UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	Docket No. 63-001-HLW
	)	
U.S. DEPARTMENT Of ENERGY	)	
	)	
	)	
(High Level Waste Repository)	)	February 23, 2008
	)	
	)	

REPLY OF WHITE PINE COUNTY TO THE U.S. DEPARTMENT OF ENERGY AND NUCLEAR REGULATORY COMMISSION STAFF ANSWERS TO WHITE PINE COUNTY'S REQUEST FOR HEARING AND PETITION FOR LEAVE TO INTERVENE INCLUDING SUPPORTING CONTENTIONS ON THE APPLICATION BY THE U.S. DEPARTMENT OF ENERGY FOR AUTHORITY TO CONSTRUCT A GEOLOGIC REPOSITORY AT A GEOLOGIC REPOSITORY OPERATIONS AREA AT YUCCA MOUNTAIN

INTRODUCTION

Pursuant to the Atomic Safety Licensing Board's ("Board") Order of January 15, 2009, White Pine County hereby replies to the U.S. Department of Energy ("DOE") and Nuclear Regulatory Commission staff ("Staff") answers to White Pine County's request for a hearing and petition for leave to intervene, including supporting contentions ("Petition"), in the proceeding to license the U.S. Department of Energy (DOE) to construct a geologic repository at the geologic repository operations area at Yucca Mountain in Nye County, Nevada. Answer of the U.S. Department of Energy to White Pine County's Request for Hearing and Petition for Leave to Intervene Including Supporting Contentions (January 15, 2009)("DOE's Response"); (NRC Staff Answers to

Intervention Petitions) ("Staff's Response)". The DOE and Staff object to the admissibility of White Pine County contentions WHI-NEPA-1, WHI-NEPA-2, WHI-NEPA-3 and WHI-NEPA-4. As discussed below, these objections are without merit.

The Nuclear Regulatory Commission has an independent duty to ensure that the Department of Energy's License Application conforms to the National Environmental Policy Act. 40 CFR §197.3. [1] The National Environmental Policy Act is a public law that requires a project proponent to discuss in a reasonably thorough fashion the impacts of the project on the general environment. *City of Carmel-by-the-Sea, et al v. USDOT, et al*, 123 F.3d 1142 (9th Circuit 1997). The Act does not require any particular substantive result since the Act mandate is a procedural one. *Id*. In this matter, the project proponent, Department of Energy, has a legal duty to discuss "in a reasonably thorough fashion impacts on the general environment. . ." 40 CFR §197.3. In furtherance of this legal duty, DOE filed a document referred to as the SAR as part of its Environmental Analysis with a declared purpose to model an igneous event which intersects with their proposed project. In its volcanic model introduction, DOE describes the model as:

> The volcanic eruption modeling case considers the processes associated with localization of upward magma flow into one or more conduits along a dike(s) that intersected the repository, eruption of contaminated magma products to the earth's surface, dispersal of the contaminated tephra by wind and *deposition downwind*, and redistribution of contaminated tephra by surface sedimentary (geomorphic) processes. See Yucca Mountain Repository SAR 2.3.11-47.

Note the emphasis on DOE's description of the proper model as tephra deposition **downwind**, **not upwind**. Despite their own documentary description of the proper

[1] These regulations arose out of the 1992 Energy Policy Act required the EPA to establish site specific standards at Yucca Mountain "for protection of the public from releases from radioactive materials stored or disposed of in the repository at the Yucca Mountain Site. Such standards shall prescribe the maximum annual effective dose equivalent to individual members of the public from releases to the accessible environment . . ." EnPA § 801(a)(1).

model, DOE failed to report in their environmental analysis any model of downwind radiation contaminated tephra fallout or radiation contaminated volcanic gas transport, they only reported upwind transports of tephra. This omission fails to meet their own stated model requirements and certainly does not qualify as a "reasonably thorough . . . [discussion] of general environmental impacts." DOE reports at SAR 2.3.11-64 that "the prevailing winds in the Yucca Mountain area are directed toward the northeast . . ." despite their wind data, DOE only report tephra deposition as though the prevailing wind was southwest and they report vog not at all. By ignoring their own data, DOE failed to meet the NEPA requirement of a thorough discussion of environmental impacts: DOE modeled radiation contaminated tephra fallout upwind; not downwind. DOE modeled vog not at all. White Pine County details in this reply to the DOE and NRC staff Answers the specific problems with this failure of analysis by arguing in the next section the admissibility of WHI-NEPA-1 the radiation contaminated tephra deposition analysis failure; WHI-NEPA-2 the radiation contaminated vog analysis failure; WHI-NEPA-3 the radiation contaminated tephra deposition mitigation analysis failure; and WHI-NEPA-4 the radiation contaminated vog mitigation analysis failure.

ARGUMENT

I. CONTENTION WHI-NEPA-1 IS ADMISSIBLE

A. WHI-NEPA-1 and Its Supporting Affidavits Address the Mandatory Requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309

Contention WHI-NEPA-1 alleges that it is not practicable to adopt the DOE EIS because of the omission in the DOE EIS of any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra

deposition in White Pine County and other downwind areas, other than for the upwind location of the Reasonably Maximally Exposed Individual (RMEI). Petition at 18. DOE and Staff take issue with the extent to which WHI-NEPA-1 addresses the requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309. WHI-NEPA-1 and its supporting affidavits address the mandatory requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309.

1. WHI-NEPA-1 Fully Complies with the Express Requirements of 10 C.F.R § 51.109

WHI-NEPA-1 meets the express requirements of 10.C.F.R. § 51.109(a)(2), because it is accompanied by the affidavit and related technical documentation of Dr. Dennis Geist. While DOE asserts that WHI-NEPA-1 does not comply with § 51.109 DOE fails to provide any factual support for this claim. 10 C.F.R § 51.109(a)(2) requires that any party contending that it is not practicable to adopt the DOE environmental impact statements must file a contention accompanied by an affidavit setting forth the factual and or technical/basis for the claim that it is not practicable for NRC to adopt the DOE EIS without further supplementation. The affidavit and included technical documents of Dr. Geist included in WHI-NEPA-1 clearly set forth the required technical/factual basis for White Pine County's claim in its Petition, and Attachments 1 and 2. Therefore, WHI-NEPA-1 meets the requirement of 10 C.F.R § 51.109(a)(2). WHI-NEPA-1 provides substantiated evidence that the environmental and public health consequences of radiologically contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI, were omitted from consideration in the DOE EIS and said consequences represent "significant and substantial new information or new considerations" that render the DOE EIS inadequate

without further supplementation. WHI-NEPA-1 therefore meets the requirement of 10 C.F.R § 51.109(c)(2).

2. WHI-NEPA-1 Fully Complies with the Express Requirements of 10 C.F.R § 2.326

WHI-NEPA-1 raises a "significant environmental issue" supported by a factual and technical basis as required by 10 C.F.R § 2.326(a)(2). WHI-NEPA-1 concludes that DOE has postulated as a credible volcanic event a violent Strombolian eruption intersecting the Yucca Mountain repository, with a 13 km high plume. Petition at 22. WHI-NEPA-1 offers evidence supported by affidavit, including a related technical report of a qualified volcanologist, that if such a volcanic event were to occur, it is highly probable that a measureable amount of contaminated ash would be deposited in White Pine County. Petition at 22. White Pine County's expert volcanologist further concludes that reasonable estimates for ash deposition in White Pine County on the basis of data gathered through actual experience with actual eruptions similar to that postulated by DOE in the Repository FSEIS range from 20 to 1000gm/m^2 Petition at 22. Dr. Geist's actual experience compares to mere estimates of deposition of tephra at the RMEI location utilized by DOE in the TSPA-LA of 0.02 gm/m^2. As shown in Figure 6.5-14 of the TSPA-LA, the DOE estimate of the annual dosage from the primary tephra fallout at the RMEI location is 4 x 10^{-6} mrem. TSPA-LA at F6.5-14. Assuming the experienced based estimates of tephra deposition rates in White Pine County stated above, and a linear relationship between tephra mass and dosage, one anticipates annual dosages of 0.004 to 0.2 mrem from primary ash deposition in White Pine County, many times greater than the model based estimates by DOE for the RMEI and disclosed in the DOE EIS. Petition at 23.

White Pine County also asserts that the radioactive tephra will be thickened locally by transport and deposition on the earth's surface, with which DOE clearly agrees. TPSA, Figure 6.5-14. Dr. Geist provides analogous evidence from his scientific experience with studying tephra redistribution and concentration in the Pacific Northwest as a basis for concluding that such mechanisms increase dosages at least 100-fold. Petition, Attachment 2. Accordingly, DOE's assertion that the affidavit and supporting materials of Dr. Geist fails to address a significant safety or environmental issue and that Dr. Geist "provides no scientific study or analysis in support" of his argument that concentration of tephra is likely to increase the dosages in White Pine County is incorrect. DOE's Response at 40. In fact, observation and measurements of natural deposits as performed by Dr. Geist, is more scientific than the use of computer model estimates.

DOE alleges that Dr. Geist "merely speculates as to reasons why DOE's analysis may or may not be faulty". DOE's Response at 40. Yet, DOE has not undertaken any analysis of tephra redistribution or concentration in White Pine County. DOE has omitted this information from the DOE EIS. It is logically impossible for Dr. Geist to have speculated about the DOE analysis because DOE never conducted the analysis. Therefore, DOE's criticism in this regard is without merit.

