questioned is her prior involvement with matters related to Yucca Mountain, we address both issues.

process, she reviewed preliminary documents describing the various options for constructing and licensing the Yucca Mountain facility. Based on her analysis, she made several statements (now challenged by Petitioners) expressing concern about various aspects of an underground repository, including the use of the TSPA as a tool to predict conditions that may develop over time and her concerns that the TSPA might not account for all FEPs. As she explained at the time, she did not state that she was unalterably opposed to the construction of a repository at Yucca Mountain – she simply expressed concerns, with the goal of fostering a robust debate within the scientific community – about these important issues.

To be sure, DOE did not share, at least to the same extent, her concerns. Instead, DOE developed an application that relies upon the TSPA, and both the NRC and EPA have adopted regulations requiring use of this type of modeling to predict future conditions. Sitting as an adjudicator, however, the Chairman cannot change those regulations and cannot second-guess Congress's selection of Yucca Mountain as the site to be pursued for a repository. Instead, her responsibility, as it relates to the adjudication, is simply to determine, as a member of a five-member body in an appellate capacity, whether the NRC's Atomic Safety and Licensing Board has committed error in rendering a decision on DOE's application. By taking her oath of office, she has agreed to call "balls and strikes" as issues are presented to her. As we explain below, and as we intend to explain in full detail

when the issue is properly presented to the Court, Petitioners' complaints that the Chairman will not be able to perform these functions in an objective, impartial manner are simply unfounded.

2. The mere fact that the Chairman has gained knowledge or developed opinions on issues related to Yucca Mountain in general does not give rise to the inference that she has an unalterably closed mind on the licensing proceeding. And, given the presumption of good faith that must be afforded to her, there is no reason to doubt the Chairman's pledge – both to Congress and in her written decision denying Petitioners' motion for recusal – to consider the Yucca Mountain license application objectively and based upon the record before her. *See, e.g., FTC v. Cement Institute*, 333 U.S. 683, 700-01 (1948) (assuming that some FTC members had previously concluded that certain conduct constituted price-fixing, the fact that “the Commission had entertained such views as the result of its prior ex parte investigations did not necessarily mean that the minds of its members were *irrevocably closed* on the subject”) (emphasis added).

The holding in *Cement Institute* comports with a long line of judicial authority (which Petitioners fail to account for, despite their assertion that the merits of their claim are “clear”) holding that mere knowledge of the subject matter or prior expression of a general opinion is not grounds for disqualification. For example, in his seminal opinion denying a motion for disqualification, Justice

Rehnquist pointed out that Justice Black, who introduced the Fair Labor Standards Act as a Senator and also presided over hearings on the Act, participated in the case reviewing the Act's constitutionality. *See Laird v. Tatum*, 409 U.S. 824, 831 (1972). Justice Rehnquist then reviewed the actions of several justices including Justices Frankfurter and Jackson and Chief Justices Vinson and Hughes, and concluded that making general statements of policy and position do not disqualify a Justice from participating in a case involving that area of the law. *Id.* at 831-33.

Similarly, this Court (while denying a recusal motion) noted that Justice Breyer participated in a case reviewing the constitutionality of the Sentencing Guidelines after serving on the Sentencing Commission that helped draft the guidelines. *Baker & Hostetler v. Department of Commerce*, 471 F.3d 1355, 1358 (D.C. Cir. 2006) (Kavanaugh, J.); *see also National Rifle Ass'n v. City of Evanston*, No. 08 C 3693, 2008 WL 3978293 (N.D. Ill. 2008) (judge who had written an article on federal gun control legislation denied request for recusal); *Carter v. West Publ'g Co.*, No. 99-11959-EE, 1999 WL 994997 at *9 (11th Cir. 1999) ("Courts have uniformly rejected the notion that a judge's previous advocacy for a legal, constitutional, or policy position is a bar to adjudicating a case, even when that position is directly implicated before the Court.").

3. Petitioners challenge several of the Chairman's prior statements in their current motion that they raised in their original recusal motion before her as

“evidence” that she has prejudged the facts of the Yucca Mountain proceeding.

We review Petitioners’ more prominent assertions *seriatim*.

First, Petitioners claim that the Chairman “co-authored a book published in 2006 criticizing the scientific and technical adequacy” of the DOE application.

Motion at 3. In fact, the Chairman was *co-editor* of a book, *Uncertainty*

Underground (MIT Press, 2006) (excerpt attached as Exhibit 3), that collected a number of articles about Yucca Mountain from several differing viewpoints,

including authors who were outspoken in their support for the project. The

Chairman co-authored an article in the book that questioned several aspects of the proposed application, including the use of performance assessment modeling to

predict future conditions. But she explicitly stated that that she was “*not* trying to suggest abandoning Yucca Mountain and going back to the drawing board.”

Exhibit 3 at 406 (emphasis added); *see also id.* at x (Preface) (“This book is *not* a judgment of the suitability of Yucca Mountain as a repository for spent nuclear

fuel and high-level nuclear waste. We leave that judgment to the reader.”)

(emphasis added).⁵ Thus, this book is clearly not evidence that the Chairman has an “irrevocably closed mind” with respect to the Yucca Mountain application.

Second, Petitioners claim that the Chairman, in both her book and in her 2006 testimony before Congress, criticized the TSPA models used to analyze the

⁵ Petitioners cite Exhibit D submitted with their petition. *See* Motion at 3. But this document does not include these statements. Exhibit 3 to this pleading does.

FEPs at the proposed repository. Petitioners claim that the TSPA is “the very heart of the DOE license application,” Motion at 3, implying that any criticism of that aspect of the application is disqualifying. But the question of whether to use the TSPA is no longer on the table – that issue has been decided in the affirmative and both the NRC and the Environmental Protection Agency (EPA) have adopted regulations requiring its use. *See* 10 C.F.R. § 63.102(j) (NRC regulations); 40 C.F.R. § 197.20 (EPA regulations).

A party in an NRC proceeding cannot file a “contention,” *i.e.*, a “claim,” challenging a regulation. *See* 10 C.F.R. § 2.335. Thus, the Chairman’s sole adjudicatory responsibility is to determine – on the record – whether the DOE application satisfies the NRC’s regulations. As a consequence, her expressions of views about a policy – specifically, her view that the modeling required by regulation may not yield a reliable outcome – have no bearing upon her ability to judge arguments that could conceivably come before her in an adjudicatory capacity. Her policy views about the TSPA are no more disqualifying than a judge’s views about the efficacy of the Sherman Act, expressed as a law professor, would preclude the judge from applying the Act fairly to the facts of an antitrust case before him. Chairman Macfarlane is capable of calling “balls and strikes” objectively, and the fact that she has previously suggested, as a policy matter, that they might be better ways to define the strike zone does not alter this conclusion.

Next, Petitioners raise the Chairman's statement that the Yucca Mountain site was "unsuitable" for a repository based on her statement that the region is seismically and volcanically active in a 2009 interview. Motion at 3; *see also* Motion at 11. But Petitioners themselves submitted testimony by the Chairman that two earthquakes have occurred within twelve miles of Yucca Mountain since 1992 and that the region had been affected by volcanoes as recently as 80,000 years ago.⁶ Petitioners never suggest that this testimony is false; instead, they simply imply that the fact she is aware of the information renders her biased. We are not aware of any authority that awareness of historical and scientific facts within a person's area of expertise – and within the public domain – is grounds for disqualification; if it were, no individual with expertise could ever serve as a member – much less as the head – of an administrative agency.

And it is beyond dispute that the Chairman has not – and will not – be called upon to decide in the context of this licensing proceeding whether a site other than Yucca is an appropriate or more suitable for a high-level waste repository. Congress removed that decision from her – and anyone else – when it designated Yucca Mountain as the sole site for a repository. Thus, this issue is not – and can never be – the subject of an admissible contention in this proceeding. Her opinion that another site might have been more appropriate in no way prevents her from

⁶ *See* Petitioners' Exhibit E submitted with the Petition, at 3-4.

judging the issues that could come before her as a member of the Commission regarding this site – *i.e.*, whether the DOE application satisfies the relevant NRC criteria for construction of a repository.

Finally, Petitioners create a “table” comparing the Chairman’s supposed views on various Yucca-related “issues” to both (1) the final DOE application, and (2) the position of the State of Nevada, which is challenging the application. Motion at 4-5. But as noted earlier, Petitioners cite the 8,600 page application without providing either this Court or Respondents a copy of the applicable portions of the application for comparison of the “supposed” positions of the Chairman or DOE. Likewise, they do not provide any documents detailing the supposed “Nevada position.” Given those omissions, this Court should not accept Petitioners’ unsupported, generalized statements of the positions of the various parties at face value. We further note that, as she explained in denying the recusal motion, the Chairman has never even *seen* the DOE application. *See* Exhibit 1 at 7. The idea that she has somehow *prejudged* it is obviously incorrect.

Moreover, Petitioners’ implication that the Chairman and Nevada are in “agreement” on contentions is simply wrong. For example, Nevada has filed contentions related to the license application that assert that certain *particular* FEPs should have been incorporated into the TSPA model. *See, e.g.*, Nevada Safety Contention 122 (contention raised by Nevada challenging failure to include

analysis of “drift degradation” FEP), attached as Exhibit 4. But nothing that the Chairman has said or written in any way suggests that she believes that any particular FEP has been “improperly” excluded. And nothing in her statements indicates that she is not capable of objectively assessing a contention by Nevada (or any other party to the proceeding) that a *specific* FEP has been improperly excluded or included or improperly assessed. Instead, her statements merely reflect a policy (*i.e.*, general or generic) view of a potential pitfall in using TSPA modeling; they do not overcome the presumption that she is capable of fairly and objectively reviewing the Licensing Board’s resolution of contentions.⁷

CONCLUSION

For the foregoing reasons, this Court should deny Petitioners’ motion.

⁷ Petitioners complain (Motion at 9) about the use of the word “policy” to describe the Chairman’s expressed views. But that word is appropriate. The Chairman expressed views about the general principles initially proposed by DOE when it considered ways to develop the Yucca Mountain application. Thus, she expressed views about DOE’s *policy* in preparing the application. She has never expressed any views about whether any specific portion of the now-completed application satisfies the applicable NRC regulations. And that is the matter that could be pending before her at some point in the future and the matter to which any recusal motion actually should be addressed.

Respectfully submitted,

 s/Andrew P. Averbach
ANDREW P. AVERBACH
Solicitor

 s/Jeremy M. Suttenger
JEREMY M. SUTTENBERG
Attorney

 s/Charles E. Mullins
CHARLES E. MULLINS
Senior Attorney
Office of the General Counsel
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, Maryland 20852
(301) 415-1618
charles.mullins@nrc.gov

December 18, 2013

Filed by CM/ECF

CERTIFICATE OF SERVICE

I hereby certify that on December 18, 2013 I filed the *Respondents' Response to Petitioners' Motion for Summary Reversal* in Case No. 13-1260 with the U.S. Court of Appeals for the District of Columbia Circuit by filing the same with the Court's CM/ECF filing system. That method is calculated to serve:

Robert M. Andersen
Christopher B. Clare
Clark Hill PLC
601 Pennsylvania Ave. N.W.
Washington, D.C. 20004

Thomas R. Gottshall
S. Ross Shealy
Haynesworth Sinkler Boyd, P.A.
Post Office Box 11889
Columbia, S.C. 29211-1889

Alan Wilson
John W. McIntosh
Robert D. Cook
Office of the Attorney General
Post Office Box 11549
Columbia, South Carolina 29211

Willaim Henry Davidson, II
Kenneth Paul Woodington
Davidson & Lindeman, P.A.
1611 Devonshire Dr., 2nd Floor
Post Office Box 8568
Columbia, S.C. 29202-8568

Respectfully submitted,

___s/Charles E. Mullins___
CHARLES E. MULLINS
Senior Attorney
Office of the General Counsel
U.S. Nuclear Regulatory Commission
11555 Rockville Pike

Rockville, Maryland 20852
DATED: December 18, 2013

RESPONDENTS' EXHIBIT 1

RESPONDENTS' RESPONSE
TO PETITIONERS' MOTION FOR SUMMARY REVERSAL

Case No. 13-1260 (D.C. Cir.)

DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR
RECUSAL/DISQUALIFICATION OF NRC CHAIRMAN ALLISON M.
MACFARLANE (Sept. 9, 2013)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

CHAIRMAN:

Allison M. Macfarlane

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

**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR
RECUSAL/DISQUALIFICATION OF NRC CHAIRMAN ALLISON M. MACFARLANE**

Introduction

Nye County, Nevada, filed a motion on August 23, 2013, requesting that I recuse myself and be disqualified from any participation in the above-captioned proceeding, which involves the Department of Energy's (DOE) license application for a geologic repository at Yucca Mountain in Nevada.¹ The State of Nevada filed an answer opposing the Motion for Recusal,² and Nye County requested an opportunity to reply to Nevada's answer.³ Although I do not find that Nye County has demonstrated compelling circumstances or that Nye County could not reasonably have anticipated Nevada's arguments, as a matter of discretion, I allow Nye County leave to file

¹ *Nye County's Motion for Recusal/Disqualification of NRC [Chairman] Allison M. Macfarlane and Points and Authorities in Support of Motion* (Aug. 23, 2013) (Motion for Recusal), at 1. The State of South Carolina, Aiken County, South Carolina, and the National Association of Regulatory Utilities Commissioners joined in this motion.

² *State of Nevada Answer in Opposition to Nye County's Motion for Recusal/Disqualification of Chairman Macfarlane* (Aug. 30, 2013).

³ *Nye County's Request for Leave to File Reply to State of Nevada's Answer in Opposition to Nye County's Motion for Recusal/Disqualification of Chairman Macfarlane* (Sept. 5, 2013); *Nye County's Reply to State of Nevada's Answer in Opposition to Nye County's Motion for Recusal/Disqualification of Chairman Macfarlane* (Sept. 5, 2013) (Reply).

its reply.⁴ I have considered all of these pleadings in reaching my decision to deny Nye County's Motion for Recusal.

Nye County has raised several concerns about my ability to be objective and fair in this adjudicatory proceeding, and I appreciate the opportunity to address these concerns. One of my most important duties as a member of the Commission is to ensure that our adjudicatory process is conducted fairly and impartially, and I am fully committed to fulfilling that duty – I owe the public no less.

Nye County's Motion for Recusal is premised upon the mistaken notion that I have somehow prejudged DOE's license application. I can state without hesitation that I have not prejudged the technical, policy, or legal issues in this adjudicatory proceeding, and that my expertise will enhance the Commission's deliberations and decision-making. In fact, I have not looked at the Department of Energy's (DOE) license application, the Nuclear Regulatory Commission (NRC) staff's safety or environmental reviews, or considered how to apply the law or NRC regulations to determine the adequacy of the application, and I have not made up my mind on any of the issues raised by the application.

In the United States, the regulatory process contemplates that people with expertise will lead regulatory commissions. These agencies exist to bring their independent technical expertise to bear on issues within their jurisdiction. Those who have been selected to serve on the Nuclear Regulatory Commission have relevant expertise in the field of nuclear energy. Some gained that experience in the Nuclear Navy, some have addressed nuclear issues in service to the Congress, and some have been professors of nuclear engineering. It is to be *expected* that Commissioners' technical backgrounds will inform, in part, their decision-making.

⁴ Under the NRC's rules of practice, a moving party "has no right to reply, except as permitted by the Secretary, the Assistant Secretary, or the presiding officer." See 10 C.F.R. §§ 2.323(c), 2.1000. "Permission may be granted only in compelling circumstances, such as where the moving party demonstrates that it could not reasonably have anticipated the arguments to which it wishes to reply." 10 C.F.R. § 2.323(c).

Nye County's motion confuses scientific and academic research and writing with regulatory decision-making in contested proceedings on licensing applications. In the former, an academic or scientist attempts to put before the reader the complexities and uncertainties surrounding an issue in order to invite debate and further scientific research. In reaching a licensing decision, however, the Commission is required to review all the positions advanced by the parties and determine whether the application satisfies regulatory requirements. As to the sufficiency of this license application, I can state unequivocally that I have not reached any conclusions, and I have an open mind. I will address the legal arguments Nye County raises below.

Background

In 2008, the DOE filed an application seeking authorization from the NRC to construct a geologic repository for the storage of high-level nuclear waste at Yucca Mountain, Nevada.⁵ In September 2008, the NRC accepted the application for docketing, and in October 2008 the Commission published a *Federal Register* notice offering members of the public an opportunity to request a hearing.⁶ Several interested parties, including Nye County, requested and were granted a hearing in this matter.⁷ The NRC staff initiated a comprehensive technical review of the application and issued one volume of its Safety Evaluation Report (SER), but has not completed or issued the remaining four volumes of the SER.⁸

⁵ See Department of Energy; Notice of Acceptance for Docketing of a License Application for Authority to Construct a Geologic Repository at a Geologic Repository Operations Area at Yucca Mountain, NV, 73 Fed. Reg. 53,284, 53,284 (Sept. 15, 2008).

⁶ *Id.*; U.S. Department of Energy (High Level Waste Repository); Notice of Hearing and Opportunity to Petition for Leave to Intervene on an Application for Authority to Construct a Geologic Repository at a Geologic Repository Operations Area at Yucca Mountain. 73 Fed. Reg. 63,029 (Oct. 22, 2008)

⁷ LBP-09-06, 69 NRC 367, 377-78 (2009).

⁸ Hearing on the Re-nomination of Allison Macfarlane to be a Member of the Nuclear Regulatory Commission Before the S. Comm. on Environment and Public Works, 113th Cong.

In 2010, the DOE filed a motion to withdraw its application, which the NRC Atomic Safety and Licensing Board (ASLB) ultimately denied.⁹ In 2011, the Commission directed the staff and the ASLB to conduct an orderly closing of the technical review and adjudicatory proceeding.¹⁰

The States of South Carolina and Washington, as well as interested parties within those states, sought a writ of mandamus requiring the NRC to complete its review of the DOE application.¹¹ On August 13, 2013, the United States Court of Appeals for the D.C. Circuit granted the writ of mandamus and ordered the NRC to “promptly continue with the legally mandated licensing process” for the DOE’s Yucca Mountain application.¹² Nye County filed its motion requesting my recusal on August 23, 2013.

Discussion

As part of my academic work, I co-edited a book entitled, *Uncertainty Underground: Yucca Mountain and the Nation’s High-Level Nuclear Waste*, which was published in 2006.¹³ In 2003 and 2006, I also testified before Congress on the topic.¹⁴ Nye County uses my past

(May 24, 2013) (Responses by Allison Macfarlane to Additional Questions from Senator Vitter) (unofficial transcript).

⁹ U.S. Department of Energy’s Motion to Withdraw (March 3, 2010); *U.S. Department of Energy* (High Level Waste Repository), LBP-10-11, 71 NRC 609 (2010).

¹⁰ CLI-11-07, 73 NRC 212 (2011).

¹¹ *In re Aiken County, et al.*, No. 11-1271 (D.C. Cir. Aug. 13, 2013) (slip op. at 4).

¹² *Id.* (slip op. at 22.).

¹³ Motion for Recusal at 3, 5, 6, 8, 9, 11 (citing UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION’S HIGH LEVEL WASTE (Allison M. Macfarlane & Rodney C. Ewing eds., The MIT Press 2006)).

¹⁴ Status of the Yucca Mountain Project: Hearing Before the S. Comm. on Environment and Public Works, 109th Cong. 32 (March 1, 2006) (Statement of Allison Macfarlane, Research Associate, Program in Science, Technology and Society, Massachusetts Institute of Technology) (unofficial transcript); Oversight of Department of Energy Activities at the Yucca

academic work, Congressional testimony, and a quote in an article dated June 23, 2009,¹⁵ to argue that now, in 2013, I should recuse myself from participating in the consideration of DOE's license application and the NRC staff's analysis of that application—neither of which I have even seen. Based largely upon my academic work, Nye County argues that I have “echoed the arguments of opponents to the repository,” and consequently have prejudged the issues that would come before me as Chairman of the NRC in the Yucca Mountain licensing proceeding.¹⁶ My skills as a scientist and as a geologist are valuable tools in my role as a regulator—among those skills is objectivity in the face of new data. Academic work performed on the basis of data available in the early 2000s is not a basis for recusal now.

NRC Commissioners look to the standards that apply to federal judges¹⁷ and make their own decisions regarding motions for recusal from adjudicatory proceedings.¹⁸ However “mere proof that [a Commissioner] has taken a public position, or has expressed strong views, or holds an underlying philosophy with respect to an issue in dispute” does not in and of itself overcome the presumption of objectivity or require disqualification.¹⁹

Mountain Site: Hearing Before the Subcomm. on Energy and Water Development of the S. Comm. on Appropriations, 108th Cong 12 (May 28, 2003) (Statement of Allison Macfarlane, Senior Research Associate, Massachusetts Institute of Technology) (unofficial transcript).

¹⁵ Motion for Recusal at 3, 5, 6, 9, 10 (citing David Talbot, *Life After Yucca Mountain*, MIT Technology Review, June 23, 2009).

¹⁶ Motion for Recusal at 8 - 13; Reply at 5 - 7.

¹⁷ 28 U.S.C. § 455(a) provides that “[a]ny justice, judge, or magistrate judge of the United States shall disqualify himself in any proceeding in which his impartiality might reasonably be questioned.” 28 U.S.C. § 455(b) provides for disqualification where a justice, judge, or magistrate judge of the United States, “has a personal bias or prejudice concerning a party, or personal knowledge of disputed evidentiary facts concerning the proceedings.”

¹⁸ *In re Joseph Macktal*, CLI-89-14, 30 NRC 85, 91 (1989).

¹⁹ *United Steelworkers of America v. Marshall*, 647 F.2d 1189, 1209 (D.C. Cir. 1980) (citing *Hortonville Joint School District No. 1 v. Hortonville Educ. Ass'n*, 426 U.S. 482, 493 (1976) and *United States v. Morgan*, 313 U.S. 409, 413 (1941)).

It is well-established that mere knowledge of the subject matter or prior expression of a general opinion is not grounds for disqualification. For example, in his seminal opinion denying a motion for disqualification Justice Rehnquist pointed out that Justice Black, who had introduced the Fair Labor Standards Act as a Senator and also presided over hearings on the Act, participated in the case reviewing the Act's constitutionality.²⁰ Justice Rehnquist then reviewed the actions of several justices including Justices Frankfurter and Jackson and Chief Justices Vinson and Hughes, and concluded that making general statements of policy and position do not disqualify a Justice from participating in a case involving that area of the law.²¹ Similarly, Judge Kavanaugh pointed out that Justice Breyer had participated in a case reviewing the constitutionality of the Sentencing Guidelines, after having served on the Sentencing Commission that helped draft the guidelines.²²

Indeed, it is often precisely *because of* their knowledge of and intense involvement in a specific regulated field that persons are appointed to lead regulatory commissions and, ultimately, to issue adjudicatory decisions with respect to issues arising in that field. Accordingly, Commissioners have consistently considered the issue of recusal not simply by inviting litigants to peruse past writings and speeches in an effort to identify disqualifying knowledge or views about a particular issue. Instead, the relevant inquiry has focused on whether a particular Commissioner possesses knowledge from an extrajudicial source *and* that

²⁰ *Laird v. Tatum*, 409 U.S. 824, 831 (1972).

²¹ *Id.* at 831-33.

²² *Baker & Hostetler v. Department of Commerce*, 471 F.3d 1355, 1358 (D.C. Cir. 2006). See also *National Rifle Association v. City of Evanston*, 2008 WL 3978293 (N.D. Ill. 2008) (judge who had written an article in 1976 on federal gun control legislation denied request for recusal); *Carter v. West Publishing Company*, 1999 WL 994997 at *9 (11th Cir. 1999) ("Courts have uniformly rejected the notion that a judge's previous advocacy for a legal, constitutional, or policy position is a bar to adjudicating a case, even when that position is directly implicated before the Court.").

knowledge has served or threatens to serve as the basis for a judicial decision,²³ or whether judicial conduct demonstrates a pervasive bias or prejudice.²⁴ These considerations reflect the fundamental principle that a Commissioner “should disqualify himself only if ‘a reasonable man, cognizant of all the circumstances, would harbor doubts about the judge’s impartiality.’”²⁵

I don’t believe that a reasonable observer, who is familiar with the entire body of my work, including my work as a sitting Commissioner, and who is familiar with Commission processes, and the applicable legal principles, would question my ability to render judicial decisions in this proceeding fairly and impartially. With respect to the actual material that the Commission would be called upon to review in a Yucca Mountain licensing proceeding, including the key question of whether compliance with Commission regulations has been demonstrated, I have not yet formed, let alone expressed, any views at all regarding the DOE license application. In fact, I have not looked at the DOE’s license application, or any of the NRC’s Technical Evaluation Reports (TER) or SER volumes. In my capacity as a scientist, years before the DOE license application was filed, I conducted research related to Yucca Mountain, and I wrote and spoke on the topic. But many years have passed since my Yucca-related research, and that research was conducted without the benefit of the DOE’s license application, or the NRC staff’s technical or environmental review. I can say without hesitation that I have formed no views on the adequacy of the DOE license application.

²³ *In re Joseph Macktal*, CLI-89-14, 30 NRC at 91; *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), CLI-82-9, 15 NRC 1363, 1366 (1982); see, e.g., *Cinderella Career and Finishing Schools, Inc. v. FTC*, 425 F.2d 583, 590-91 (D.C.Cir.1970) (agency chairman should have recused himself in light of his public statements indicating prejudgment of the case).

²⁴ *In re Joseph Macktal*, CLI-89-14, 30 NRC at 91 (citing *Houston Lighting and Power Co.* (South Texas Project, Units 1 and 2), CLI-82-9, 15 NRC at 1366).

²⁵ *Id.* at 91 (quoting *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), LBP-88-29, 28 NRC 637, 639 (1988)).

Although Nye County argues that I have “echoed the arguments of opponents to the repository,”²⁶ my research and published work was completed *years before* the DOE submitted its license application. As a result of my research and analyses, I addressed, based on information then available to me, matters such as Total System Performance Assessment (TSPA) modeling, the nuclear waste policy process, and the geologic environment of the proposed repository.²⁷ None of my analyses or statements address whether an application for a waste repository at Yucca Mountain would satisfy NRC regulatory requirements.

While I have made public statements concerning Yucca Mountain, I did so as a professor and a geologist in order to further scientific research and public debate. I highly value understanding the full range of views on any issue, a point I have consistently made to the staff at the Nuclear Regulatory Commission since I arrived in 2012. For instance, during my speech at the Regulatory Information Conference in March 2013, I noted, “In order for our regulatory process to be successful, we must take a broad range of viewpoints into account.”²⁸ My past research has always been set in the broader context of understanding the technical and societal issues associated with the back end of the nuclear fuel cycle. When I have written about Yucca Mountain, it has been in the context of geologic disposal of nuclear waste writ large, so that any country could draw lessons from U.S. experience to improve on their own nuclear waste disposal program. In my book, I note, “Although the Yucca Mountain site is unique in many

²⁶ Motion for Recusal at 8 – 13; Reply at 5 – 7.

²⁷ UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION’S HIGH LEVEL WASTE, *supra* n.13; Rodney Ewing and Allison Macfarlane, Yucca Mountain, *Science*, at 296, 659-660 (Apr. 26, 2002); and Allison Macfarlane, Underlying Yucca Mountain: The Interplay of Geology and Policy in Nuclear Waste Disposal, *Social Studies of Science*, 33/5, 783-807 (Oct. 2003).