DOE argues that because Dr. Geist admits "[i]t is impossible for me to predict the consequences of tephra distribution in White Pine County …" that his conclusions regarding possible tephra redistribution in White Pine County "should therefore be disregarded". DOE Response at 41. DOE has taken the phrase "impossible for me to predict" out of context by extracting only the first part of Dr. Geist's sentence. The key

clause in Dr. Geist's statement is "… by comparison to the RMEI calculation". Because the RMEI is absolutely inadequate as an analogue for conditions in White Pine County, Dr. Geist is unwilling to base his estimates of tephra redistribution and concentration "by comparison to the RMEI calculation". In his technical report, Dr. Geist describes the characteristics of the RMEI which render its use in estimating tephra redistribution and concentration in White Pine County infeasible. (Petition, Attachment 2). DOE's argument then states that because Dr. Geist admits "[i]t is impossible for me to predict the consequences of tephra distribution in White Pine County by comparison to the RMEI calculation…" that his conclusions regarding possible tephra redistribution in White Pine County "should therefore be disregarded" is unfounded and unsupported in the record.

WHI-NEPA-1 meets the requirements of 10. C.F.R. § 2.326(a)(3) because if true a materially different result would be likely (from the result wherein NRC adopts the DOE EIS without any requirement for supplementation beyond that already recommended by Staff). Specifically, NRC would have to reach a conclusion that it would only be practicable to adopt the DOE EIS with additional supplementation to that already recommended by Staff.

WHI-NEPA-1 meets the requirement of 10 C.F.R. § 2.326(b). WHI-NEPA -1 is supported by affidavits, given by competent individuals with knowledge of the facts and expertise in volcanism and/or NEPA compliance that set forth the factual and/or technical basis for White Pine County's claims of omission and significance. Therefore, the contention meets the requirement of 10 C.F.R. § 2.326(b). Because both the DOE and Staff appear to lack any substantive technical basis to critique WHI-NEPA-1, both DOE

and Staff expend considerable verbiage and manipulation of Dr. Geist's report in their answers seeking to disqualify White Pine County's important issue on the basis of technicalities surrounding the legitimacy of affidavits proffered by the County. Principal among various complaints, both DOE and Staff asserts that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b)".

DOE argues that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b). DOE's Response at 34. WHI-NEPA-1 simply contends that the DOE EIS omits "any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the Reasonably Maximally Exposed Individual (RMEI)". Petition at 18. The White Pine County proffered affidavits of both Dr. Geist (an expert in volcanism) and Dr. Baughman (an expert in NEPA compliance) clearly state that upon review of the DOE EIS, both experts determined that the DOE EIS failed to address (and therefore omitted) consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI. Thus, the affidavits of Dr. Geist and Dr. Baughman conclude factually that the DOE EIS failed to address (and therefore omitted) consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the Reasonably Maximally Exposed Individual (RMEI). Dr. Geist, in his affidavit and related technical report, goes a step further in that he provides factual evidence supporting the likely

significance of the omitted information to public health and the environment. Accordingly, WHI-NEPA-1 meets the requirement of 10 C.F.R. § 2.326(b).

As a contention of omission, White Pine County can not be held responsible in its defense of WHI-NEPA-1 for completing the very analysis and information that the County argues was omitted and must be incorporated through further supplementation of the DOE EIS. It is the County's burden to show that said omission has occurred and that the omitted information is a significant public health or environmental issue. The information which WHI-NEPA-1 asserts has been omitted can be found nowhere in the DOE EIS and its supporting documents. It is the responsibility of NRC to ensure that, if warranted, said omission is cured through further supplementation of the DOE EIS. The technical and factual basis in White Pine County's motion proves that tephra deposition is a significant public health and environmental issue which DOE has omitted from the EIS. Because the information contained in WHI-NEPA-1 and described above presents a significant public health and environmental issue it must be addressed in greater detail through further review.

DOE questions the qualifications of Dr. Geist and Dr. Baughman to offer the opinions they proffer in their affidavits. With regard to Dr. Geist, DOE challenges his qualifications to "offer speculation on the computer models DOE used to estimate tephra transport". DOE's Response at 34. While Dr. Geist admits he is "not an expert on the computer models", that does not mean that he does not understand the basis of how the model works, its limitations and the interpretation of its output. Petition, Attachment 2 at 2. If DOE's assertion regarding Dr. Geist's expertise were true, then one would also have to conclude that DOE's own volcanologists are not experts in the computer model

because they are not expert in the code used in the data management software used by the model (Microsoft Excel). An appropriate analogy would be a NASCAR driver who does not understand the engineering of each component of his/her car, but understands how it works and is able to operate it in a professional manner. In fact, nowhere in Dr. Geist's affidavit and related technical report does he offer criticism of the computer models DOE used to estimate tephra transport and deposition, beyond what is in DOE's self-assessment of said model. Petition at 23.

With regard to Dr. Baughman, DOE asserts that he "fails to present any grounds for concluding that he is an expert in the matters addressed in the contention regarding radiologically contaminated tephra or how such material might be deposited in White Pine County". DOE's Response at 35. White Pine County did not retain Dr. Baughman as an expert in volcanism. Rather, Dr. Baughman has been retained by the County owing to his expertise with NEPA and the preparation and review of NEPA compliance documents. The statements in Dr. Baughman's affidavit are clearly limited to his conclusions, based upon his review of the DOE EIS, regarding the omission of information which is the subject of WHI-NEPA-1 from said DOE EIS. DOE's challenge therefore of Dr. Baughman as an expert regarding radiologically contaminated tephra or how such material might be deposited in White Pine County is not relevant. DOE has not challenged Dr. Baughman's expertise regarding NEPA.

In their answers, DOE and Staff each contest the technical information presented by Dr. Geist in his affidavit and related technical report. In the case of DOE, a claim is made that Dr. Geist has erred in calculating and reporting "reasonable estimates for ash deposition in White Pine County on the basis of the tabulated eruptions range from 20 to

1,000 gm/m^2". DOE Response at 39. In its answer, DOE asserts that the deposition value for the Ruapehu analogous volcanic event used by Dr. Geist is in error and rather than the 20 gm/m^2 cited by Dr. Geist "the reference given states that the Ruapehu eruption in 1996 deposited 0.0002 kg/m^2 at a distance of 200 km (Bonadonna et al. 2005, at 1, Attachment WHI-NEPA-1), which equates to 0.2 gm/m^2, not the 20 gm/m^2 as reported in Attachment 2". DOE Response at 39. DOE has misinterpreted the isomass map of Figure 11 in Bonadonna et al. 2005. One can clearly see from the isomass map of Figure 11 in Bonadonna et al. 2005 that the deposit is at least 0.05 kg/m^2 at the New Zealand coast along the dispersal axis, equating to 50 gm/m^2. If anything, Dr. Geist's use of 20 gm/m^2 as a lower bound for his estimate is conservative, and the DOE response is incorrect by a factor of 1000, owing to an error in arithmetic.

DOE is wrong to claim that Dr. Geist's estimate of the "upper limit of 1000 gm/m^2 estimated for deposition in White Pine County appears to be arbitrarily chosen and not based on data". DOE Response at 39. First, the upper limit estimate of 1000 gm/m^2 is based on comparable plume heights to the one postulated by DOE in the volcanic eruption scenario described in the LA and DOE EIS and is bracketed by larger and smaller eruption events, including well-characterized eruptions at Hekla and Ruapehu. Petition, Attachment 2. Second, the measurements of natural features cited in the references to Dr. Geist's report and utilized by him in reaching his conclusions are actual data, not the simply the output of computer models.

DOE takes issue with the use by Dr. Geist of the Hekla and Ruapehu volcanic events as analogues because "future potential eruptions in the Yucca Mountain region are expected to be basaltic in composition, less voluminous, and less explosive than either

Ruapehu or Hekla". DOE's Response at 40. This belies the fact that DOE has postulated a 13 km high plume for the volcanic eruption simulations which form the basis of information disclosed in the DOE EIS. The DOE simulations of a volcanic eruption at Yucca Mountain are comparable in volume and explosivity to the Hekla and Ruapehu volcanic events. DOE's conclusion that "[o]f the eruptions cited in Attachment 2, Paricutin is the only one remotely analogous to potential future volcanic activity near Yucca Mountain" is simply incorrect. More important is the similarity of real, natural eruptions to the postulated volcanic eruption event actually modeled by DOE and presented within the DOE EIS. In this regard, the Hekla and Ruapehu volcanic events are clearly applicable analogues.

While not taking issue with Dr. Geist's representation and use of the date from Bonadonna et al. 2005, Staff questions Dr. Geist's exclusion of the Paricutin eruption from his basis for deriving a range of reasonable ash deposition in White Pine County. Staff Response at 1522. Dr. Geist included every report reasonably accessible to compare the distal ash deposition from a plume that is comparable in height to the one DOE postulates for an eruption at Yucca Mountain. He did not include Particutin data in his range of estimates because it is irrelevant: there is no report of the wind direction during the explosive phase of the Paricutin eruption, nor reports of the spatial distribution of the ash from that eruptive phase. Without knowing wind direction or the special distribution of tephra deposition, a single measurement is meaningless. This is precisely the reason that DOE's estimates of radiological dosages at the RMEI site are irrelevant for the environmental impact in White Pine County and other downwind **site**s**.** Wind direction is one of the most important parameters for distribution of tephra SNL 2007; Appendix D.

The total spatial distribution of tephra deposition (isopach or isomass maps) is available in the literature (which is cited in Dr. Geist's report, Petition, Attachment 2) for the Hekla and Ruapehu eruptions, but it is absent for the Paricutin eruption that deposited ash in Mexico City. Dr. Geist therefore limited his derivation of the range of tephra deposition in White Pine County and other downwind areas to the most analogous events for which there are usable data; the Paricutin data are not usable. Accordingly, Staff's concern with Dr. Geist's exclusion of data regarding the Particutin event is without merit and must result from a lack of understanding of the products of volcanic eruptions.