²⁸ Allison Macfarlane, *The Next 25 Years*, Regulatory Information Conference, Rockville, MD, March 12, 2013.

respects, many of the issues that we highlight here are the same for other geologic repositories.”²⁹

My purpose in researching, writing, and speaking about Yucca Mountain was to ensure that any geologic repository built in the United States or elsewhere would be as safe and secure as it could possibly be. In that sense, I view my prior work as a geologist to be consistent with the NRC’s mission, and similar to the work of the NRC staff, which is dedicated to fulfilling that mission. The NRC conducts rigorous reviews of the design and license applications it receives; we do not “rubber stamp” design or license applications. Where we challenge or criticize design or license applications, we do so for the purpose of protecting public health and safety, the common defense and security, and the environment.

Nye County asserts that I support withdrawal of the DOE license application, oppose the technical and policy approaches in DOE’s license application, support efforts to develop an entirely new approach to nuclear waste disposal, and advocate “going back to the drawing board” to “develop new alternatives.”³⁰ These assertions are unfounded and inconsistent with my prior work and statements on Yucca Mountain.

As I stated in the book, I was “not trying to suggest abandoning Yucca Mountain and going back to the drawing board.”³¹ Instead, I was trying to “put forth some ideas for improving the current situation” based on my analyses and those of the other scientists who contributed to the book.³² I noted that, in selecting contributors for the book, my co-editor and I “attempted to include authors from a wide range of disciplines who hold differing views on the suitability of

²⁹ UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION’S HIGH LEVEL WASTE, *supra* n. 13, at 4.

³⁰ Motion for Recusal at 4.

³¹ UNCERTAINTY UNDERGROUND: YUCCA MOUNTAIN AND THE NATION’S HIGH LEVEL WASTE, *supra* n. 13, at 406.

³² *Id.*

Yucca Mountain as a repository site.”³³ And we explicitly state in the book that, “This [book] is not a judgment on the suitability of Yucca Mountain as a repository for spent nuclear fuel and high-level nuclear waste. We leave that judgment to the reader.”³⁴

Nye County asserts that my knowledge of the issues involved in the adjudication requires my disqualification and recusal.³⁵ My prior knowledge of an issue in an adjudicatory proceeding does not automatically result in my disqualification. Clearly, Commissioners have and develop expertise and knowledge that they use in regulatory decision-making. My views are not etched in stone, I will allow myself to be persuaded by new information or evidence that is presented in the proceeding, and I will be fair to all parties in the proceeding.³⁶

As a member of the Commission, sitting in an adjudicatory capacity in a licensing proceeding, I do not make decisions about the facts in the case. The parties are responsible for establishing a sound record that addresses the issues, and the ASLB governs that process. When a party appeals an ASLB decision, the Commission reviews the record much the same way a court of appeals might. Decisions I make as a member of the Commission sitting in an adjudicatory capacity are based on the record, the parties’ arguments, and whether the ASLB properly applied the Commission’s rules and precedents in reaching its decision. If called upon to do so in this proceeding, I will review the comprehensive record developed by the NRC in light of the applicable regulatory requirements and render an impartial decision on the

³³ *Id.* at x.

³⁴ *Id.*

³⁵ Motion for Recusal at 11-13; Reply at 3-5.

³⁶ See *United Steelworkers of America v. Marshall*, 647 F.2d at 1208, 1210 (citing *Cinderella Career & Finishing Schools, Inc. v. FTC*, 425 F.2d 583, 591 (D.C. Cir. 1970) (other citations omitted)) (Disqualification of an agency adjudicator is required when his public statements about pending cases revealed she “has in some measure adjudged the facts as well as the law of a particular case in advance of hearing it[.]” and had “demonstrably made up her mind about important and specific factual questions and was impervious to contrary evidence.”).

application. Analyses that I conducted for the book, which were completed in the early 2000 time frame, years before the DOE submitted its license application, will not govern; obviously, my decision on the merits of the Yucca Mountain license application must ultimately be based on the adjudicatory record, not on the information I analyzed many years ago in my writings. As I have testified, I have not analyzed the DOE license application or the NRC's technical analyses, I remain impartial about whether the DOE's license application meets the NRC's regulatory requirements, and I will keep an open mind.³⁷

As support for its assertion that I have prejudged the issues in this licensing proceeding, Nye County references a quote attributed to me in a 2009 article, in which I was asked if the Yucca Mountain site was unsuitable and I replied "yes."³⁸ I have made strong statements that sparked useful debate about Yucca Mountain, but I made these statements as a geologist and professor in an entirely different setting, without attempting to address whether any DOE application could or would satisfy NRC regulatory requirements. I had not reviewed the application or the NRC's safety or environmental reviews, or considered how to apply the law and the applicable NRC regulations to determine the adequacy of the application.

When asked whether I believe Yucca Mountain to be unsuitable as a permanent waste repository during my first confirmation hearing, I testified that "I have not examined all the recent evidence on Yucca Mountain, including the Department of Energy's application and the NRC's technical review of that application and would have to do so to reach a judgment about its

³⁷ Hearing on the Nomination of Allison Macfarlane and Re-nomination of Kristine L. Svinicki to be Members of the Nuclear Regulatory Commission Before the S. Comm. on Environment and Public Works, 112th Cong. (June 13, 2012) (Responses by Allison Macfarlane to Additional Questions from Senators Sessions, Barrasso, and Crapo) (unofficial transcript); Hearing on the Re-nomination of Allison Macfarlane to be a Member of the Nuclear Regulatory Commission Before the S. Comm. on Environment and Public Works, 113th Cong. (May 23, 2013) (Responses by Allison Macfarlane to Additional Questions from Senator Vitter) (unofficial transcript).

³⁸ David Talbot, *Life After Yucca Mountain*, MIT Technology Review, June 23, 2009.

current suitability.”³⁹ When asked about this quote during a House Energy and Commerce Committee Hearing on July 24, 2012, I testified that while I was not sure of the context of the quote, the quote was made before the license application was submitted, I had not read the license application or the NRC’s technical analyses, and that with time, knowledge changes, more evidence comes to light, and I intend to keep an open mind.⁴⁰ I stand by my testimony; I have and will keep an open mind. The quote attributed to me in June 2009, taken together with everything else that I have written and said on this subject, does not support the conclusion that I have prejudged the facts and the law regarding the particular license application at issue.⁴¹ I recognize that any NRC decision on site suitability must be based on a complete, current, and fully developed record.

³⁹ Hearing on the Nomination of Allison Macfarlane and Re-nomination of Kristine L. Svinicki to be Members of the Nuclear Regulatory Commission Before the S. Comm. on Environment and Public Works, 112th Cong. (June 13, 2012) (Response by Allison Macfarlane to an Additional Question from Senator Barrasso) (unofficial transcript).

⁴⁰ NRC Policy and Governance Oversight: Hearing Before the Subcomm. on Environment and the Economy and the Subcomm. on Energy and Power of the H. Comm. on Energy & Commerce, 112th Cong. _ (July 24, 2012)(unofficial transcript):

Mr. Murphy: In 2009, when you were asked by a writer for the MIT Technology Review, the question “is Yucca really unsuitable?” you answered yes at that time. Are you saying your opinion has changed? And I put this in the context of what the other commissioner said, the value of having a more lengthy and detailed answer to things because maybe these things cannot be reduced to a yes/no answer. Has your position changed? Is it yes? Is it no? Is it we have more work to do?

Ms. Macfarlane: I am not sure of the context of that quote, so I can’t speak directly to that quote, but what I can tell you – and maybe in a sense of reassuring – is that I have spent much time researching Yucca Mountain. I believe all the analyses that I have done are technically defensible. As a scientist, I would not try to publish anything that wasn’t technically defensible; it wouldn’t be publishable. Most of the analyses that I did of Yucca Mountain for the book, which was published in 2006, were done in the early 2000 time frame. That was before the license application was submitted. I have not read the license application. I have not read yet the NRC’s technical analyses. Of course, with time, knowledge changes, more evidence comes to light, and I intend to keep an open mind.

⁴¹ *NIRS v. NRC*, 509 F.3d 562, 571 (D.C. Cir. 2007).

Finally, I believe there are other factors to consider on the issue of my recusal. I do not believe it would serve the public interest for a Commissioner, particularly one with substantial technical expertise in geology and on geologic disposal of nuclear waste, to recuse herself where it is unnecessary to do so.⁴² Of course, the duty to sit as a Commissioner in difficult cases is a factor to carefully weigh, but that duty does not override the public's right to a fair and impartial adjudicatory process.⁴³

Although Nye County asserts that many have already concluded that I have prejudged the issues in this case,⁴⁴ any decision whether my impartiality "can 'reasonably be questioned' is to be made in light of the facts as they existed, and not as they were surmised or reported."⁴⁵ Fair minded people, having considered the entire body of my work, including my work as Chairman of the NRC, applicable legal principles, and my statements explaining my decision on this motion, will not doubt my ability to be fair and impartial in this licensing proceeding, recognizing that I have not examined the application or prejudged the facts or the law.

Conclusion

Throughout my service as Chairman of the NRC, I have kept an open mind and have fairly and objectively considered all of the matters that have come before me on their individual merits, based on the evidence in the record and the parties' arguments, and without prejudice. I will consider all of the issues that arise in this proceeding with the same level of

⁴² See *Cheney v. United States District Court for the District of Columbia*, 541 U.S. 913, 915 (2004) ("We do not think it would serve the public interest to go beyond the requirements of the statute and recuse ourselves, out of an excess of caution ... Even one unnecessary recusal impairs the functioning of the Court.") (SCALIA, J., respecting recusal).

⁴³ See *Cinderella Career & Finishing Schools, Inc. v. FTC*, 425 F.2d at 591 (citing *Amos Treat & Co. v. SEC*, 306 F.2d 260, 267 (1962) (An "administrative hearing 'must be attended, not only with every element of fairness but with the very appearance of complete fairness[.]").

⁴⁴ Reply at 5 (citations omitted).

⁴⁵ *Cheney v. United States District Court for the District of Columbia*, 541 U.S. at 915 (SCALIA, J., respecting recusal) (quoting *Microsoft Corp. v. United States*, 530 U.S. 1301, 1302 (2000) (REHNQUIST, C.J., respecting recusal)).

NUCLEAR REGULATORY COMMISSION

In the Matter of

U.S. DEPARTMENT OF ENERGY
(High-Level Waste Repository)

)
)
)
)
)

Docket No. 63-001-HLW
ASLBP No. 09-892-HLW-CAB04

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing "**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF NRC CHAIRMAN ALLISON M. MACFARLANE,**" have been served upon the following persons by Electronic Information Exchange and by e-mail. Some participants do not have current digital certificates.

U.S. Nuclear Regulatory Commission
Atomic Safety and Licensing Board (ASLBP)
Mail Stop T-3F23
Washington, DC 20555-0001

Construction Authorization Board 04 (CAB04)

Thomas S. Moore, Chair
Administrative Judge
thomas.moore@nrc.gov

Paul S. Ryerson
Administrative Judge
paul.ryerson@nrc.gov

Richard E. Wardwell
Administrative Judge
richard.wardwell@nrc.gov

Anthony C. Eitrem, Esq., Chief Counsel
anthony.eitrem@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the General Counsel
Mail Stop O-15D21
Washington, DC 20555-0001
Elva Bowden Berry, Esq.
elva.bowdenberry@nrc.gov
Joseph S. Gilman, Esq.
joseph.gilman@nrc.gov
Daniel W. Lenehan, Esq.
daniel.lenehan@nrc.gov
Megan A. Wright, Esq.
megan.wright@nrc.gov
Mitzi A. Young, Esq.
mitzi.young@nrc.gov

OGC Mail Center
OGCMailCenter@nrc.gov

U.S. Nuclear Regulatory Commission
Office of Commission Appellate Adjudication
Mail Stop O-7H4M
Washington, DC 20555-0001
OCAA Mail Center
ocaamail@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the Secretary of the Commission
Mail Stop O-16C1
Washington, DC 20555-0001
Hearing Docket
hearingdocket@nrc.gov

U.S. DEPARTMENT OF ENERGY (High Level Waste Repository) Docket No. 63-001-HLW
**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF
NRC CHAIRMAN ALLISON M. MACFARLANE**

U.S. Department of Energy
Office of General Counsel
1000 Independence Avenue S.W.
Washington, DC 20585
Martha S. Crosland, Esq.
martha.crosland@hq.doe.gov
Nicholas P. DiNunzio, Esq.
nick.dinunzio@rw.doe.gov
James Bennett McRae
ben.mcrae@hq.doe.gov
Cyrus Nezhad, Esq.
cyrus.nezhad@hq.doe.gov
Christina C. Pak, Esq.
christina.pak@hq.doe.gov

Office of Counsel, Naval Sea Systems Command
Nuclear Propulsion Program
1333 Isaac Hull Avenue, SE, Building 197
Washington, DC 20376
Frank A. Putzu, Esq.
frank.putzu@navy.mil

For U.S. Department of Energy
Talisman International, LLC
1000 Potomac St., NW, Suite 300
Washington, DC 20007
Patricia Larimore, Senior Paralegal
plarimore@talisman-intl.com

Counsel for U.S. Department of Energy
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave., NW
Washington, DC 20004
Lewis M. Csedrik, Esq.
lcsedrik@morganlewis.com
Raphael P. Kuyler, Esq.
rkuyler@morganlewis.com
Charles B. Moldenhauer, Esq.
cmoldenhauer@morganlewis.com
Thomas D. Poindexter, Esq.
tpoindexter@morganlewis.com
Alex S. Polonsky, Esq.
apolonsky@morganlewis.com
Thomas A. Schmutz, Esq.
tschmutz@morganlewis.com
Donald J. Silverman, Esq.
dsilverman@morganlewis.com
Paul J. Zaffuts, Esq.
pzaffuts@morganlewis.com
Shannon Staton, Legal Secretary
sstaton@morganlewis.com
Elaine M. Hirsch, Legal Secretary
ehirsch@morganlewis.com

Counsel for U.S. Department of Energy
Hunton & Williams LLP
Riverfront Plaza, East Tower
951 East Byrd Street
Richmond, VA 23219
Kelly L. Faglioni, Esq.
kfaglioni@hunton.com
Donald P. Irwin, Esq.
dirwin@hunton.com
Stephanie Meharg, Paralegal
smeharg@hunton.com
Michael R. Shebelskie, Esq.
mshebelskie@hunton.com
Belinda A. Wright, Sr. Professional Assistant
bwright@hunton.com

U.S. DEPARTMENT OF ENERGY (High Level Waste Repository) Docket No. 63-001-HLW
**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF
NRC CHAIRMAN ALLISON M. MACFARLANE**

Counsel for State of Nevada
Egan, Fitzpatrick, Malsch & Lawrence, PLLC
1750 K Street, NW, Suite 350
Washington, DC 20006
Martin G. Malsch, Esq.
mmalsch@nuclearlawyer.com
Susan Montesi:
smontesi@nuclearlawyer.com

Counsel for State of Nevada
Egan, Fitzpatrick, Malsch & Lawrence, PLLC
1777 N.E. Loop 410, Suite 600
San Antonio, TX 78217
Charles J. Fitzpatrick, Esq.
cfitzpatrick@nuclearlawyer.com
John W. Lawrence, Esq.
jlawrence@nuclearlawyer.com
Laurie Borski, Paralegal
lborski@nuclearlawyer.com

Bureau of Government Affairs
Nevada Attorney General
100 N. Carson Street
Carson City, NV 89701
Marta Adams, Chief Deputy Attorney General
madams@ag.nv.gov

Nevada Agency for Nuclear Projects
Nuclear Waste Project Office
1761 East College Parkway, Suite 118
Carson City, NV 89706
Steve Frishman, Tech. Policy Coordinator
steve.frishman@gmail.com
Susan Lynch, Administrator of Technical Prgms
szeeee@nuc.state.nv.us

Nye County Regulatory/Licensing Advisor
18160 Cottonwood Rd. #265
Sunriver, OR 97707
Malachy Murphy, Esq.
mrmurphy@chamberscable.com

Nye Co. Nuclear Waste Repository Project Office
2101 E. Calvada Boulevard, Suite 100
Pahrump, NV 89048
Celeste Sandoval, Quality Assurance Records Spec.
csandoval@co.nye.nv.us

Counsel for Lincoln County, Nevada
Whipple Law Firm
1100 S. Tenth Street
Las Vegas, NV 89017
Annie Bailey, Legal Assistant
baileys@lcturbonet.com
Adam L. Gill, Esq.
adam.whipplelaw@yahoo.com
Eric Hinckley, Law Clerk
erichinckley@yahoo.com
Bret Whipple, Esq.
bretwhipple@nomademail.com

Lincoln County District Attorney
P. O. Box 60
Pioche, NV 89403
Gregory Barlow, Esq.
lcd@lcturbonet.com

Lincoln County Nuclear Oversight Program
P.O. Box 1068
Caliente, NV 89008
Connie Simkins, Coordinator
jcciac@co.lincoln.nv.us

For Lincoln County, Nevada
Intertech Services Corporation
PO Box 2008
Carson City, NV 89702
Mike Baughman, Consultant
mikebaughman@charter.net

Counsel for Nye, County, Nevada
601 Pennsylvania Avenue NW
North Building, Suite 1000
Washington, DC 20004
Robert Andersen, Esq.
randersen@clarkhill.com
Christopher Clare, Esq.
cclare@clarkhill.com

U.S. DEPARTMENT OF ENERGY (High Level Waste Repository) Docket No. 63-001-HLW
**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF
NRC CHAIRMAN ALLISON M. MACFARLANE**

Clark County, Nevada
500 S. Grand Central Parkway
Las Vegas, NV 98155
Phil Klevorick, Sr. Mgmt Analyst
klevorick@clarkcountynv.gov
Elizabeth A. Vibert, Deputy District Attorney
Elizabeth.Vibert@ccdandv.com

Counsel for Eureka County, Nevada
Harmon, Curran, Speilberg & Eisenberg, LLP
1726 M. Street N.W., Suite 600
Washington, DC 20036
Diane Curran, Esq.
dcurran@harmoncurran.com

Eureka County, Nevada
Office of the District Attorney
701 S. Main Street, Box 190
Eureka, NV 89316-0190
Theodore Beutel, District Attorney
tbeutel.ecda@eurekanv.org

Nuclear Waste Advisory for Eureka
County, Nevada
1983 Maison Way
Carson City, NV 89703
Abigail Johnson, Consultant
eurekanrc@gmail.com

For White Pine County, Nevada
Intertech Services Corporation
PO Box 2008
Carson City, NV 89702
Mike Baughman, Consultant
mikebaughman@charter.net

For Eureka County, Nevada
NWOP Consulting, Inc.
1705 Wildcat Lane
Ogden, UT 84403
Loreen Pitchford, Consultant
lpitchford@comcast.net

Eureka County Public Works
PO Box 714
Eureka, NV 89316
Ronald Damele, Director
rdamele@eurekanv.org

Counsel for Churchill, Esmeralda, Lander,
and Mineral Counties, Nevada

Armstrong Teasdale, LLP
1975 Village Center Circle, Suite 140
Las Vegas, NV 89134-6237
Tara Baugh
tbaugh@armstrongteasdale.com

Kolesar & Leatham
1975 Village Center Circle, Suite 140
Las Vegas, NV 89134
Robert F. List, Esq.
rlist@klnevada.com

Esmeralda County Repository Oversight Program-
Yucca Mountain Project
PO Box 490
Goldfield, NV 89013
Edwin Mueller, Director
muellered@msn.com

Mineral County Nuclear Projects Office
P.O. Box 1600
Hawthorne, NV 89415
Linda Mathias, Director
yuccainfo@mineralcountynv.org

For Lincoln and White Pine County, Nevada
Jason Pitts, LSN Administrator
P.O. Box 126
Caliente, NV 89008
jayson@idtservices.com

U.S. DEPARTMENT OF ENERGY (High Level Waste Repository) Docket No. 63-001-HLW
**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF
NRC CHAIRMAN ALLISON M. MACFARLANE**

For White Pine County, Nevada
Kelly Brown, District Attorney
801 Clark Street, Suite 3
Ely, NV 89301
kbrown@mwpower.net

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
Kevin, W. Bell, Senior Staff Counsel
kwbell@energy.state.ca.us

White Pine Co. Nuclear Waste Project Ofc
959 Campton Street
Ely, NV 89301
Mike Simon, Director
wpnucwst1@mwpower.net

California Department of Justice
Office of the Attorney General
1300 I Street, PO Box 944255
Sacramento, CA 94244-2550
Michele Mercado, Analyst
michele.Mercado@doj.ca.gov

Counsel for Inyo County, California
Gregory L. James, Attorney at Law
712 Owens Gorge Road
HC 79, Box
Mammoth Lakes, CA 93546
E-Mail: gljames@earthlink.net

California Department of Justice
Office of the Attorney General
1515 Clay Street, 20th Fl, PO Box 70550
Oakland, CA 94612-0550
Timothy E. Sullivan, Deputy Attorney General
timothy.Sullivan@doj.ca.gov

Counsel for Inyo County, California
Law Office of Michael Berger
479 El Sueno Road
Santa Barbara, CA 93110
Michael Berger, Esq.
michael@lawofficeofmichaelberger.com
Robert Hanna, Esq.
robert@lawofficeofmichaelberger.com

California Department of Justice
Office of the Attorney General
300 S. Spring Street, Suite 1702
Los Angeles, CA 90013
Brian Hembacher, Deputy Attorney General
brian.hembacher@doj.ca.gov

Inyo Co Yucca Mtn Repository Assessment Ofc
P. O. Box 367
Independence, CA 93526-0367
Cathreen Richards, Associate Planner
crichards@inyocounty.us

Counsel for State of South Carolina
Davidson & Lindemann, P.A.
1611 Devonshire Drive
P.O. Box 8568
Columbia, SC 29202
Kenneth P. Woodington, Esq.
kwoodington@dml-law.com

Counsel for State of Washington
Office of the Attorney General
P. O. Box 40117
Olympia, WA 98504-0117
Todd R. Bowers, Esq.
toddb@atg.wa.gov
Andrew A. Fitz, Esq.
andyf@atg.wa.gov
Michael L. Dunning, Esq.
michaeld@atg.wa.gov
H. Lee Overton, Esq.
leo1@atg.wa.gov
Danielle French, Esq.
daniellef@atg.wa.gov

Counsel for Aiken County, SC
Haynsworth Sinkler Boyd, PA
1201 Main Street, Suite 2200
P. O. Box 11889
Columbia, SC 29211-1889
Thomas R. Gottshall, Esq.
tgottshall@hsblawfirm.com
Ross Shealy, Esq.
rshealy@hsblawfirm.com

U.S. DEPARTMENT OF ENERGY (High Level Waste Repository) Docket No. 63-001-HLW
**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF
NRC CHAIRMAN ALLISON M. MACFARLANE**

Florida Public Service Commission
Office of the General Counsel
2540 Shumard Oak Boulevard
Tallahassee, FL 32303
Cynthia Miller, Esq.
cmiller@psc.state.fl.us

Counsel for Native Community Action Council
Alexander, Berkey, Williams & Weathers LLP
2030 Addison Street, Suite 410
Berkeley, CA 94704
Curtis G. Berkey, Esq.
cberkey@abwwlaw.com
Rovianne A. Leigh, Esq.
rleigh@abwwlaw.com
Scott W. Williams, Esq.
swilliams@abwwlaw.com

Native Community Action Council
P.O. Box 140
Baker, NV 89311
Ian Zabarte, Member of Board of Directors
mrizabarte@gmail.com

Counsel for Prairie Island Indian Community
Public Law Resource Center PLLC
505 N. Capitol Avenue
Lansing, MI 48933
Don L. Keskey, Esq.
donkeskey@publiclawresourcecenter.com

Prairie Island Indian Community Legal Department
5636 Sturgeon Lake Road
Welch, MN 55089
Philip R. Mahowald, Esq.
pmahowald@piic.org

Nuclear Energy Institute
Office of the General Counsel
1776 I Street, NW Suite 400
Washington, DC 20006-3708
Jerry Bonanno, Esq.
jxb@nei.org
Anne W. Cottingham, Esq.
awc@nei.org
Ellen C. Ginsberg, Esq.
ecg@nei.org

Counsel for Nuclear Energy Institute
Pillsbury Winthrop Shaw Pittman LLP
2300 N Street, N.W.
Washington, DC 20037-1122
Jay E. Silberg, Esq.
jay.silberg@pillsburylaw.com
Timothy J.V. Walsh, Esq.
timothy.walsh@pillsburylaw.com

Counsel for Nuclear Energy Institute
Winston & Strawn LLP
1700 K Street, N.W.
Washington, DC 20006-3817
William A. Horin, Esq.
whorin@winston.com
Rachel Miras-Wilson, Esq.
rwilson@winston.com
David A. Repka, Esq.
drepka@winston.com
Carlos L. Sisco, Senior Paralegal
csisco@winston.com

Counsel for National Association of Regulatory
Utility Commissioners (NARUC)
1101 Vermont Avenue, Suite 200
Washington, DC 20005
James Ramsay, Esq.
jramsay@naruc.org
Robin Lunt, Esq.
rlunt@naruc.org

U.S. DEPARTMENT OF ENERGY (High Level Waste Repository) Docket No. 63-001-HLW
**DECISION ON THE MOTION OF NYE COUNTY, NEVADA, FOR RECUSAL/DISQUALIFICATION OF
NRC CHAIRMAN ALLISON M. MACFARLANE**

Counsel for Joint Timbisha Shoshone Tribal Group
Fredericks, Peebles, & Morgan LLP
1001 Second St.
Sacramento, CA 95814
Felicia M. Brooks, Data Administrator
fbrooks@ndnlaw.com
Ross D. Colburn, Law Clerk
rcolburn@ndnlaw.com
Sally Eredia, Legal Secretary
seredia@ndnlaw.com
Darcie L. Houck, Esq.
dhouck@ndnlaw.com
Brian Niegemann, Office Manager
bniegemann@ndnlaw.com
John M. Peebles, Esq.
jpeebles@ndnlaw.com
Robert Rhoan, Esq.
rrhoan@ndnlaw.com

Fredericks, Peebles, & Morgan LLP
3610 North 163rd Plaza
Omaha, NE 68116
Shane Thin Elk, Esq.
sthinelk@ndnlaw.com

For Joint Timbisha Shoshone Tribal Group
Indian Village Road, P.O. Box 206
Death Valley, CA 92328-0206
Joe Kennedy, Executive Director
joekennedy08@live.com
Tameka Vazquez, Bookkeeper
purpose_driven12@yahoo.com

[Original Signed by Brian Newell _____]
Office of the Secretary of the Commission

Dated at Rockville, Maryland
this 9th day of September, 2013

RESPONDENTS' EXHIBIT 2

RESPONDENTS' RESPONSE
TO PETITIONERS' MOTION FOR SUMMARY REVERSAL

Case No. 13-1260 (D.C. Cir.)

Order in this Docket (Oct. 22, 2013)

United States Court of Appeals
FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 13-1260**September Term, 2013****NRC-63-001-HLW****Filed On:** October 22, 2013

Nye County, et al.,

Petitioners

v.

Nuclear Regulatory Commission and Allison
M. Macfarlane,

Respondents

BEFORE: Henderson*, Griffith, and Kavanaugh, Circuit Judges

ORDER

Upon consideration of the petition for expedited review or, in the alternative, writ of mandamus; the emergency motion for preliminary injunction; the combined response thereto, and the combined reply, it is

ORDERED that the petition for writ of mandamus be denied. Petitioners have not shown a "clear and indisputable right" to mandamus relief. See Gulfstream Aerospace Corp. v. Mayacamas Corp., 484 U.S. 271, 289 (1988). Mandamus is available only if there is no other adequate remedy available to petitioners. See National Min. Ass'n v. Mine Safety & Health Admin., 599 F.3d 662, 673 (D.C. Cir. 2010) (citations omitted). It is

FURTHER ORDERED that the emergency motion for preliminary injunction be denied. Petitioners have not satisfied the stringent requirements for injunctive relief. See Winter v. Natural Res. Def. Council, 555 U.S. 7, 20 (2008); D.C. Circuit Handbook of Practice and Internal Procedures 33 (2011). It is

* Judge Henderson would grant the petition for expedited review.