Of further concern is Staff's description of the extent to which DOE has relied upon the Paricutin volcanic event as an analogous event. Staff Response at 1522. Here, Staff fails to recognize that DOE used Paricutin as an analogue, but only for comparing tephra thicknesses close to the volcano (comparable to the distance to the RMEI site). Accordingly, DOE's use of Paricutin as an analogue is irrelevant to the instance of estimating tephra deposition in White Pine County and other distant downwind areas. Staff's failure to recognize this important distinction is troublesome and may help to explain why Staff's adoption review of the DOE EIS did not identify the issue which is the subject of WHI-NEPA-1.

WHI-NEPA-1 is clearly distinct from the re-opening motion in *Pub. Serv. Co. of N.H.* and is therefore not an "out of hand reopening motion" that should be rejected under the standard set in *Pub. Serv. Co. of N.H.* DOE relies upon *Pub.Serv. Co. of N.H.* for the proposition that "the Commission expects its adjudicatory boards to enforce the [section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand re-opening motions that do not meet those requirements within their four corners." (DOE Response at 34 (quoting *Pub.*

Serv. Co of N.H. (Seabrook Station, Units 1 and 2) ALAB-915, 29 NRC 427, 432 (1989)). In *Pub. Serv. Co. of N.H.* a motion to reopen the record concerning the licensing of the Seabrook Nuclear Facility was denied. Specifically, the adjudicatory board found the motion did not meet the criteria because 1) it only contained the opinion of the petitioner who had not qualified himself as an expert; 2) did not suggest that the petitioner had any formal education or professional experience in the fields of geology, seismology, and earthquake engineering; 3) that the petitioner only had a lay claim as to the knowledge of the facts alleged; and 4) did not supply a sworn affidavit of a qualified expert. WHI-NEPA-1 clearly exceeds these standards. WHI-NEPA-1 contains the opinions of Dr. Geist and Dr. Baughman who are both, based on sworn affidavits, qualified as experts. WHI-NEPA-1 clearly states that Dr. Geist and Dr. Baughman have formal training and professional experience in volcanology and NEPA compliance, respectively. Dr. Geist's knowledge of the facts alleged is based on thorough research and far exceeds a lay opinion. Both Dr. Geist and Dr. Baughman, qualified experts, have supplied sworn affidavits. Therefore, WHI-NEPA-1 is not an out-of-hand reopening motion that should be rejected

3. WHI-NEPA-1 is Material to the Findings that the NRC Must Make

Pursuant to Section 114(f) the Nuclear Waste Policy Act (NWPA) and consistent with (10 CFR § 51.109(c) the Board must "find that it is practicable to adopt any environmental impact statement prepared by the Secretary of Energy in connection with a geologic repository proposed to be constructed under Title I of the Nuclear Policy Waste Act of 1982, as amended unless: … (2) [s]ignificant and substantial new information or new considerations render such environmental impact state inadequate". In its answer,

DOE argues that WHI-NEPA-1 does not raise an issue material to the findings NRC must make because White Pine County has failed to demonstrate that DOE's environmental impact analysis violate NEPA". DOE's Response at 36. Because 10 CFR § 51.109(c) does not require NRC to determine whether DOE's environmental impact analysis violate NEPA, DOE's argument here is without merit. More importantly, as discussed above with respect to the requirements of 10 CFR §§ 51.109 and 2.326, WHI-NEPA-1 demonstrates that "significant and substantial new information or new considerations render DOE's environmental impact statement inadequate without further supplementation.

DOE argues that WHI-NEPA-1 "is not material because, in accordance with DOE guidance for preparation of NEPA documents (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002) [LSN# DN2001714520]), the probability of a volcanic eruption at Yucca Mountain that would release radiologically contaminated tephra is so low that the analysis of the event is not required under NEPA." DOE's Response at 36. For a variety of reasons this argument is without merit and should be immediately rejected.

First, the document relied upon here by DOE is neither statute nor regulation, has no force of law upon DOE, let alone NRC, and is therefore immaterial to establishing compliance with NEPA.

Second, DOE provides no evidence that the guidance has been shown to be legally consistent with NEPA, DOE implementing regulations regarding NEPA, or, more importantly, NRC's regulations for implementing NEPA.

Third, DOE fails to mention that the guidance document encourages consideration of a range of accident scenarios including those of a low probability. As stated in the guidance, "The key to informative accident analyses is to develop realistic accident scenarios that address a reasonable range of event probabilities and consequences. The set of accident scenarios considered should serve to inform the decision maker and the public of the accident risks associated with a proposed action and alternatives. DOE should consider accident scenarios that represent the range or spectrum of reasonably foreseeable accidents, including low probability/high consequence accidents and higher probability/(usually) lower consequence accidents." (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]) By limiting its analysis to only the RMEI, DOE has not considered a range of accidents.

Fourth, DOE fails to point out that the guidance document states, "Because one purpose of NEPA analysis is to inform the public, consider analyzing an accident scenario in which the public has expressed a keen interest, even when the scenario is not reasonably foreseeable". (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 5 [LSN# DN2001714520])

Finally, DOE fails to point out that the guidance document appears focused in its applicability upon facilities having operational lifetimes of "only several decades" and that "[a]ccident scenarios that have frequencies less than 10^{-6} per year are so unlikely to occur during the life of *such* [emphasis added] facilities that they are generally not important to consider in making decisions about facilities". DOE Guidance on NEPA

Document Preparation, Recommendations for Analyzing Accidents under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]). The DOE NEPA guidance relied upon by DOE is not even remotely applicable to the Yucca Mountain geologic repository which has a regulatory life of 1 million years.

DOE would now have the Board believe that it was somehow guided by this irrelevant NEPA guidance document during preparation of the DOE EIS and is therefore justified in its omission from the DOE EIS of any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas. In fact, the subject guidance document is not cited within DOE's EIS as a reference relied upon by DOE in preparation of its NEPA compliance documents.

Despite this attempt by DOE to suggest otherwise, as noted in White Pine County's petition, DOE has provided no evidence that its decision to omit any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI, was based upon anything more than a decision to simply present in the DOE EIS the same analysis it had prepared for the LA, an analysis limited in geographic scope not by NEPA but by NRC licensing regulations in Part 63. In fact, in DOE's response to White Pine County comments on the Repository DSEIS contained in Volume III of the Repository FSEIS in which the County once again questions the omission of tephra deposition and related environmental and public health consequences in the County, DOE states, "The EPA and NRC regulations that relate to the licensing of the proposed repository require that DOE's performance assessment must

consider all potential pathways of radionuclide transport and exposure for the RMEI. DOE has modified Section S.3.2.1.3 of the SEIS Summary and the introductory section to Chapter 5 to make this clear. The TSPA results in the SEIS consider all potential pathways, including airborne releases. DOE used the same characteristics of the RMEI, including location and lifestyle, for all TSPA calculations…" Petition at 10.

Not surprisingly, DOE's response to White Pine County's comments on the Repository DEIS make no mention of the phantom DOE NEPA guidance document that DOE now seeks to hide behind in defense of its decision to omit significant and substantial new information or new considerations from the DOE EIS. The fact is, DOE has provided no credible evidence to counter White Pine County's claim that DOE undertook only that limited scope of analysis of the deposition and consequences of radiologically contaminated tephra that DOE determined was required to comply with NRC regulations at 10 CFR 63 without any regard for the environmental disclosure requirements of NEPA, DOE's NEPA implementing regulations or NRC's NEPA implementing regulations.

In asserting that "White Pine County's contention is addressed to such a low frequency accident resulting from a natural phenomenon", DOE has failed to point out that the degree of uncertainty surrounding its own estimates of the annual intersection probability associated with its probabilistic volcanic hazard analysis has grown with the availability of new data. In a January 28, 2009 presentation to the Nuclear Waste Technical Review Board, Peter Swift, Lead Laboratory Chief Scientist for Sandia National Laboratories, reported that based upon new data obtained through DOE's ongoing probabilistic volcanic hazard analysis, the annual intersection probability has

nearly doubled from 1.7 x 10^{-8} to 3.1 x 10^{-8}. Peter Swift, Sandia National Laboratories, Presentation Handout, pp. 28-29, Nuclear Waste Technical Review Board, January 28, 2009, Las Vegas, Nevada. The fact is, the probabilistic volcanic hazard analysis reported by DOE in the LA and carried forward into DOE's EIS indicates that over the million year regulatory lifetime of the Yucca Mountain repository that the volcanic eruption scenario postulated by DOE is likely to occur, and perhaps not once, but several times. Most importantly, as additional data is becoming available to DOE, the probability of such a volcanic eruption is increasing. For all of the aforementioned reasons, DOE's decision to omit any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI from the DOE EIS was misguided, inappropriate and shown below, inconsistent with NEPA and NRC regulations for implementing NEPA.

DOE's argument that "the low probability of a volcanic eruption is also a reasonable rationale for excluding a discussion of mitigation of radiological contaminated tephra" is immaterial to the ruling the board must make in response to WHI-NEPA-1. DOE argues that it "may decline to discuss mitigation measures when it believes the environmental impact of the action will be minor. (DOE Response at 39 (Quoting *Transmission Access Policy Study Group v. Fed. Energy Regulatory Comm'n*, 225 F.3d 667, 737 (D.C. Cir. 2000)). This argument must fail as WHI-NEPA-1 does not concern the failure of DOE to discuss mitigation measures but rather concerns the complete omission of analysis of tephra deposition in White Pine County. Therefore, this argument is immaterial and the Board should not consider it.

Similarly, DOE argues that "NEPA requires only possible mitigation measures to 'be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated.' DOE Response at 39 (Quoting Circuit in *City of Carmel-by-the-Sea v. U.S. DOT*, 123 F.3d 1142, 1150 (9th Cir. 1997). WHI-NEPA-1 does not concern the detail of mitigation analysis DOE has conducted but rather concerns the complete omission of analysis of tephra deposition in White Pine County. Therefore, this argument is immaterial and the Board should not consider it.

In the end, NRC's finding that the DOE EIS can be adopted must be based upon a determination that the documents fully satisfy NRC's independent NEPA requirements. Accordingly, the Board must be guided at first by NEPA itself. NEPA requires "a detailed statement by the responsible official on … (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented" (42 USC § 4332**,** NEPA Sec 102 1(c)(ii)). The environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas is just such an adverse environmental effect which cannot be avoided should the Yucca Mountain project be implemented. Not withstanding DOE's meritless argument to the contrary, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI would be clearly consistent with NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be guided by Council On Environmental Quality (CEQ) NEPA implementing regulations which require that an EIS consider "[d]irect effects and

their significance (Sec. 1508.8(a)) and [i]ndirect effects and their significance (Sec. 1508.8(b)). The deposition of radiologically contaminated tephra in White Pine County and its environmental and public health consequences of said deposition is just such a direct effect. The concentration of radiologically contaminated tephra in White Pine County and the related environmental and public health consequences of said concentration represents an indirect effect. A finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the upwind location of the RMEI, would be explicitly consistent with CEQ regulations for implementing NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be consistent with NRC's regulations for implementation of NEPA. NRC's NEPA implementing regulations require that a draft EIS consider "major points of view concerning the environmental impacts of the proposed action and the alternatives, and contain an analysis of significant problems and objections raised by other Federal, State, and local agencies …"(10 CFR 51.71(b)). As described in great detail in White Pine County's Petition, the County has, in its capacity as a Secretary of Energy designated affected unit of local government, over the past 13 years and on numerous occasions, brought to DOE's attention County's views with regard to either: 1) the need for DOE to address in its NEPA compliance documents volcanism as an atmospheric pathway for radiation exposure in White Pine County, or 2) the failure by DOE in its NEPA compliance documents to address volcanism as an atmospheric pathway for radiation exposure in White Pine County. Petition pp. 3-7. Nowhere in

DOE's answer to White Pine County's petition does it deny that it has failed to consider the volcanic eruption issues consistently raised by the County during the past 13 years. Rather, DOE's answer collectively seeks to reduce County's concerns to a level of insignificance not worthy of inclusion in DOE EIS. The failure of DOE's EIS to explicitly consider the major points of view and include an analysis of the volcanism issues raised repeatedly by White Pine County is contrary to NRC regulations at #10 CFR 51.71(b) for implementing NEPA.

Regulations governing NRC's implementation of NEPA further require that a supplement to a final environmental impact statement will be prepared if the proposed action has not been taken and (1) [t]here are substantial changes in the proposed action that are relevant to environmental concerns; or (2) [t]here are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. 10 CFR 51.92(a). The proposed action for the NRC with regard to the DOE EIS the Board may elect to adopt, with or without further supplementation, is the granting of a license to construct the Yucca Mountain geologic repository. NRC has not yet taken proposed action. Notwithstanding DOE's arguments to the contrary, which foregoing sections of this reply have shown to be without merit, WHI-NEPA-1 presents new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Therefore, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind

areas, other than for the location of the RMEI would be fully consistent with NRC regulations for implementing NEPA (Cf.10 CFR 51.92(a)).

As noted in White Pine County's petition, in determining whether or not to adopt the DOE EIS with or without further supplementation, NRC should be guided by NUREG-1748 ("Environmental Review Guidance for Licensing Actions Associated with NMSS Programs"), which indicates that the use of a regulatory requirement to limit an analysis of impacts is not necessarily appropriate in the context of NEPA. Petition at 21. White Pine County's petition points out that the DOE EIS admits that "In developing the TSPA-LA model for the analysis in this Repository SEIS, DOE took into consideration the regulatory requirements in the proposed EPA and NRC standards to provide a perspective on potential radiological impacts during the postclosure period. For this SEIS, DOE based the analyses on the TSPA-LA model that serves as the basis for the compliance assessment included in DOE's application to the NRC for construction and authorization and a license to receive and possess radioactive materials at the repository." Petition at 20. Here, DOE admits that its analysis presented in the EIS is limited in scope to that required to satisfy NRC and EPA regulations. As discussed previously in this reply and in County's petition, the eruptive-scenario evaluated in the LA-SAR does not report any consideration of the transport of contaminated ash to White Pine County, located northeast and downwind of the Yucca Mountain site. Instead, the analysis is focused entirely on the effects of the RMEI location in Amargosa Valley, south of the Yucca Mountain site and downwind. Petition at 22. In its answer to WHI-NEPA-1, DOE has not taken issue with the application of NUREG-1748 as an indicator of an inappropriate regulation-based limitation placed by DOE on the scope of analysis within

the DOE EIS. A finding by the Board that the DOE inappropriately limited the scope of analysis within the DOE EIS to that considered to satisfy proposed EPA and NRC regulations and that DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI would be fully consistent with NRC guidance for implementing NEPA contained in NUREG-1748.

B. WHI-NEPA-1 Does Not Represent a Potential Battle of the Experts

There is no "battle of the experts" in this case because the DOE EIS has omitted any analysis or consideration of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI. In a final act of desperation, DOE plays the "battle of the experts" trump card in an attempt to fend off the likely conclusion of the Board that White Pine County's extensive factual and technical evidence is supported by qualified experts. With regard to WHI-NEPA-1, DOE states in its answer, "[a]ccordingly, a NEPA contention such as this one that is premised on a disagreement between an intervener's expert and DOE's expert analysis in an EIS, does not create a triable issue and should not be admitted." DOE's Response at 42. Because DOE has clearly omitted from the DOE EIS any analysis or consideration of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the upwind location of the RMEI, there can not possibly be, and there is not any disagreement between White Pine County's experts and DOE's expert analysis in the DOE EIS. As noted by Dr. Geist "White Pine County is

down prevailing wind from Yucca Mountain, and that is by far the most important consideration. Unfortunately, the computer simulations (ASHPLUME code) reported in the SAR and Sandia's more detailed 2007 report are truncated beyond Forty-Mile Wash". Petition, Attachment 2.. In fact, at no point within its response does DOE deny that it has omitted any analysis or consideration of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI. With regard to the admissibility of WHI-NEPA-1, there is neither merit nor applicability to the disingenuous "battle of the experts" argument put forth by DOE.

C. WHI-NEPA-1 Contains All Requisite Supporting Facts, Expert Opinion and References

For the reasons discussed above with respect to the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v), WHI-NEPA-1 succeeds in providing the requisite supporting facts, expert opinion and references. DOE's answer falls far short of proving that WHI-NEPA-1 is non-compliant with the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v).

D. WHI-NEPA-1 Exposes the Existence of a Genuine Dispute on a Material Issue of Law or Fact

As substantiated above, WHI-NEPA-1 clearly describes an omission of significant and substantial new information or new consideration that would render the FEIS and SFEIS impractical for adoption by NRC without additional supplementation. Because DOE disagrees with the addition of further supplementary information to the DOE EIS, a genuine dispute on a material issue of law or fact does exist.

II. CONTENTION WHI-NEPA-2 IS ADMISSIBLE

A. WHI-NEPA-2 and Its Supporting Affidavits Address the Mandatory Requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309

Contention WHI-NEPA-2 alleges that it is not practicable to adopt the DOE EIS because the Yucca Mountain FEIS and the Repository FSEIS omit any consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the Reasonably Maximally Exposed Individual (RMEI) and in White Pine County and other downwind areas, NRC cannot adopt the EISs without the addition of supplementary information. Petition at 25. DOE and Staff take issue with the extent to which WHI-NEPA-2 addresses the requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309. WHI-NEPA-2 and its supporting affidavits address the mandatory requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309.

1. WHI-NEPA-2 Fully Complies with the Express Requirements of 10 C.F.R § 51.109

With regard to 10 C.F.R § 51.109(a)(2), WHI-NEPA-2 is accompanied by the affidavit and related technical documentation of Dr. Dennis Geist. 10 C.F.R § 51.109(a)(2) requires that any party contending that it is not practicable to adopt the DOE environmental impact statements must file a contention accompanied by an affidavit setting forth the factual and or technical/basis for the claim. that it is not practicable for NRC to adopt the DOE EIS without further supplementation. The affidavit and included technical documents of Dr. Geist included in WHI-NEPA-2 clearly set forth the required

technical/factual basis for White Pine County's claim. (Petition, Attachments 1 and 2) Therefore, WHI-NEPA-2 therefore meets the requirement of 10 C.F.R § 51.109(a)(2). WHI-NEPA-2 provides substantiated evidence that the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the Reasonably Maximally Exposed Individual (RMEI) and in White Pine County and other downwind areas were omitted from consideration in the DOE EIS, and said consequences represent "significant and substantial new information or new considerations" that render the DOE EIS inadequate without further supplementation. WHI-NEPA-2 therefore meets the requirement of 10 C.F.R § 51.109(c)(2).