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 13-1260

September Term, 2013

FURTHER ORDERED that the request for expedited consideration of the petition for review be deferred pending further order of the court.

Per Curiam

FOR THE COURT:
Mark J. Langer, Clerk

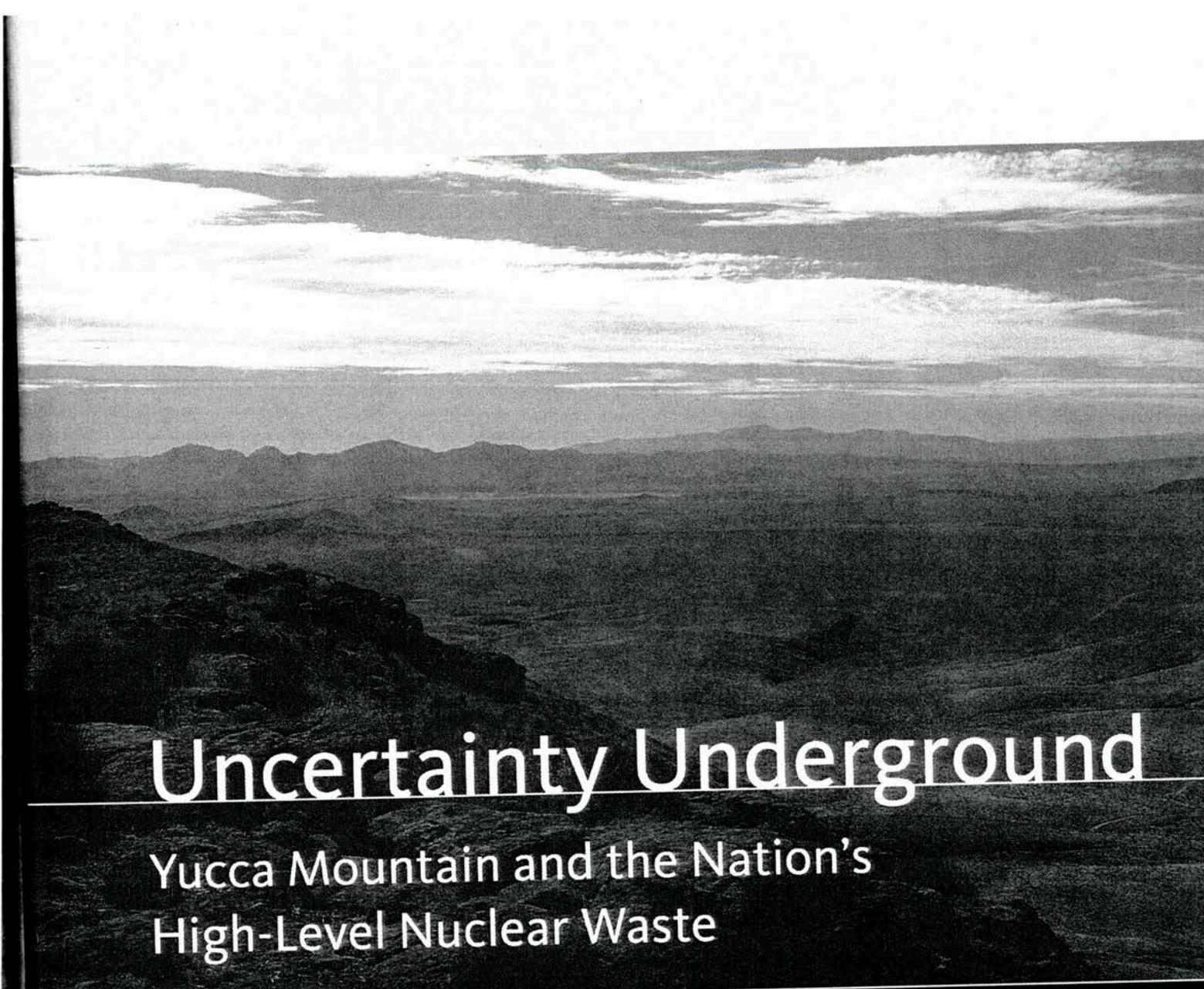
BY: /s/
Timothy A. Ralls
Deputy Clerk/LD

RESPONDENTS' EXHIBIT 3

RESPONDENTS' RESPONSE
TO PETITIONERS' MOTION FOR SUMMARY REVERSAL

Case No. 13-1260 (D.C. Cir.)

Excerpts from Uncertainty Underground
(MIT Press, 2006)



Uncertainty Underground

Yucca Mountain and the Nation's
High-Level Nuclear Waste

edited by Allison M. Macfarlane and Rodney C. Ewing

© 2006 Massachusetts Institute of Technology

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.

MIT Press books may be purchased at special quantity discounts for business or sales promotional use. For information, please e-mail special_sales@mitpress.mit.edu or write to Special Sales Department, The MIT Press, 55 Hayward Street, Cambridge, MA 02142.

This book was set in Sabon by SNP Best-Set Typesetter Ltd., Hong Kong and was printed and bound in the United States of America. Printed on recycled paper.

Library of Congress Cataloging-in-Publication Data

Uncertainty underground : Yucca Mountain and the nation's high-level nuclear waste / edited by Allison M. Macfarlane and Rodney C. Ewing.
p. cm.

Includes bibliographical references and index.

ISBN 978-0-262-13462-0 (hc.: alk. paper)—ISBN 978-0-262-63332-1 (pb. : alk. paper)

1. Radioactive waste disposal in the ground—Nevada—Yucca Mountain. 2. Radioactive waste sites—Nevada—Yucca Mountain—Evaluation. 3. Geology—Nevada—Yucca Mountain Region. 4. Radioactive waste disposal—Government policy—United States. I. Macfarlane, Allison. II. Ewing, Rodney C.

TD898.12.N3.U5226 2006
363.72'890979334—dc22

2005056218

10 9 8 7 6 5 4 3

Preface

Despite substantial effort during the past several decades, there is, at present, no geologic repository receiving spent nuclear fuel or high-level nuclear waste. A few countries, particularly Finland and Sweden, have made considerable progress in siting and developing a geologic repository; others are in the earliest stages of site investigations. Although there is broad consensus that geologic disposal is the safest available solution to the management and disposal of these highly radioactive waste materials (National Research Council 2001b), implementation has proven to be technically and politically difficult. In the United States, although Yucca Mountain in Nevada was identified in the early 1980s as a potential site for nuclear waste disposal, it is still not open, and its fate hangs on a number of regulatory and judicial decisions—each with an important scientific and technical basis—that have yet to be made.

Much has already been written about the political difficulties of siting high-level nuclear waste repositories (see, for example, Carter 1987; Colglazier and Langum 1988; Dunlap et al. 1993; Gerrard 1994; Flynn and Slovic 1995; Metlay 2000). Over the years, a huge number of technical reports, journal papers, proceedings volumes, and monographs have been published as well (see, for example, vol. 38, no. 1–3, and vol. 62–63 of the *Journal of Contaminant Hydrology*; vol. 17, no. 7, of the journal *Applied Geochemistry*; the *Proceedings of the International High-Level Radioactive Waste* conferences; the *Proceedings of the Materials Research Society's Symposium* on the scientific basis for nuclear waste management; Winograd 1981; National Research Council 1957, 1983, 1995, 2001a, 2001b, 2003; Hanks et al. 1999).

Despite this large knowledge base, substantial funding (over seven billion dollars spent on the Yucca Mountain site during the past decades), and a large number of talented scientists and engineers engaged in every aspect of this problem, there are

continued delays. We maintain that one important reason for the difficulties and the delay is that the scientific and engineering communities have underestimated the effort required to characterize this site and model its behavior over the long periods judged to be appropriate for nuclear waste disposal—tens to many hundreds of thousands of years. The key to appreciating the scale of the scientific challenge has been the relatively recent recognition of the large uncertainties inherent in such analyses.

In this book, *Uncertainty Underground*, we have asked experts to address these uncertainties in the context of the specific and relevant processes of interest at Yucca Mountain. We have limited the number of pages available to each author, and asked them to describe the relevant issues in a way that is accessible to the broader audience of the interested public and policymakers. We also have attempted to include authors from a wide range of disciplines who hold differing views on the suitability of Yucca Mountain as a repository site. This book is not a judgment of the suitability of Yucca Mountain as a repository for spent nuclear fuel and high-level nuclear waste. We leave that judgment to the reader. Rather, we have tried to present some of the complexities and highlight the sources of uncertainty in the scientific analysis. We also have endeavored to place this discussion into its historical and regulatory context. There is probably no better example of science and engineering being so thoroughly mixed in a cauldron of politics, policy, and regulation than Yucca Mountain.

Even as this book was written, there have been a number of developments that have had an important impact on Yucca Mountain as a potential geologic repository. In July 2004, the U.S. Court of Appeals for the District of Columbia Circuit remanded a part of the existing U.S. Environmental Protection Agency (EPA) standard, ruling that the EPA had not followed the instructions of Congress as given in the 1992 Energy Policy Act, which required the EPA to promulgate a standard that was consistent with the recommendations of the National Academy of Sciences. In the academy report, *Technical Bases for Yucca Mountain Standards* (National Research Council 1995), the committee argued that there was no scientific basis for selecting a ten-thousand-year, or any other period, time of compliance; therefore, they recommended that the period of compliance be extended to the time of peak dose, which for Yucca Mountain is on the order of some hundreds of thousands of years. The academy report clearly recognized that such calculations involved considerable uncertainties, which are the subject of this book. Despite the recommendations of the academy, in 2001, the EPA pro-

mulgated a standard that included a time of compliance of ten thousand years, and it is this part of the standard that has been remanded by the court. The EPA is in the process of developing a new standard, which will inevitably be a subject of controversy.

As this book was in the final stages of preparation, the EPA issued draft revised radiation protection standards for the Yucca Mountain repository. The newly proposed standards incorporate multiple compliance criteria applicable at different lengths of time. For periods up to ten thousand years, the dose limit is 150 microsieverts, as it was in the previous standard. For periods after ten thousand years and up to one million years after disposal, the standard is 3.5 millisieverts. The proposed standard states that “The primary means for demonstrating compliance with the standards is the use of computer modeling to project the performance of the disposal system under the range of expected conditions” (EPA 2005, p 33). The *uncertainty* in these projections is, of course, the central issue addressed in the following chapters.

At the same time, plans move ahead for an interim spent fuel storage site near Salt Lake City, Utah. Private Fuel Storage, a consortium of eight nuclear utility companies, joined the Skull Valley band of the Goshute Indians to site a forty-thousand-metric-ton nuclear waste storage facility on land owned by the Goshute Indians. In February 2005, the Atomic Safety Licensing Board of the U.S. Nuclear Regulatory Commission (NRC) ruled that the facility would be able to withstand an airplane crash with acceptable risk (Johnson 2005). The commission has ruled to give a license to the facility, though opening will likely be delayed by pending lawsuits from the state of Utah and some of the members of the Goshute people.

Another recent development was the publication of a National Academy of Sciences report on the security of spent fuel pools at nuclear power reactors (National Research Council 2005). At the prompting of Congress and building on previous work by an independent group (Alvarez et al. 2003), the academy reviewed the security of spent fuel at nuclear power plants in the event of a terrorist attack. It found that fuel in some pool designs may be vulnerable to certain types of attack, at worst causing a zirconium-cladding fire that could release a large amount of radioactivity. The academy suggested that immediate measures should be taken at plants to mitigate loss-of-coolant accidents and that the NRC should conduct further research on pool attacks. It proposed dry cask storage as a safer and more secure alternative to pool storage for older spent nuclear fuel. What the NRC will

do with these suggestions and the report's impact on the high-level nuclear waste program remains unclear.

The final development that requires comment occurred within the U.S. Department of Energy's (DOE) Yucca Mountain Project. In March 2005, the U.S. Geological Survey revealed the existence of e-mail messages exchanged among its workers that allegedly suggest scientific fraud may have occurred. The messages were from scientists who developed the models of water transport in the unsaturated zone, above the water table, at Yucca Mountain during the years 1998–2000. In the messages, the scientists complain about the lack of personnel, funding, and time to complete their assigned work, and suggest that to complete the work, they had to make up scientific notebook entries, dates on computer model runs, and the like. The messages focus on the DOE's Quality Assurance program and the burdens the scientists felt in meeting its requirements. The inspector generals from the DOE, the Department of the Interior, the U.S. Geological Survey, and the Federal Bureau of Investigation are currently examining the e-mail messages.

Amid all of these developments, the DOE has announced that the submission of the license application to the NRC has once again been delayed. In 2004, the NRC ruled that the License Support Network did not meet the requirements for a license application submission. The previous schedule had anticipated the license application by the end of 2004, and the first receipt of waste in 2010. Considering that the NRC may take up to four years to review the license application, the date for the first receipt of nuclear waste may slip significantly.

Although many of these recent events have changed the context of some of the book's chapters, which were written several years ago, the scientific and technical issues remain essentially unchanged. Thus, we believe that this book remains a timely contribution to the discussion of the general concept of geologic disposal and the specific issues faced by the Yucca Mountain site.

References

- Alvarez, R., Beyea, J., Janberg, K., Kang, J., Lyman, E., Macfarlane, A., Thompson, G., and von Hippel, F. (2003) Reducing the Hazards from Stored Spent Power Reactor Fuel in the United States. *Science and Global Security* 11, pp. 1–51.
- Carter, L.J. (1987) *Nuclear Imperatives and Public Trust: Dealing with Radioactive Waste*. Washington, DC: Resources for the Future, 473 p.
- Colglazier, E.W., and Langum, R.B. (1988) Policy Conflicts in the Process for Siting Nuclear Waste Repositories. *Annual Review of Energy* 13, pp. 317–357.