2. WHI-NEPA-2 Fully Complies with the Express Requirements of 10 C.F.R § 2.326

WHI-NEPA-1 raises a "significant environmental issue" supported by a factual and technical basis as required by 10 C.F.R § 2.326(a)(2). WHI-NEPA-2 concludes that DOE has postulated as a credible volcanic event a violent Strombolian eruption intersecting the Yucca Mountain repository, with a 13 km high plume. Petition at 22) WHI-NEPA-2 offers evidence supported by affidavit, including a related technical report, of a qualified volcanologist that if such a volcanic event were to occur, it is highly probable that a measureable amount of contaminated ash would be deposited in White Pine County. Petition at 22. White Pine County's expert volcanologist further concludes that because gas is dispersed much more widely in the atmosphere than is tephra, the contribution of volcanic gases on atmospheric transport of radionuclides may be significant. Petition at 28. Reasonable estimates for ash deposition in White Pine County on the basis of experience with actual eruptions similar to that postulated by DOE in the Repository FSEIS range from 20 to 1000 $gm/m^{2.}$ Petition at 22. This compares to

estimates of deposition of tephra at the RMEI location utilized by DOE in the TSPA-LA of 0.02 gm/m^2. As shown in Figure 6.5-14 of the TSPA-LA, the DOE estimate of the annual dosage from the primary tephra fallout at the RMEI location is 4×10^{-6} mrem. TSPA-LA at F6.5-14.. Assuming the estimates of tephra deposition rates in White Pine County stated above, and a linear relationship between tephra mass and dosage, one anticipates annual dosages of 0.004 to 0.2 mrem from primary ash deposition in White Pine County, many times greater than that predicted by DOE for the RMEI and disclosed in the DOE EIS. Petition at 23. Dr. Geist provides analogous evidence from his scientific experience with studying tephra erosion, transportation, and redistribution in the Pacific Northwest as a basis for concluding that such mechanisms may increase these dosages by 100-fold. Petition, Attachment 2. In the technical report which accompanies his affidavit, Dr. Geist, concludes, based upon analogous volcanic events, that acidic fumes (vog) routinely are carried 200 km downwind from the volcanic vent at Kilauea, Hawaii. Petition at 28. Accordingly, DOE's assertion that White Pine County's expert has failed to set forth the required factual and/or technical bases is unfounded. DOE's Response at 44.

WHI-NEPA-2 meets the requirements of 10. C.F.R. § 2.326(a)(3) because if true a materially different result would be likely (from the result wherein NRC adopts the DOE EIS without any requirement for supplementation beyond that already recommended by Staff). Specifically, NRC would have to reach a conclusion that it would only be practicable to adopt the DOE EIS with additional supplementation to that already recommended by Staff.

WHI-NEPA-2 meets the requirement of 10 C.F.R. § 2.326(b). WHI-NEPA-2 is supported by affidavits, given by competent individuals with knowledge of the facts and expertise in volcanism and/or NEPA compliance that set forth the factual and/or technical basis for White Pine County's claims of omission and significance. Therefore, the contention meets the requirement of 10 C.F.R. § 2.326(b). Because both the DOE and Staff appear to lack any substantive technical basis to debase WHI-NEPA-2, both DOE and Staff expend considerable verbiage in their answers seeking to disqualify White Pine County's important issue on the basis of technicalities surrounding the legitimacy of affidavits proffered by the County. Principal among various complaints, both DOE and Staff asserts that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b)".

DOE argues that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b). DOE's Response at 44. WHI-NEPA-2 simply contends that the DOE EIS omits "any consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the Reasonably Maximally Exposed Individual (RMEI) and in White Pine County and other downwind areas". Petition at 25. The White Pine County proffered affidavits of both Dr. Geist (an expert in volcanism) and Dr. Baughman (an expert in NEPA compliance) clearly state that upon review of the DOE EIS, both experts determined that the DOE EIS failed to address (and therefore omitted) consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas. Thus, the affidavits of Dr. Geist and Dr. Baughman conclude factually that the DOE EIS failed to

address (and therefore omitted) consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas. Dr. Geist, in his affidavit and related technical report, goes a step further in that he provides factual evidence supporting the likely significance of the omitted information to public health and the environment. Accordingly, WHI-NEPA-2 meets the requirement of 10 C.F.R. § 2.326(b).

In its response, Staff states "[neither] Dr. Geist or White Pine County provide any information to demonstrate what, if any, the potential impact would be for the RMEI or the residences of White Pine County". Staff Response at 1526. In fact, Dr. Geist's affidavit and related technical report indicate 1) the solubility of uranium dioxide in volcanic gas is significant; 2) volcanic gases are routinely carried 200 km away from eruptive sites; and 3) White Pine County is 230 miles (downwind) from Yucca Mountain. (Petition, Attachment 2) Any unbiased reader of Dr. Geist's technical report would certainly infer that uranium could be transported to White Pine County in volcanic gases in the event of the DOE postulated eruption through the Yucca Mountain repository. Staff's assertion that "[neither] Dr. Geist or White Pine County provide any information to demonstrate what, if any, the potential impact would be for the RMEI or the residences of White Pine County is wrong.

Staff also takes issue with Dr. Geist's reference in his technical report to and the work of his colleague Dr. Taunton. Staff states, "[t]he contention fails to establish the relevance of this work to the contended topic of atmospheric transport of radionuclides in volcanic gases". Staff Response at 1528. This portion of Staff's response is obviously written by someone with no experience in geochemistry. The Yajima et al. (1995) results

are the most relevant ones that Dr. Geist is aware of in the literature, because their experiments were performed at pH as low as 2. The whole purpose of the determination of equilibrium constants is so the solubility of species can be calculated under a range of conditions different than those of the exact experiment. It is manifest that the distribution of 5 million kg of uranium distributed across the environment is a detrimental environmental impact. Here Staff's surprisingly narrow attempt to defeat WHI-NEPA-2 on the basis of a hair-splitting technicality is squarely counter to NRC's responsibilities regarding protection of public health and the environment. WHI-NEPA-2 raises an important omission of a significant issue and new information pertaining to the environment and public health not currently found in the DOE EIS.

DOE repeatedly recognizes that magmatic volatiles would play an important role in the igneous scenarios that were considered (SAR, 2.3.11). The issue of the transport of radioactive materials in a volatile phase is focused on in the "igneous intrusion scenario" (SAR 2.3.11.3), but there is no consideration of the eruption of the radioactive volatiles. Incomprehensibly, DOE then does not consider the transport of radioactive waste by volatiles, should they erupt (SAR 2.3.11.4).

As a contention of omission, White Pine County can not be held responsible in its defense of WHI-NEPA-2 for completing the very analysis and information that the County argues was omitted and must be incorporated through further supplementation of the DOE EIS. It is the County's burden to show that said omission has occurred and that the omitted information is a significant public health or environmental issue. The information which WHI-NEPA-2 asserts has been omitted can be found nowhere in the DOE EIS and its supporting documents. It is the responsibility of NRC to ensure that, if

warranted, said omission is cured through further supplementation of the DOE EIS. The technical and factual basis in White Pine County's motion proves that volcanic gas is a significant public health and environmental issue which DOE has omitted from the EIS. Because the information contained in WHI-NEPA-2 and described above presents a significant public health and environmental issue it must be addressed in greater detail through further review.

DOE questions the qualifications of Dr. Geist and Dr. Baughman to offer the opinions they proffer in their affidavits. With regard to Dr. Geist, DOE challenges his qualifications to "offer speculation on the computer models DOE used to estimate tephra transport". DOE's Response at 44. Because WHI-NEPA-2 is concerned not with the tephra transport but with the transport of radionuclides in volcanic gases, DOE's criticism of Dr. Geist here is irrelevant. Nonetheless, while Dr. Geist admits he is "not an expert on the computer models" that does not mean that he does not understand the basis of how the model works, its limitations and the interpretation of its output. (Petition, Attachment 2 at 2) If DOE's assertion regarding Dr. Geist's expertise were true, than one would also have to conclude that DOE's own volcanologists are not experts in the computer model because they are not expert in the computer code used in the data management software used by the model (Microsoft Excel). An appropriate analogy would be a NASCAR driver who does not understand the engineering of each component of his/her car, but understands how it works and is able to operate it in a professional manner. In fact, nowhere in Dr. Geist's affidavit and related technical report does he offer speculation on the technical details of the computer models DOE used to estimate tephra transport, beyond what is in DOE's self-assessment of said model.

With regard to Dr. Baughman, DOE asserts that he "fails to present any grounds for concluding that he is an expert in the matters addressed in the contention regarding radiologically contaminated tephra or how such material might be deposited in White Pine County". DOE's Response at 44. White Pine County did not retain Dr. Baughman as an expert in volcanism. Rather, Dr. Baughman has been retained by the County owing to his expertise with NEPA and the preparation and review of NEPA compliance documents. The statements in Dr. Baughman's affidavit are clearly limited to his conclusions, based upon his review of the DOE EIS, regarding the omission of information which is the subject of WHI-NEPA-2 from said DOE EIS. DOE's challenge therefore of Dr. Baughman as an expert regarding volcanic gas transport of radionuclides as a result of a volcanic explosion is not relevant. DOE has not challenged Dr. Baughman's expertise regarding NEPA.

Astonishingly, DOE's answer now seeks to imply that the probabilistic assessment of volcanic hazard contained within the SAR and characterized within the DOE EIS includes the assessment of probability regarding volcanic gas transport. DOE's Response at 45. It is not surprising that DOE's answer provides no reference to where this analysis can be found within the DOE EIS and its supporting documents. In preparing WHI-NEPA-2 and this reply, White Pine County has undertaken an extensive LSN-based search of the DOE EIS; the underlying TSPA-LA; the SAR and all related source documents. This extensive review makes it perfectly clear that while DOE and DOE contractor scientists and others preparing source documents relied upon by DOE and DOE contractor scientists were fully aware that a volcanic eruption at Yucca Mountain would be attended by volcanic gases being emitted into the atmosphere, neither

the TSPA-LA, the SAR or the DOE EIS include any explicit consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas. The deception that DOE seeks to introduce into the Yucca Mountain licensing proceedings by now suggesting that its TSPA-LA, the SAR or the DOE EIS include any explicit consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas is deplorable and should be discounted on its face.

WHI-NEPA-2 is clearly distinct from the re-opening motion in *Pub. Serv. Co. of N.H.* and is therefore not an "out of hand reopening motion" that should be rejected under the standard set in *Pub. Serv. Co. of N.H*. DOE relies upon *Pub.Serv. Co. of N.H.* for the proposition that "the Commission expects its adjudicatory boards to enforce the [section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand re-opening motions that do not meet those requirements within their four corners." DOE Response at 34 (quoting *Pub. Serv. Co of N.H.* (Seabrook Station, Units 1 and 2) ALAB-915, 29 NRC 427, 432 (1989). In *Pub. Serv. Co. of N.H.* a motion to reopen the record concerning the licensing of the Seabrook Nuclear Facility was denied. Specifically, the adjudicatory board found the motion did not meet the criteria because 1) it only contained the opinion of the petitioner who had not qualified himself as an expert; 2) did not suggest that the petitioner had any formal education or professional experience in the fields of geology, seismology, and earthquake engineering; 3) that the petitioner only had a lay claim as to the knowledge of the facts alleged; and 4) did not supply a sworn affidavit of a qualified expert. WHI-

NEPA-2 clearly exceeds these standards. WHI-NEPA-2 contains the opinions of Dr. Geist and Dr. Baughman who are both, based on sworn affidavits, qualified as experts. WHI-NEPA-2 clearly states that Dr. Geist and Dr. Baughman have formal training and professional experience in volcanology and NEPA compliance, respectively. Dr. Geist's knowledge of the facts alleged is based on thorough research and far exceeds a lay opinion. Both Dr. Geist and Dr. Baughman, qualified experts, have supplied sworn affidavits. Therefore, WHI-NEPA-2 is not an out-of-hand reopening motion that should be rejected.

3. WHI-NEPA-2 is Material to the Findings that the NRC Must Make

Pursuant to Section 114(f) the Nuclear Waste Policy Act (NWPA) and consistent with (10 CFR § 51.109(c) the Board must "find that it is practicable to adopt any environmental impact statement prepared by the Secretary of Energy in connection with a geologic repository proposed to be constructed under Title I of the Nuclear Policy Waste Act of 1982, as amended unless: … (2) [s]ignificant and substantial new information or new considerations render such environmental impact state inadequate". In its answer, DOE argues that WHI-NEPA-2 does not raise an issue material to the findings NRC must make because White Pine County has failed to demonstrate that DOE's environmental impact analysis violate NEPA". (DOE's Response at 46) Because 10 CFR § 51.109(c) does not require NRC to determine whether DOE's environmental impact analysis violate NEPA, DOE's argument here is without merit. More importantly, as discussed above with respect to the requirements of 10 CFR §§ 51.109 and 2.326, WHI-NEPA-2 demonstrates that "significant and substantial new information or new considerations

render DOE's environmental impact statement inadequate without further supplementation.

DOE argues that WHI-NEPA-2 "is not material because, in accordance with DOE guidance for preparation of NEPA documents (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002) [LSN# DN2001714520]), the probability of a volcanic eruption at Yucca Mountain that would release radionuclides via atmospheric transport in volcanic gases is so low that the analysis of the event is not required under NEPA." DOE's Response at 46. This argument is without merit and should be immediately rejected.

First, the document relied upon here by DOE is neither statute or regulation, has no force of law upon DOE, let alone NRC, and is therefore immaterial to establishing compliance with NEPA.

Second, DOE provides no evidence that the guidance has been shown to be legally consistent with, NEPA, DOE implementing regulations regarding NEPA or more importantly, NRC's regulations for implementing NEPA.

Third, DOE fails to mention that the guidance document encourages consideration of a range of accident scenarios including those of a low probability. As stated in the guidance, "The key to informative accident analyses is to develop realistic accident scenarios that address a reasonable range of event probabilities and consequences. The set of accident scenarios considered should serve to inform the decision maker and the public of the accident risks associated with a proposed action and alternatives. DOE should consider accident scenarios that represent the range or "spectrum" of reasonably

foreseeable accidents, including low probability/high consequence accidents and higher probability/(usually) lower consequence accidents." (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]) By limiting its analysis to only the RMEI, DOE has not considered a range of accidents.

Fourth, DOE fails to point out that the guidance document states, "Because one purpose of NEPA analysis is to inform the public, consider analyzing an accident scenario in which the public has expressed a keen interest, even when the scenario is not reasonably foreseeable". (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 5 [LSN# DN2001714520]).

Finally, DOE fails to point out that the guidance document appears focused in its applicability upon facilities having operational lifetimes of "only several decades" and that "[a]ccident scenarios that have frequencies less than 10^{-6} per year are so unlikely to occur during the life of *such* [emphasis added] facilities that they are generally not important to consider in making decisions about facilities". DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]). The DOE NEPA guidance relied upon by DOE is not even remotely applicable to the Yucca Mountain geologic repository which has a regulatory life of 1 million years.

DOE would now have the Board believe that it was somehow informed by this irrelevant NEPA guidance document during preparation of the DOE EIS and is therefore justified in its omission from the DOE EIS of any consideration or analysis of the

environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas. In fact, the subject guidance document is not cited within DOE's EIS as a reference relied upon by DOE in preparation of its NEPA compliance documents.

Despite this attempt by DOE to suggest otherwise, as noted in White Pine County's petition, DOE has provided no evidence that its decision to omit any consideration or analysis of the environmental and public health consequences of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas was based upon anything more than a decision to simply present in the DOE EIS the same analysis it had prepared for the LA, an analysis limited in geographic scope not by NEPA but by NRC licensing regulations in Part 63. In fact, in DOE's response to White Pine County comments on the Repository DSEIS contained in Volume III of the Repository FSEIS in which the County once again questions the omission of tephra deposition and related environmental and public health consequences in the County, DOE states, "The EPA and NRC regulations that relate to the licensing of the proposed repository require that DOE's performance assessment must consider all potential pathways of radionuclide transport and exposure for the RMEI. DOE has modified Section S.3.2.1.3 of the SEIS Summary and the introductory section to Chapter 5 to make this clear. The TSPA results in the SEIS consider all potential pathways, including airborne releases. DOE used the same characteristics of the RMEI, including location and lifestyle, for all TSPA calculations…" Petition at 10.

Not surprisingly, DOE's response to White Pine County's comments on the Repository DEIS make no mention of the phantom DOE NEPA guidance document that

DOE now seeks to hide behind in defense of its decision to omit significant and substantial new information or new considerations from the DOE EIS. It is also not surprising that DOE's response to White Pine County's comments on the Repository DEIS says nothing about radiologically contaminated gases. The fact is, DOE has provided no credible evidence to counter White Pine County's claim that DOE has failed, in absolute disregard for NEPA, DOE's NEPA implementing regulations and NRC's NEPA implementing regulations, to consider the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas. Nor has DOE provided any credible evidence that it did not purposefully limit the scope of analysis presented in its EIS regarding a volcanic eruption at Yucca Mountain to the deposition and consequences of radiologically contaminated tephra required to comply with NRC regulations at 10 CFR 63.

In asserting that "White Pine County's contention is addressed to such a low frequency accident resulting from a natural phenomenon", DOE has failed to point out that the degree of uncertainty surrounding its own estimates of the annual intersection probability associated with its probabilistic volcanic hazard analysis has grown recently with the availability of new data. In a January 28, 2009 presentation to the Nuclear Waste Technical Review Board, Peter Swift, Lead Laboratory Chief Scientist for Sandia National Laboratories reported that based upon new date obtained through DOE's ongoing probabilistic volcanic hazard analysis, the annual intersection probability has nearly doubled from 1.7×10^{-8} to 3.1×10^{-8}. Peter Swift, Sandia National Laboratories, Presentation Handout, pp. 28-29, Nuclear Waste Technical Review Board, January 28,

2009, Las Vegas, Nevada. The fact is, the probabilistic volcanic hazard analysis reported by DOE in the LA and carried forward into DOE's EIS indicates that over the million year regulatory lifetime of the Yucca Mountain repository that the volcanic eruption scenario postulated by DOE is likely to occur, and perhaps not once, but several times. Most importantly, as additional data is becoming available to DOE, the probability of such a volcanic eruption is increasing. For all of the aforementioned reasons, DOE's decision to omit any consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas from the DOE EIS was misguided, inappropriate and shown below, inconsistent with NEPA and NRC regulations for implementing NEPA.

In the end, NRC's finding that the DOE EIS can be adopted must be based upon a determination that the documents fully satisfy NRC's independent NEPA requirements. Accordingly, the Board must be guided at first by NEPA itself. NEPA requires "a detailed statement by the responsible official on … (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented" (42 USC § 4332**,** NEPA Sec 102 1(c)(ii)) The environmental and public health consequences of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas is just such an adverse environmental effect which cannot be avoided should the Yucca Mountain project be implemented. Notwithstanding DOE's meritless argument to the contrary, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of

radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas would be clearly consistent with NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be guided by Council On Environmental Quality (CEQ) NEPA implementing regulations which require that an EIS consider "[d]irect effects and their significance (Sec. 1508.8(a)) and [i]ndirect effects and their significance (Sec. 1508.8(b)). The emission of radiologically contaminated volcanic gas over White Pine County and the environmental and public health consequences of said gases is just such a direct effect. The concentration of said radionuclides deposited onto the land surface from the settling of radiologically contaminated volcanic gas in White Pine County and the related environmental and public health consequences of said concentration represents an indirect effect. A finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas would be explicitly consistent with CEQ regulations for implementing NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be consistent with NRC's regulations for implementation of NEPA. NRC's NEPA implementing regulations require that a draft EIS consider "major points of view concerning the environmental impacts of the proposed action and the alternatives, and contain an analysis of significant problems and objections raised by other Federal, State, and local agencies …"(10 CFR 51.71(b)) As described in great detail in White Pine County's Petition, the County has, in its capacity as a Secretary of Energy

designated affected unit of local government, over the past 13 years and on numerous occasions brought to DOE's attention County's views with regard to either: 1) the need for DOE to address in its NEPA compliance documents volcanism as an atmospheric pathway for radiation exposure in White Pine County, or 2) the failure by DOE in its NEPA compliance documents to address volcanism as an atmospheric pathway for radiation exposure in White Pine County. Petition pp. 3-7. Nowhere in DOE's answer to White Pine County's petition does it deny that it has failed to consider the volcanic eruption issues consistently raised by the County during the past 13 years. Rather, DOE's answer collectively seeks to reduce County's concerns to a level of insignificance not worthy of inclusion in DOE EIS. The failure of DOE's EIS to explicitly consider the major points of view and include an analysis of the volcanism issues raised repeatedly by White Pine County is contrary to NRC regulations at10 CFR 51.71(b) for implementing NEPA.