24

Uncertainty, Models, and the Way Forward in Nuclear Waste Disposal

Allison M. Macfarlane

I end this book with a discussion of uncertainty, the theme that has been woven through the chapters. In examining uncertainty, I also evoke the theme of process, in particular the process involved in the technical aspects of nuclear waste disposal policy decisions. Before going any further, I should make clear that the views in this chapter are my own and do not necessarily reflect those of the other chapter authors.

The focus of this chapter, and the book as a whole, is on two questions: Is the Earth system understood well enough to make predictions about the future behavior of radioactive waste emplaced into rock? And can the models that provide these predictions be verified or validated? Furthermore, if the answer to these two questions is no, then how can a nuclear waste repository site be evaluated?

The authors of the first chapters (1–6) of this volume have described the history and process that have brought the proposed geologic repository at Yucca Mountain nearly to the point of a license application submission to the Nuclear Regulatory Commission (NRC). The remaining chapters (7–23) have described a number of the technical issues that have been raised in the evaluation of Yucca Mountain as a suitable and safe geologic repository for high-level nuclear waste. With each of these technical issues there are uncertainties (chapter 5), some of which can be reduced by additional work and research, and some that are inherent to the extrapolation of the results of models over time and space. Some of the uncertainties may be critically important to understanding the performance of the repository, but others may be of little consequence.

The main issue confronted by advocates and detractors of Yucca Mountain is one of evaluating the safety of a repository, even in the face of some level of uncertainty that cannot be reduced. In the extreme, there are two possibilities, both undesirable. One is a positive determination of compliance by the NRC based on models that

are so uncertain that the results and decision remain questionable. The other extreme possibility is that an adequate and safe repository site may be abandoned due to the large uncertainties involved. The authors of this book's chapters have raised many issues, but how does one place them into a context and process that leads to the best policy decision? In this last chapter, I will summarize the important sources of uncertainty in the analysis of the performance of Yucca Mountain and offer my own suggestions for the path forward.

Uncertainty

The Department of Energy (DOE) contends that we now have an adequate understanding of geologic and hydrologic processes to make predictions about radionuclide transport over geologic periods of time (Abraham 2002).¹ I would rather pose the question, Has the DOE identified and does it understand all the "features, events, and processes," as the DOE calls them, that will occur over the next hundreds of thousands of years at Yucca Mountain, especially once thermally hot radioactive waste has perturbed the natural system?

The chapters in this book have noted a variety of factors that make it difficult to predict repository behavior over geologic time, including climate, saturated zone behavior, volcanism, unsaturated zone behavior, and the environment of the repository. Many chapters (12, 13, 15–22) have identified a similar uncertainty: the environmental and chemical conditions of the repository environment as it evolves over time, especially the chemistry of the water that will exist in the repository. This uncertainty arises from the difficulty of predicting interactions over tens to hundreds of thousands of years brought about by introducing a thermally and radioactively hot waste package into a complex geologic environment. The difficulty stems from the sheer number of parameters and processes to identify, many of which are coupled interactions (e.g., thermohydrologic-chemical, thermohydrologic-mechanical) that are hard to understand or even recognize. Furthermore, scientists have not yet identified some of the fundamental thermodynamic parameters and kinetic processes by which these interactions would be controlled.

The method by which the DOE and the NRC will evaluate Yucca Mountain's suitability as a repository is a probabilistic performance assessment. The DOE's version of probabilistic performance assessment, called Total System Performance Assessment (TSPA), is a huge computer model, the results of which will be used to compare to the Environmental Protection Agency (EPA) standard to determine

compliance. The DOE's TSPA model "is a probabilistic analysis that identifies the features, events, and processes that might affect the performance of the repository; examines their effects on performance; and estimates the expected annual dose to the potential receptor. This method synthesizes data and information into a set of models that simulate the behavior of individual system components and then abstracts and refines this information into linked models that represent important aspects of system performance" (OCRWM 2002b, sec. 4.2).

This book discusses uncertainties in both the geologic and engineered barriers in the repository system at Yucca Mountain. But will these factors actually be detrimental to the performance of the repository? According to the DOE's weighting scheme in the TSPA model, some of these uncertainties are not significant enough to generate large radiation doses far into the future. For instance, the DOE claims that it has determined the percentage of water that travels in fast pathways compared with slow pathways, and that it is very limited: "It is estimated, however, that the fast flow component of the overall groundwater percolation flux at this horizon [the repository level] is less than a few percent of the total flow (table 4.12), which would contribute inconsequentially to releases of radionuclides from the repository" (OCRWM 2002a, sec. 4.3.4).

Knowledge about fast flow paths in the repository comes from studies that showed high levels of chlorine-36 in repository rocks. These high values most likely result from precipitation of bomb-pulse chlorine-36 from the testing of nuclear weapons over the Pacific Ocean in the 1950s. This estimate is quantified by transport models based on a set of assumptions that conclude that little water is carried in the fast flow paths (CRWMS M&O 2000). These assumptions include: bomb-pulse samples are found from only a few locations in the Exploratory Studies Facility; no significant correlation between high matrix saturation and elevated ^{36}Cl has been reported; these discrete fast paths are not associated with large catchment areas involving large volumes of infiltrating water; bomb-pulse signatures of ^{36}Cl were not found in the perched water bodies (CRWMS M&O 2000, U0085, sec. 6.6.3); and postbomb pulse tritium was detected only in one sample from the perched water (in borehole NRG-7a), but not in any of the other samples (CRWMS M&O 2000, U0085, sec. 6.6.2).

The authors of chapter 11 point out that one might not expect to find much bomb-pulse tritium because of its short half-life (12.3 years) and that bomb-pulse chlorine-36 would be highly diluted in perched water bodies. Moreover, the few locations in which bomb-pulse radionuclides were found depends entirely on the

396 *Macfarlane*

sampling methodology—a larger sample size may have indicated more instances of the presence of bomb-pulse radionuclides.

As the authors of chapter 11 suggest, the DOE's models do not include such processes as the effects from thousand-year storms. Scientists know little about which fractures may flow in the rocks, the processes that control fracture flow, and how water is partitioned between the rock matrix and the fractures. This example illustrates the degree to which the DOE's modeling results depend on assumptions, and the current level of knowledge about features, events, and processes.

Furthermore, knowledge about features, events, and processes at Yucca Mountain is continually in flux. For instance, the DOE is still collecting data on the process of water transport through the rocks at Yucca Mountain. One of the first field experiments done on repository-level rocks to understand how water flows over short distances in a fault zone was reported in 2005 (Salve et al. 2005). In addition, the DOE is still working to collect information on the diffusion process in the rocks at Yucca Mountain and to understand repository-induced processes, such as the effects of the repository's ventilation on the moisture content of the ambient atmosphere (Dyer and Peters 2004). Such data will result in further refinements in the performance assessment model.

Over the long term, such adjustments may cause substantial divergence from the original model, calling into question the use of these models in policy making (Oreskes et al. 1994). The DOE, however, disagrees: "Because uncertainty is fully integrated into the assessment of total system performance, DOE does not expect that additional information will significantly change the TSPA results or the conclusions reached in the site suitability evaluation and has confidence in the overall safety of the repository" (OCRWM 2002b, sec. 3.2.2). But the DOE is basing its opinion on the assumption that it has characterized the uncertainty correctly, and further, that it has characterized all the features, events, and processes that will occur in the repository as it evolves.

Use of Models in Predictions

The discussion above illustrates how the DOE relies heavily on models that predict the performance of the geologic and engineered barriers at Yucca Mountain to determine site suitability. Many assumptions go into these models. To its credit, the DOE is conservative in the assumptions it makes. The problem, though, is that one cannot make assumptions about processes or features that one is not aware of.

Because the DOE's case for Yucca Mountain is based entirely on complex models of Earth system processes interacting with engineered features and processes, it is absolutely essential to examine the use of models in making detailed predictions. Others have explored the use and misuse of models in the earth sciences and technical policy decision making (see, for example, Bredehoeft et al. 1978; Winograd 1986; Winograd 1990; Konikow and Bredehoeft 1992; Oreskes et al. 1994; Ewing 1999; Ewing et al. 1999; Oreskes and Belitz 2001; Bredehoeft 2003; chapter 5, this volume). One of the main conclusions from these works is that these models cannot be validated or verified. Winograd (1990) goes so far as to say that models such as the TSPA cannot even be calibrated. Oreskes and colleagues (1994) explain that models of Earth systems cannot be validated because they attempt to simulate open systems, which exchange matter and energy with their surroundings. In open systems, there is no way to know all the input parameters or processes, or to assess the boundary conditions that might affect the system; the modeler must anticipate all input parameters for all processes that will occur over the time period modeled. For geologic timescales, this task is unfeasible because the current-day data sets are incomplete (Oreskes et al. 1994). Perhaps Secretary of Defense Donald Rumsfeld (2002) put it best when, speaking of another issue entirely (the Iraq War), he said: "There are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know." The chapters in this book underscore the fact that we are missing input data and knowledge of processes that will operate during the life of the repository.

Models of natural systems over geologic periods of time, such as the TSPA model, ignore the realities of the complexity of open systems over large timescales. Field geology is based on observations of the natural world and investigations into processes that occurred in the past. Investigations into past reactions among minerals and fluids in rocks show that equilibrium may be rarely reached, and therefore it is almost impossible to decipher the detailed history of a rock, let alone predict reactions into the geologic future. Geology has not advanced far enough yet to expect that it can do this for the rocks at Yucca Mountain.

The TSPA model is, by definition, a simplification of the natural and engineered systems at Yucca Mountain. Rare events, such as the thousand-year storms discussed earlier, are not included either because they are not recognized or not enough is known about them to construct reasonable input parameters or processes for

modeling. Oreskes and Belitz (2001) suggest that models that omit low-probability events tend to produce overly optimistic results.

Sarewitz (2004) states that uncertainty should be thought about as a manifestation of a lack of coherence among scientific (and engineering) subdisciplines. Complex Earth systems problems, such as understanding the behavior of a repository at Yucca Mountain, require the cooperation and coordination of many different groups of scientists and engineers, all of whose subdisciplines have different values and diverse perspectives. The results they produce are in a sense incomparable because of their different origins (Sarewitz et al. 2000; Sarewitz 2004). It is possible, then, that a different management agency (not the DOE), different management, or different scientists and engineers might have come up with a different version of the TSPA, which might have given a different result. Interestingly, International Atomic Energy Agency scholars found that among six models prepared to study contaminant transport in agricultural fruits, there were large differences. These differences resulted from “what we call ‘modeler uncertainty,’ i.e., difference in problem formation, model implementation, and parameter selection originating from subjective interpretation of the problem at hand” (Linkov and Burmistov 2003, p. 1297).

A model of an open system such as the repository at Yucca Mountain can provide only a rudimentary glimpse of the system—and even that can be misleading, if certain processes and parameters are not accounted for. It is therefore unrealistic to think that the modeling of such a complex system as the Yucca Mountain repository could provide a single number that is in any way valid and represents the “truth.” But this is just what the TSPA model does. According to the DOE, the TSPA model suggests that the dose from the repository ten thousand years after the waste is put in place will be 0.1 millirems per year (Office of Civilian Radioactive Waste Management 2002b).

The DOE says that it will validate models through the use of laboratory, in situ, and field tests as well as by studying analogous systems. For instance, as the DOE states, “Simulated thermal-hydrologic-chemical processes have been validated by comparison to water and gas compositions measured during thermal tests and with laboratory data” (Office of Civilian Radioactive Waste Management 2002b, sec. 3.2.1.2.3). Oreskes and colleagues indicate that although models can be confirmed through comparison with laboratory and field data, they cannot be validated:

Finally, even if a model result is consistent with present and past observational data, there is no guarantee that the model will perform at an equal level when used to predict the future. First, there may be small errors in input data that do not impact the fit of the model under

the time frame for which historical data are available, but which, when extrapolated over much larger time frames, do generate significant deviations. Second, a match between model results and present observations is no guarantee that future conditions will be similar, because natural systems are dynamic and may change in unanticipated ways. (1994, p. 643)

The DOE continues to use the language of validation and verification extensively when discussing its models. As Oreskes and colleagues (1994) note, using the terms “validate” or “verify” are powerful signifiers of the truth of model results. Laypeople and policymakers tend to believe that when technical experts talk about models being validated, this means that the model provides an accurate representation of what will happen in the future (Oreskes and Belitz 2001). As pointed out above, in the case of Earth systems models, though researchers may claim that their models have been validated, this is not to say that the model can accurately predict the future behavior of the system. More disturbing is the use of model results by DOE experts in papers, discussions, and talks. In these situations, they often mistakenly refer to model results as if they represented actual data. For example, in Secretary of Energy Spencer Abraham’s (2002) recommendation of the Yucca Mountain site, he remarks, “The amount of water that eventually reaches the repository level at any point in time is very small, so small that capillary forces tend to retain it in small pores and fractures in the rock. It is noteworthy that all our *observations* so far indicate that no water actually drips into the tunnels at this level and all of the water is retained within the rock” (emphasis added). Knowledge about how much water will reach the repository in the future is based on a number of model results; in this statement, what appears to be actual data are not—they are simply the predictions of a computer model. Such behavior is misleading to laypersons, policymakers, and other experts, and results in confusion about what is really known about the repository system and what is not.² Talking about modeling results as if they were established data leads to overconfidence in the state of technical evaluation of the situation.

Language has become an important tool in legitimizing both the Yucca Mountain site and the TSPA. Just consider the term “TSPA,” which suggests that the model really does describe the “total” system. Consider further the following statement: “The code is described in the S&ER [Science and Engineering Report] Rev. 1, Section 4.2.4. Both conservative and realistic versions have been developed” (OCRWM 2002a, sec. 4.7.01). The DOE is informing us that it knows what is realistic and what is conservative when it comes to modeling. The problem is that the agency does not know, as has already been emphasized, all the features, events,

400 *Macfarlane*

and processes that will affect a repository over geologic timescales, and therefore cannot know what is realistic and what is conservative.