Regulations governing NRC's implementation of NEPA further require that a supplement to a final environmental impact statement will be prepared if the proposed action has not been taken and (1) [t]here are substantial changes in the proposed action that are relevant to environmental concerns; or (2) [t]here are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. (10 CFR 51.92(a)) The proposed action for the NRC with regard to the DOE EIS the Board may adopt, with or without further supplementation, is the granting of a license to construct the Yucca Mountain geologic repository. NRC has not yet taken the proposed action. Notwithstanding DOE's arguments to the contrary, which foregoing sections of this reply have shown to be without merit, WHI-NEPA-2

presents new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Therefore, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the Reasonably Maximally Exposed Individual (RMEI) and in White Pine County and other downwind areas would be fully consistent with NRC regulations for implementing NEPA at 10 CFR 51.92(a).

B. WHI-NEPA-2 Contains All Requisite Supporting Facts, Expert Opinion and References

For the reasons discussed above with respect to the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v), WHI-NEPA-2 succeeds in providing the requisite supporting facts, expert opinion and references. DOE's answer falls far short of proving that WHI-NEPA-2 is non-compliant with the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v).

C. WHI-NEPA-2 Exposes the Existence of a Genuine Dispute on a Material Issue of Law or Fact

As substantiated above, WHI-NEPA-2 clearly describes an omission of significant and substantial new information or new consideration that would render the FEIS and SFEIS impractical for adoption by NRC without additional supplementation. Because DOE disagrees with the addition of further supplementary information to the DOE EIS, a genuine dispute on a material issue of law or fact does exist.

III. CONTENTION WHI-NEPA-3 IS ADMISSIBLE

A. WHI-NEPA-3 and Its Supporting Affidavits Address the Mandatory Requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309

Contention WHI-NEPA-3 alleges that it is not practicable to adopt the DOE EIS because of the DOE EIS omits any discussion of means to mitigate adverse the environmental and public health impacts of radiation contaminated tephra deposition in White Pine County and other downwind areas. Petition at 30. DOE and Staff take issue with the extent to which WHI-NEPA-3 addresses the requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309. WHI-NEPA-3 and its supporting affidavits address the mandatory requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309.

1. WHI-NEPA-3 Fully Complies with the Express Requirements of 10 C.F.R § 51.109

While DOE asserts that WHI-NEPA-3 does not comply with 51.109 DOE fails to provide any factual support for this claim. WHI-NEPA-3 is accompanied by the affidavit and related technical documentation of Dr. Dennis Geist. 10 C.F.R § 51.109(a)(2) requires that any party contending that it is not practicable to adopt the DOE environmental impact statements must file a contention accompanied by an affidavit setting forth the factual and or technical/basis for the claim. The affidavit and included technical documents of Dr. Geist included in WHI-NEPA-3 clearly set forth the required technical/factual basis for White Pine County's claim, Therefore, WHI-NEPA-3 meets the requirement of 10 C.F.R § 51.109(a)(2).

WHI-NEPA-3 provides substantiated evidence that the environmental and public health consequences of radiologically contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI, were omitted

from consideration in the DOE EIS and said consequences represent "significant and substantial new information or new considerations" that render the DOE EIS inadequate without further supplementation. WHI-NEPA-3 therefore meets the requirement of 10 C.F.R § 51.109(c)(2).

2. WHI-NEPA-3 Fully Complies with the Express Requirements of 10 C.F.R § 2.326

WHI-NEPA-3 raises a "significant environmental issue" supported by a factual and technical basis as required by 10 C.F.R § 2.326(a)(2). WHI-NEPA-3 concludes that DOE has postulated as a credible volcanic event, a violent Strombolian eruption intersecting the Yucca Mountain repository, with a 13 km high plume. Petition at 35. WHI-NEPA-3 offers evidence supported by affidavit, including a related technical report, of a qualified volcanologist that if such a volcanic event were to occur, it is highly probable that a measureable amount of contaminated ash would be deposited in White Pine County. Petition at 35. White Pine County's expert volcanologist further concludes that reasonable estimates for ash deposition in White Pine County on the basis of experience with actual eruptions similar to that postulated by DOE in the Repository FSEIS range from 20 to 1000gm/$m^{2.}$ Petition at 35. This compares to estimates of deposition of tephra at the RMEI location utilized by DOE in the TSPA-LA of 0.02 gm/m^2. As shown in Figure 6.5-14 of the TSPA-LA, the DOE estimate of the annual dosage from the primary tephra fallout at the RMEI location is 4 x 10^{-6} mrem. TSPA-LA at F6.5-14. Assuming the estimates of tephra deposition rates in White Pine County stated above, and a linear relationship between tephra mass and dosage, one anticipates annual dosages of 0.004 to 0.2 mrem from primary ash deposition in White Pine County, many times greater than that predicted by DOE for the RMEI and disclosed in the DOE

EIS. Petition at 35. Dr. Geist provides evidence from his scientific experience with studying tephra redistribution and concentration in the Pacific Northwest as a basis for concluding that such mechanisms may increase these dosages by 100-fold. Petition, Attachment 2. Accordingly, DOE's assertion that the affidavit and supporting materials of Dr. Geist fails to address a significant safety or environmental issue and "provides no scientific study or analysis in support" of his argument that concentration of tephra is likely to increase the dosages in White Pine County is incorrect. DOE's Response at 57.

DOE goes on to allege that Dr. Geist "merely speculates as to reasons why DOE's analysis may or may not be faulty". DOE's Response at 57. DOE has not undertaken any analysis of tephra redistribution or concentration in White Pine County. DOE has omitted this information from the DOE EIS. It is logically impossible for Dr. Geist to have speculated about such an analysis that was never conducted by DOE. Therefore, DOE's criticism in this regard is without merit.

DOE argues that because Dr. Geist admits "[i]t is impossible for me to predict the consequences of tephra distribution in White Pine County by comparison to the RMEI calculation…" that his conclusions regarding possible tephra redistribution in White Pine County "should therefore be disregarded". DOE Response at 57. DOE has taken the phrase "impossible for me to predict" out of context. The key clause in Dr. Geist's statement is "by comparison to the RMEI calculation". Because the RMEI is absolutely inadequate as an analogue for conditions in White Pine County, Dr. Geist is unwilling to base his estimates of tephra redistribution and concentration "by comparison to the RMEI calculation". In his technical report, Dr. Geist describes the characteristics of the RMEI which render its use in estimating tephra redistribution and concentration in White Pine

County infeasible. Petition, Attachment 2. DOE's argument that because Dr. Geist admits "[i]t is impossible for me to predict the consequences of tephra distribution in White Pine County by comparison to the RMEI calculation…" that his conclusions regarding possible tephra redistribution in White Pine County "should therefore be disregarded" is unfounded.

WHI-NEPA-3 meets the requirements of 10. C.F.R. § 2.326(a)(3) because if true a materially different result would be likely (from the result wherein NRC adopts the DOE EIS without any requirement for supplementation beyond that already recommended by Staff). Specifically, NRC would have to reach a conclusion that it would only be practicable to adopt the DOE EIS with additional supplementation to that already recommended by Staff.

WHI-NEPA-3 meets the requirement of 10 C.F.R. § 2.326(b). WHI-NEPA-3 is supported by affidavits, given by competent individuals with knowledge of the facts and expertise in volcanism and/or NEPA compliance that set forth the factual and/or technical basis for White Pine County's claims of omission and significance. Therefore, the contention meets the requirement of 10 C.F.R. § 2.326(b). Because both the DOE and Staff appear to lack any substantive technical basis to debase WHI-NEPA-3, both DOE and Staff expend considerable verbiage in their answers seeking to disqualify White Pine County's important issue on the basis of technicalities surrounding the legitimacy of affidavits proffered by the County. Principal among various complaints, both DOE and Staff asserts that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b)".

DOE argues that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b). DOE's Response at 51. WHI-NEPA-3 simply contends that the DOE EIS omits any discussion of means to mitigate adverse the environmental and public health impacts of radiation contaminated tephra deposition in White Pine County and other downwind areas. Petition at 30. The White Pine County proffered affidavits of both Dr. Geist (an expert in volcanism) and Dr. Baughman (an expert in NEPA compliance) clearly state that upon review of the DOE EIS, both experts determined that the DOE EIS failed to include (and therefore omitted) any discussion of means to mitigate adverse the environmental and public health impacts of radiation contaminated tephra deposition in White Pine County and other downwind areas. Thus, the affidavits of Dr. Geist and Dr. Baughman conclude factually that the DOE EIS failed to include (and therefore omitted) any discussion of means to mitigate adverse the environmental and public health impacts of radiation contaminated tephra deposition in White Pine County and other downwind. Dr. Geist, in his affidavit and related technical report, goes a step further in that he provides factual evidence supporting the likely significance of the omitted information to public health and the environment. Accordingly, WHI-NEPA-3 meets the requirement of 10 C.F.R. § 2.326(b).