Can Predictions Guide Policy Decisions?

If the TSPA is neither accurate nor a reliable method of judging the Yucca Mountain repository site, then how should the site be judged? Aren't predictions required to make sound technical policy decisions? Predictions are viewed by laypeople, policymakers, and the technical experts themselves as a way to legitimize policy decisions in an authoritative way (Sarewitz and Pielke 1999). Sarewitz and Pielke (1999) point out that scientists benefit from predictions by receiving funding to make them, while politicians benefit from deferring decision making until the prediction is completed. Herrick and Sarewitz (2000) assert that debate centered on the technical aspects of a complex policy decision often deflects attention from the "real" sources of debate—the issues of economics, values, ethics, equity, aesthetics, ideology, and regional politics that are at the base of issues such as high-level nuclear waste disposal.

Perhaps it's best to first examine how past predictions have fared. Have they been useful? Were they proven accurate? The record here is sobering: assessments of model-based predictions show that they have a poor track record (Konikow and Bredehoeft 1992; Oreskes and Belitz 2001; Bredehoeft 2003). For example, groundwater flow modeling of the Coachella Aquifer in California for the period 1974–1980 did not accurately predict water levels because of incorrect assumptions about the amount of stream recharge from tributaries in the system (Konikow and Bredehoeft 1992). Some scholars suggest that predictions are not necessary to make technical policy decisions (Sarewitz and Pielke 1999; Sarewitz et al. 2000; Oreskes and Belitz 2001; Bredehoeft 2003). If it is so difficult to get model predictions right, is there any reason to rely on models to make policy decisions? If not, then how should these decisions be made?

Wisdom?

This book has focused predominantly on technical issues, but what is important for policy is how technical issues enter the decision-making process. Thus I pose this question: What would the U.S. nuclear waste program look like if it were done

“properly”? Would it be as large as it is now? Would it cost as much as it does now? How would the technical information be used and what role would it play in policy decision making?

In an address to the Uranium Institute, Ian Duncan identified a number of ways *not* to go about siting a nuclear waste repository. They bear repeating here:

- To maximize the attraction of NIMBY, have the site decided behind closed doors and then announced and defended (DAD) . . .
- Trust only yourselves. Make sure that the oversight body is male dominated, industry loaded, with perhaps some token female and government presence.
- Rush the procedure, minimizing community involvement as much as possible.
- Pretend that the site selected will only be used for scientific evaluation, certainly not for final disposal.
- Distribute glossy brochures that depict the decay of radiotoxicity in obscure units over time, both on a log/log scale, and hope that the lay population will each have degrees in physics, chemistry, mathematics and geology . . . (Duncan 1999, p. 3–4)

In identifying a successful process of nuclear waste disposal policy, I will rely on the available information, including an examination of what other countries have done, a look back at the U.S. Nuclear Waste Policy Act, and suggestions from the literature. I will then lay out my own plan for success.

Other Countries' Experience

Although the U.S. high-level nuclear waste program is relatively advanced, we can learn from looking at what others are doing around the world. Sweden and Finland, for example, have programs just as advanced as the one in the United States, but they are much more socially accepted. Sweden's program is run by SKB, a company formed by the four Swedish nuclear power companies. After initial attempts to characterize the geology in different areas of the country were met with public resistance in the 1980s, SKB decided to ask municipalities to volunteer for investigation (Lidskog and Sundqvist 2004). This second attempt to find a site also failed after the volunteer localities eventually rejected further investigation. Success came when SKB began its own study of the five municipalities that already hosted some type of nuclear facility. Four of the communities were asked to participate in

402 *Macfarlane*

a feasibility study, and two accepted. These two are now the focus of SKB's final investigation before an ultimate siting decision is made (Lidskog and Sundqvist 2004).

The Swedish example is interesting because after SKB's initial encounter with public resistance, the company switched its focus from finding a suitable geology to finding a site where the public would accept a facility (Lidskog and Sundqvist 2004). At this point (the late 1980s), SKB began to argue that suitable geology existed throughout the country. Thus, its technical focus shifted to developing an engineered barrier (the waste package, in this case a canister with a shell of copper) that would work well in the geologic environment typically found in the country (a reducing environment in saturated conditions). Another factor in Sweden's success so far has been that the public has a great deal of trust in SKB and the nuclear industry generally. Sixty percent of Swedish citizens trust information provided by their national organization in charge of nuclear waste disposal, as compared to 27 percent in other European Union countries (Lidskog and Sundqvist 2004).

Finland's nuclear waste program is also run by a company, Posiva Oy, established by its nuclear power companies. Posiva Oy has already settled on a single site, Eurajoki near Olkiluoto, where it is building an underground laboratory. Like Sweden, Finland intends to use a copper canister to store its waste in crystalline rock below the water table. After the country passed a law in 1987 that allowed local communities an absolute veto over a nuclear waste site, Posiva Oy investigated five sites representing Finland's different rock types (Lidskog and Andersson 2002). Though the final site at Eurajoki, which already houses a nuclear power plant, might have seemed likely from the beginning, the Finns found it useful to compare a number of sites, concluding that "without a program that included several investigation sites, it would not have been possible to say anything about the comparative advantages and disadvantages of the Olkiluoto and other candidate sites" (Vira 1996, p. 31).

Germany provides another thought-provoking example of how to dispose of nuclear waste even though it has not yet identified a site. With the election of the Socialist-Green government in 1998, a commission was established to revisit the issue of nuclear waste disposal and develop a plan to select a site. The commission issued its report in 2002. The plan is to follow a five-step process (AkEnd 2002). The first step will be to consider all possible sites in Germany and exclude some from use on the basis of five geologic criteria. To be considered suitable for nuclear waste disposal, the site:

- Must not exhibit large vertical movements above the rate of one millimeter per year
- Must contain no active fault zones
- Must have only very low seismic activity
- Must exhibit no quaternary volcanism (or the potential for future volcanism)
- Must not have young groundwater (the water must not contain carbon-14 or tritium) (AkEnd 2002)

Once sites are excluded based on these restrictions, the next step will be to identify sites with favorable geology based on a set of weighting criteria. Of the candidates that pass geologic muster, three to five will be selected for surface exploration in step three. At this time, the communities at the identified sites will be given the opportunity to reject the surface exploration studies. In the fourth step, at least two of the above sites will be selected for underground exploration; again, the local communities will be allowed a say in whether this happens. The fifth step is the site selection decision.

In the German case, strong public participation is required in the process to ensure success. Unlike the Swedish situation, the Germans plan to base their selection decision first on geology to ensure the safety of the site. They feel that geologic barriers will provide the longest-term resistance to radionuclide transport and thus they intend to emphasize the geology over the engineered barriers, depending on the site selected (AkEnd 2002). By selecting a tectonically stable site, the German time of compliance will be about one million years, give or take an order of magnitude (AkEnd 2002).

In all of these European examples, public participation in the siting effort is highly valued. In these countries' political systems, a nuclear waste repository cannot be sited without the support of the local public. These waste programs also took pains (and paid the financial costs) to characterize more than one site before the final site selection is made. Hence, their site selection does not depend on the single result of a complex model. They are using a variety of methods, including social acceptability, to make a final site selection. How does this compare with the U.S. situation?

The U.S. Experience

The early U.S. nuclear waste program, as governed by the 1982 Nuclear Waste Policy Act, does not look terribly different from some of the European programs.

404 *Macfarlane*

In light of this, I would like to ask what “advice” the act has for us now. The authors of the Nuclear Waste Policy Act took pains to instill a sense of fairness into the legislation because they knew how enormous the burden would be on a locale once it was chosen as the site to store such undesirable material. Thus, the act required the DOE to investigate a second site, which was tacitly understood to ensure geographic equity—one in the eastern portion of the country and one in the west (Davis 1987; Colglazier and Langum 1988). Similar to the German plan, the Nuclear Waste Policy Act directed that the DOE should first choose five sites for which environmental assessment reports would be written. From those five, the DOE was to choose at least three for in-depth characterization, including exploratory shafts to the proposed repository level. These three sites were to include at least two different rock types. As reported by Colglazier and Langum, “This requirement was to ensure sufficient diversity of sites to make possible a reasonable comparative assessment, in keeping with the intent of the National Environmental Policy Act” (1988, pp. 320–321). The act also included a provision that the selected state could veto the siting decision—a veto that would require majorities of both houses of Congress to override. (No veto power was given to the local municipality where the site was to be located.) Moreover, the act required that the federal government consult with the selected states and provide financial aid to them, which would support independent technical analysis and ease impacts resulting from the repository (Colglazier and Langum 1988).

This all changed, however, with the passage of the Nuclear Waste Policy Amendments Act in 1987. The three sites to be compared were reduced to one. The need for a second site was left in limbo, awaiting a report from the secretary of energy between 2007 and 2010 (Congress 1982). Congress even went as far in the amendments to legislate the type of rock that the DOE could investigate. The amendments included language that forbade investigation into crystalline rock (such as granite)—a constraint that in effect exempted a large part of the eastern portion of the country from even being considered as a repository site (Gerrard 1994).

With the enactment of the amendments, Congress in effect broke the covenant it had established with the country, and especially with states such as Nevada, which had potential sites. The amendments were viewed by Nevada as singularly unfair—a clear case of the “decide, announce, defend” process that Duncan (1999) decried earlier. In turn, because of the painful political process involved in the nuclear waste legislation, the DOE found itself under great pressure to deem Yucca Mountain a suitable site.

There is wisdom, though, to be found in the original Nuclear Waste Policy Act. The characterization of multiple sites, and better yet, sites with different geologies, allows one to choose not the best site but the best of the group. This gives some comfort to the public in the selected region. A Utah newspaper editorial written in 1981—before any nuclear waste legislation had yet been enacted—stated it well: “Neither Utah nor any other state can properly refuse to bear the nuclear waste burden once it (the repository site) has been established to the best of human conditions. However, the honor of making such sacrifice for time without end must confer on the luckless lamb the satisfaction of knowing first-hand that the duty couldn’t have been just as well assigned elsewhere” (quoted in Colglazier and Langum 1988, p. 352).

During debate over the original Nuclear Waste Policy Act, Rep. Morris Udall (D-AZ) recommended that the states with the sites slated for characterization should be allowed to draw up their own compensation packages to negotiate with the DOE (Carter 1987). The need for two sites remains an open question, though Congress will likely prefer to stick with just one. But geographic equity argues for the existence of a second site.

What to Do Now?

If the U.S. nuclear waste disposal program had been developed “correctly,” it would probably seem closer to what was outlined in the original Nuclear Waste Policy Act and the German plan. Sites would have been initially selected based on their geologic merit. More detailed research would have been conducted at a subset of sites (two or three). These sites would need approval by the local community and state before any research could go on. With such a plan, the method of final site selection would be measured in a relative sense, by comparing the sites, instead of an absolute sense, with no relative context as is the case now. One site might require more engineering, and one might require less. The final decision would be based on societal preferences at the time. If the United States preferred the Swedish path, it would choose the heavily engineered site; if it preferred the German path, it might select the site with the better geology. Furthermore, there would be a provision for two sites in the country—one in the East, and one in the West—as originally planned to ensure a sense of geographic equity. Then, one state would not feel solely put upon. The money spent on characterizing multiple sites simultaneously would be balanced by that saved from fewer lawsuits due to less citizen opposition to the plan.

This is not the U.S. situation, of course, and I am not trying to suggest abandoning Yucca Mountain and going back to the drawing board. Instead, I would like to put forth some ideas for improving the current situation based on this analysis. First, I suggest that policymakers, including the DOE and the NRC, de-emphasize the importance of performance assessment. The long discussion above highlights the many reasons that complex models such as the DOE's TSPA will not be able to make adequate predictions, and as a result these predictions cannot be validated or verified. The government's decision to base a policy of such significance as the disposal of high-level nuclear waste on a single result from a complex predictive model is misleading to the public and policymakers. No country should depend so heavily on the results of an uncertain computer model to make policy decisions such as these.

How, then, should policy decisions on nuclear waste be made? Let's revisit the advice of the person who first suggested that the United States consider the unsaturated zone in the Nevada desert: Ike Winograd. Winograd (1990) proposed that the DOE use "technical judgment" to evaluate the suitability of the site. Technical judgment includes the use of multiple barriers in a repository and encourages the use of multiple techniques to analyze the site, with weighting as judged reasonable by experience. This is simply a more honest way of acknowledging our inability to specify the suite of correct conceptual models for analysis.

Technical judgment can be supplemented by comparative analysis. In the current situation that relies on performance assessment, Yucca Mountain is being evaluated in isolation—that is, without comparison to any other site. This makes it difficult for policymakers, the public, and even scientists to grasp all the crucial issues that will affect the safety of a repository over geologic time. For both scientific and social reasons, comparing the site to others makes sense (Flynn and Slovic 1995). Thus, I propose that Yucca Mountain be evaluated via comparison to other existing or planned sites about which a substantial set of information has been gathered. Potential sites for comparison include the Swedish site, the Olkiluoto site in Finland, the clay site in France, and the Waste Isolation Pilot Project site in Carlsbad, New Mexico. If Yucca Mountain comes up significantly short in making such a comparison, then Congress will have to reconsider site selection.

Fortunately, an opportunity has recently emerged to make changes in the way Yucca Mountain is evaluated. Because of a July 2004 court decision (see chapter 1, this volume), the EPA must revisit the radiation protection standard for Yucca Mountain. This will cause the NRC to promulgate new regulations and the DOE

to issue new guidelines. The NRC and the DOE could de-emphasize performance assessment in determining whether the Yucca Mountain site is suitable, and add in other measures such as those suggested above.

What else can be done to improve the current situation? Jasanoff (1995) has shown that the legitimacy of scientific assessments, especially those done by governmental bodies, can be improved by negotiation and compromise instead of controversy. Conflict over scientific assessments can be ameliorated by the use of the independent scientific community. Jasanoff (1995) suggests that policy decisions should be arranged so that there is continual and repeated consultation among the scientists producing the analysis, independent scientific experts, the public, and policymakers. The Nuclear Waste Technical Review Board, which oversees the DOE's nuclear waste programs, is an oversight body, with its members appointed by the president from candidates recommended by the National Academy of Sciences. This appointment process can result in a sense of political dependence that may mute the board's message. Instead, Congress or the DOE could provide funds to citizens' groups to consult with scientists not affiliated with Yucca Mountain to develop a list of independent experts to act as a review board. This was done quite successfully for the Waste Isolation Pilot Plant in New Mexico, where a federally funded, state organization, the Environmental Evaluation Group, provided credible technical oversight of the pilot plant. Such an oversight group or board would be required to have meetings open to all who are interested during its review sessions. Such a measure would supply both oversight and legitimacy to the DOE's assessments.

Finally, I believe that a false sense of urgency surrounds nuclear waste disposal in the United States. In reality, all reactor sites whose pools have filled and have required additional storage space for their spent fuel have been able to use dry cask storage (Macfarlane 2001a, 2001b). By 2005, a majority of reactor operators will have purchased dry cask storage because not all the spent fuel can be picked up at once (Macfarlane 2001a). Concerns about the security of spent fuel pools at reactor sites, highlighted in a recent National Research Council report (2005), may increase the pressure on utility companies to move spent fuel into dry casks on-site. Dry cask storage of spent fuel over a period of decades will allow both radioactivity and thermal output to decrease, making the waste easier to handle and dispose of. Older fuel provides somewhat fewer challenges in predicting repository performance.

The transport of spent nuclear fuel to a geologic repository will necessarily require decades. Hence, there is considerable time to reconsider whether Yucca Mountain

408 · Macfarlane

is a reasonable site for the long-term storage of nuclear waste. There is little to be gained, and much to be lost, from rushing a decision of such magnitude.

Notes

1. In its *Yucca Mountain Site Suitability Evaluation*, the DOE states that it is satisfied with the level of treatment and understanding of these uncertainties in the current TPSA analyses supporting the site recommendation decision process. In addition to multiple barriers and the use of analogues, additional provisions are being implemented to increase confidence that the postclosure performance objectives will be met. These provisions include validation, implementation of a quality assurance program, and development of a performance confirmation program. (Office of Civilian Radioactive Waste Management 2002b, sec. 3.2.2)
2. One of my own experiences with confusion of model results and actual data stems from a talk by a person working for the DOE headquarters (a technical expert himself) who, when asked about flow rates through the unsaturated zone, responded by saying that fast pathways were a small fraction of the flow, so such flow on fast pathways would not affect the performance assessment. In doing so, he confused me as to what was actual data (not the percentage fractionation of flow in the pathways—these are model results; see discussion in text) and what was not.

References

- Abraham, S. (2002) *Recommendation by the Secretary of Energy regarding the Suitability of the Yucca Mountain Site for a Repository under the Nuclear Waste Policy Act of 1982*. Department of Energy. February.
- AkEnd, Arbeitskreis Auswahlverfahren Endlagerstandorte (2002) *Site Selection Procedure for Repository Sites*. Committee on a Site Selection Procedure for Repository Sites. December. http://www.akend.de/englisch/berichte/index_1024.htm.
- Bredehoeft, J.D., England, A.W., Stewart, D.B., Trask, N.J., and Winograd, I.J. (1978) Geologic Disposal of High-Level Radioactive Wastes: Earth-Science Perspectives. *U.S. Geological Survey Circular 779*, 15 p.
- Bredehoeft, J.D. (2003) From Models to Performance Assessment: The Conceptualization Problem. *Ground Water* 41, pp. 571–577.
- Carter, L.J. (1987) *Nuclear Imperatives and Public Trust: Dealing with Radioactive Waste*. Washington, DC: Resources for the Future, 473 p.
- Colglazier, E.W., and Langum, R.B. (1988) Policy Conflicts in the Process for Siting Nuclear Waste Repositories. *Annual Review of Energy* 13, pp. 317–357.
- CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) (2000) *Unsaturated Zone Flow and Transport Model Process Model Report*. Department of Energy. TDR–NBS–HS–000002 REV 00 ICN 02. August.
- Davis, J.A. (1987) Nuclear Waste: An Issue That Won't Stay Buried. *Congressional Quarterly Weekly Report* 45, pp. 451–456.

RESPONDENTS' EXHIBIT 4

RESPONDENTS' RESPONSE
TO PETITIONERS' MOTION FOR SUMMARY REVERSAL

Case No. 13-1260 (D.C. Cir.)

Nevada Safety Contention 122

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE COMMISSION

In the Matter of)	
)	
U.S. DEPARTMENT OF ENERGY)	Docket No. 63-001
)	
(High Level Waste Repository))	December 19, 2008

**STATE OF NEVADA'S
PETITION TO INTERVENE AS A FULL PARTY**

Honorable Catherine Cortez Masto
Nevada Attorney General
Marta Adams
Chief, Bureau of Government Affairs
100 North Carson Street
Carson City, Nevada 89701
Tel: 775-684-1237
Email: madams@ag.nv.gov

Egan, Fitzpatrick & Malsch, PLLC
Martin G. Malsch *
Charles J. Fitzpatrick *
John W. Lawrence *
12500 San Pedro Avenue, Suite 555
San Antonio, TX 78216
Tel: 210.496.5001
Fax: 210.496.5011
mmalsch@nuclearlawyer.com
cfitzpatrick@nuclearlawyer.com
jlawrence@nuclearlawyer.com

*Special Deputy Attorneys General

NEV-SAFETY-122 - SCREENING OF DRIFT DEGRADATION FEPs1. A statement of the contention itself

SAR Subsection 2.3.4.1 improperly excludes features, events and processes relating to seismic-induced rockfall damage, non-seismic rockfall and drift collapse that could occur within the first 10,000 years from consideration in the TSPA on the basis of low consequence or low probability.

2. A brief summary of the basis of the contention

SAR Subsection 2.3.4.1 excludes features, events and processes relating to seismic-induced rockfall damage, non-seismic rockfall and drift collapse from consideration in the TSPA on the basis of low consequence or low probability, whereas modeling undertaken by the Center for Nuclear Waste Regulatory Analyses (CNWRA) considers that rubble loading may be sufficient to collapse drip shields, allow seepage to pass through them and contact waste packages allowing localized corrosion to occur.

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

This contention raises an issue whether DOE has complied with the NRC requirements applicable to Yucca Mountain, and falls within the scope of the hearing as specified in section II, paragraph 1 of the Notice of Hearing.

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

10 C.F.R. § 63.31(a)(2) states that the NRC may authorize construction of the GROA at the Yucca Mountain site if it determines that there is reasonable expectation the materials described in the application can be disposed of without unreasonable risk to the health and safety of the public. In reaching this determination, 10 C.F.R. § 63.31(a)(3) requires the LA to satisfy the requirements contained in 10 C.F.R. § 63.21, and the site and design to comply with Subpart

E of 10 C.F.R. Part 63. 10 C.F.R. § 63.113 (part of Subpart E) requires that compliance with that paragraph must be demonstrated through a performance assessment that meets the requirements specified at 10 C.F.R. §§ 63.114 , 63.303, 63.305, 63.312 and 63.342 (the latter four are part of Subpart L). 10 C.F.R. § 63.114(c) requires that any performance assessment used to demonstrate compliance with Section 63.113 for 10,000 years after disposal must consider alternative conceptual models of features and processes, for 10,000 years after disposal, that are consistent with available data and scientific understanding and evaluate the effects that alternative conceptual models have on the performance of the geologic repository. 10 C.F.R. § 63.342 sets the limit on performance assessments by excluding features, events and processes from consideration that are estimated to have less than one chance in 10,000 of occurring within 10,000 years of disposal, and provides that performance assessments need not evaluate the impacts resulting from any features, events and processes with a higher chance of occurrence if the results of the performance assessments would not be changed significantly in the initial 10,000-year period after disposal. This contention alleges non-compliance with these regulatory provisions and therefore raises a material issue within the scope of the licensing proceeding.

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

In SAR Subsection 2.3.4.1, seismic-induced drift rockfall damage to EBS system components is screened from consideration on several grounds. For nonlithophysal units, damage can occur to the drip shields, but advection through cracks in the drip shield and failure of drip shield plates is excluded because of low consequences for the TSPA. Rupture of axial stiffeners is assessed to occur only for an impact of a 28.3 metric ton (MT) rock block and is excluded on the grounds of low probability. Also, damage to waste packages and waste package internals is excluded on the grounds that the drip shields do not separate and because they remain

intact mechanically deflecting rockfall away from the waste packages. Seismic-induced rockfall in the lithophysal units is not excluded from the TSPA.

Also in SAR Subsection 2.3.4.1, non-seismic rockfall in both lithophysal and nonlithophysal units, resulting from processes such as drift degradation induced by *in situ* gravitational and excavation-induced stresses and thermally induced stresses, is excluded on the grounds that potential rock block sizes generated by these processes are not sufficient to tear or rupture the drip shield plates, and that potential advective flux through stress corrosion cracks resulting from denting of the drip shield plates by rockfall is of low consequence.

Finally, in SAR Subsection 2.3.4.1, partial and complete drift collapse, as opposed to discrete rockfall is considered, as a result of thermal effects, stresses related to excavation and other non-seismic processes. DOE assesses that drift collapse resulting from excavation and thermal stresses is expected to be relatively minor during the time of the thermal phase and that time-dependent strength degradation of the rock mass over the first 20,000 years after emplacement is expected to result in only partial drift collapse in either lithophysal or nonlithophysal rock masses. From these considerations, the impact of drift collapse on the performance of the drip shield, waste package, emplacement pallet and invert was excluded on the basis of low consequence.

In contrast, the CNWRA describes how drift degradation and the resulting rubble accumulation in an emplacement drift are modeled in TPA Version 5.1 for both lithophysal and nonlithophysal units. See "Risk Insights Derived from Analyses of Model Updates in the Total-System Performance Assessment Version 5.1 Code" (7/31/2008), LSN# NRC000029711, Section 4, at 4-1 through 4-3. The drift degradation is taken to occur at a steady rate from thermal loading beginning at the time of closure (*id.* at 4-1). In addition, episodic accumulation

of rubble from seismic activity is taken to occur using a linear relationship between ground motion magnitude and rubble accumulation. The rubble load on the drip shields is computed. If it is found to be sufficient to collapse the drip shields, it is assumed that some fraction of the seepage may pass through the drip shields and contact the waste packages. If water contact with the waste packages occurs early in the thermal period, localized corrosion may occur. Also, the rubble load on the collapsed drip shields is assumed to be transferred to waste packages and may be concentrated. If the resulting stress is amplified by seismic acceleration, mechanical damage to the waste package may occur.

Results from the CNWRA analysis shows that the radiological impact of the scenario with thermal degradation, but no seismic degradation, is very much larger than the radiological impact of the scenario without either thermal or seismic degradation. *See* NRC000029711, Figure 4.1 at 4-2. When seismic degradation is also included, the radiological impact is increased further, but the differences between the results obtained with and without thermal drift degradation are reduced. The assessed radiological impacts approach their peak values on a timescale of around 10,000 years, i.e. they are substantially expressed within 10,000 years.

Evaluation of the effects of rockfall and drift degradation on drip shields and waste packages depend on detailed stress and mechanical stability analyses and on interpretation of the effects of mechanical damage on corrosion resistance and water penetration potential. The State of Nevada has not evaluated the extent to which analyses of these effects have been undertaken by DOE and CNWRA, and has not investigated differences between those analyses. Nevertheless, it is clear that DOE and CNWRA have developed very different conceptual models for the consequences of rockfall and drift degradation. These different conceptual models either

need to be reconciled, or one needs to be eliminated on the basis of available data and scientific understanding, or both need to be propagated through the DOE performance assessments.

In light of the CNWRA report, DOE's screening of features, events and processes relating to seismic-induced rockfall damage, non-seismic rockfall and drift collapse from consideration in the TSPA on the basis of low consequence or low probability has not been adequately justified, in conflict with 10 C.F.R. § 63.342. Furthermore, the CNWRA position represents, at the very least, an alternative conceptual model that is considered by them to be consistent with available data and scientific understanding and that, therefore, should be evaluated in the performance assessment to comply with 10 C.F.R. § 63.114(c).

6. There must be sufficient information to show that there is a genuine dispute with DOE, along with specific references to the portions of the LA being controverted

In SAR Subsection 2.3.4.1, DOE screens various features, events and processes relating to rockfall and drift degradation, however, the screening adopted is not consistent with the position taken on these features, events and processes by the CNWRA in a report that post-dates submission of the License Application. DOE does not recognize in the License Application that any legitimate alternative models of these features, events and processes could be adopted.

There is a need to show either that the CNWRA model is inconsistent with available data and scientific understanding, or to update the screening assessment to take account of the legitimacy of this model in conformance with 10 C.F.R. § 63.342 and to propagate it through the performance assessments in accord with 10 C.F.R. § 63.114(c).

Because the TSPA is a complex non-linear model, and changes in the approach adopted are likely to result in changes in the results obtained that vary both as a function of time post-closure and from realization to realization within a modeling case, a determination whether acceptance of this contention would necessarily lead to calculated doses in excess of EPA's dose

standards would require DOE to perform a substantial number of additional modeling cases that are not included in the LA and that are beyond the practical ability of anyone else to perform. Moreover, there are more than 100 Nevada TSPA contentions with characteristics like this one. These relate to a total of 19 different broad aspects of the TSPA. Therefore, there are many thousands of possible changes that would need to be made to DOE's TSPA approach to include the effects of accepting this one contention along with all possible combinations of Nevada's other contentions relating to different aspects of the TSPA, even if all contentions relating to each broad aspect of the TSPA were considered together in defining the variant cases. This vastly increases the burden and complexity of showing the dose effects of acceptance of Nevada's contentions.