As a contention of omission, White Pine County can not be held responsible in its defense of WHI-NEPA-3 for completing the very analysis and information that the County argues was omitted and must be incorporated through further supplementation of the DOE EIS. It is the County's burden to show that said omission has occurred and that the omitted information is a significant public health or environmental issue. The information which WHI-NEPA-3 asserts has been omitted can be found nowhere in the

DOE EIS and its supporting documents. It is the responsibility of NRC to ensure that, if warranted, said omission is cured through further supplementation of the DOE EIS. The technical and factual basis in White Pine County's motion proves that tephra deposition is a significant public health and environmental issue which DOE has omitted from the EIS. Because the information contained in WHI-NEPA-3 and described above presents a significant public health and environmental issue it must be addressed in greater detail through further review.

DOE questions the qualifications of Dr. Geist and Dr. Baughman to offer the opinions they proffer in their affidavits. With regard to Dr. Geist, DOE challenges his qualifications to "offer speculation on the computer models DOE used to estimate tephra transport". DOE's Response at 51. While Dr. Geist admits he is "not an expert on the computer models" that does not mean that he does not understand the basis of how the model works, its limitations and the interpretation of its output. Petition, Attachment 2 at 2. If DOE's assertion regarding Dr. Geist's expertise were true, than one would also have to conclude that DOE's own volcanologists are not experts in the computer model because they are not expert in the data management software used by the model. An appropriate analogy would be a NASCAR driver who doesn't understand the engineering of each component of his/her car, but understands how it works and is able to operate it in a professional manner. In fact, nowhere in Dr. Geist's affidavit and related technical report does he offer speculation on the computer models DOE used to estimate tephra transport, beyond what is in DOE's self-assessment of said model. Petition at 35.

With regard to Dr. Baughman, DOE asserts that he "fails to present any grounds for concluding that he is an expert in the matters addressed in the contention regarding

radiologically contaminated tephra or how such material might be deposited in White Pine County". DOE's Response at 51. Given that WHI-NEPA-3 is concerned with radiologically contaminated volcanic gas, DOE's concern that Dr. Baughman is apparently not an expert "in the matters addressed in the contention regarding radiologically contaminated tephra or how such material might be deposited in White Pine County" is irrelevant. Regardless, White Pine County did not retain Dr. Baughman as an expert in volcanism. Rather, Dr. Baughman has been retained by the County owing to his expertise with NEPA and the preparation and review of NEPA compliance documents. The statements in Dr. Baughman's affidavit are clearly limited to his conclusions, based upon his review of the DOE EIS, regarding the omission of information which is the subject of WHI-NEPA-3 from said DOE EIS. DOE's challenge therefore of Dr. Baughman as an expert regarding radiologically contaminated tephra or how such material might be deposited in White Pine County is not relevant. DOE has not challenged Dr. Baughman's expertise regarding NEPA.

In their answers, DOE and Staff each contest the technical information presented by Dr. Geist in his affidavit and related technical report. In the case of DOE, a claim is made that Dr. Geist has erred in calculating and reporting "reasonable estimates for ash deposition in White Pine County on the basis of the tabulated eruptions range from 20 to 1,000 gm/m^{2}". DOE Response at 39. In its answer, DOE asserts that the deposition value for the Ruapehu analogous volcanic event used by Dr. Geist is in error and rather than the 20 gm/m^2 cited by Dr. Geist "the reference given states that the Ruapehu eruption in 1996 deposited 0.0002 kg/m^2 at a distance of 200 km (Bonadonna et al. 2005, at 1, Attachment WHI-NEPA-1-1), which equates to 0.2 gm/m^2, not the 20 gm/m^2 as reported in

Attachment 2". DOE Response at 56. DOE has misinterpreted the isomass map of Figure 11 in Bonadonna et al. 2005. One can clearly see from the isomass map of Figure 11 in Bonadonna et al. 2005 that the deposit is at least 0.05 kg/m^2 at the New Zealand coast along the dispersal axis, equating to 50 gm/m^2. If anything, Dr. Geist's use of 20 gm/m^2 as a lower bound for his estimate is conservative.

DOE is wrong to claim that Dr. Geist's estimate of the "upper limit of 1000 gm/m^2 estimated for deposition in White Pine County appears to be arbitrarily chosen and not based on data". DOE Response at 56. First, the upper limit estimate of 1000 gm/m^2 is based on comparable plume heights to the one postulated by DOE in the volcanic eruption scenario described in the LA and DOE EIS and is bracketed by larger and smaller eruption events, including Hekla and Ruapehu. Petition, Attachment 2. Second, the measurements of natural features cited in the references to Dr. Geist's report and utilized by him in reaching his conclusions are actual data, not the simply the output of computer models.

DOE takes issue with the use by Dr. Geist of the Hekla and Ruapehu volcanic events as analogues because "future potential eruptions in the Yucca Mountain region are expected to be basaltic in composition, less voluminous, and less explosive than either Ruapehu or Hekla". DOE's Response at 57. This belies the fact that DOE has postulated a 13 km high plume for the volcanic eruption simulations which form the basis of information disclosed in the DOE EIS. The DOE simulations of a volcanic eruption at Yucca Mountain are comparable in volume and explosivity to the Hekla and Ruapehu volcanic events. DOE's conclusion that "[o]f the eruptions cited in Attachment 2, Paricutin is the only one remotely analogous to potential future volcanic activity near

Yucca Mountain" is irrelevant. More important is the similarity of natural analogues to the postulated volcanic eruption event actually modeled by DOE and presented within the DOE EIS. In this regard, the Hekla and Ruapehu volcanic events are clearly applicable analogues.

While not taking issue with Dr. Geist's representation and use of the date from Bonadonna et al. 2005, Staff unnecessarily questions Dr. Geist's exclusion of the Paricutin eruption from his basis for deriving a range of reasonable ash deposition in White Pine County. Staff Response at 1533. Dr. Geist included every report reasonably required to compare the distal ash deposition from a plume that is comparable in height to the one DOE postulates for an eruption at Yucca Mountain. He did not include Paricutin data in his range of estimates because it is irrelevant: there is no report of the wind direction during the explosive phase of the Paricutin eruption, nor reports of the special distribution of the ash from that eruption. Without knowing wind direction or the special distribution of tephra deposition, a single measurement is almost meaningless. Wind direction is one of the most important parameters for distribution of tephra. Assessment or direct measurement of wind direction is available in the literature (which is cited in Dr. Geist's report, Petition, Attachment 2) for the Hekla and Ruapehu eruptions, but it is absent for the Paricutin eruption that deposited ash in Mexico City. Dr. Geist therefore limited his derivation of the range of tephra deposition in White Pine County to the two most analogous events for which there are usable data. Accordingly, Staff's concern with Dr. Geist's exclusion of data regarding the Paricutin event is without merit and must result from a lack of understanding of the products of volcanic eruptions.

Of further concern, is Staff's description of the extent to which DOE has relied upon the Paricutin volcanic event as an analogous event as further evidence of the error in Dr. Geist's failure to consider this event in his analysis. Staff Response at 1534. Here, Staff fails to recognize that DOE used Paricutin as an analogue, but just for comparing tephra thicknesses close to the volcano (RMEI distances). Accordingly, DOE's use of Paricutin as an analogue is irrelevant to the instance of estimating tephra deposition in White Pine County and other downwind areas. Staff's failure to recognize this important distinction is troublesome and may help to explain why Staff's adoption review of the DOE EIS did not identify the issue which is the subject of WHI-NEPA-3.

WHI-NEPA-3 is clearly distinct from the re-opening motion in *Pub. Serv. Co. of N.H.* and is therefore not an "out of hand reopening motion" that should be rejected under the standard set in *Pub. Serv. Co. of N.H*. DOE relies upon *Pub.Serv. Co. of N.H.* for the proposition that "the Commission expects its adjudicatory boards to enforce the [section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand re-opening motions that do not meet those requirements within their four corners." DOE Response at 34 (quoting *Pub. Serv. Co of N.H.* (Seabrook Station, Units 1 and 2) ALAB-915, 29 NRC 427, 432 (1989). In *Pub. Serv. Co. of N.H.* a motion to reopen the record concerning the licensing of the Seabrook Nuclear Facility was denied. Specifically, the adjudicatory board found the motion did not meet the criteria because 1) it only contained the opinion of the petitioner who had not qualified himself as an expert; 2) did not suggest that the petitioner had any formal education or professional experience in the fields of geology, seismology, and earthquake engineering; 3) that the petitioner only had a lay claim as to the knowledge of the facts alleged; and 4) did not supply a sworn affidavit of a qualified expert. WHI-

NEPA-1 clearly exceeds these standards. WHI-NEPA-1 contains the opinions of Dr. Geist and Dr. Baughman who are both, based on sworn affidavits, qualified as experts. WHI-NEPA-1 clearly states that Dr. Geist and Dr. Baughman have formal training and professional experience in volcanology and NEPA compliance. Dr. Geist's knowledge of the facts alleged is based on thorough research and far exceeds a lay opinion. Both Dr. Geist and Dr. Baughman, qualified experts, have supplied sworn affidavits. Therefore, WHI-NEPA-3 is not an out-of-hand reopening motion that should be rejected.

3. WHI-NEPA-3 is Material to the Findings that the NRC Must Make

Pursuant to Section 114(f) the Nuclear Waste Policy Act (NWPA) and consistent with (10 CFR § 51.109(c) the Board must "find that it is practicable to adopt any environmental impact statement prepared by the Secretary of energy in connection with a geologic repository proposed to be constructed under Title I of the Nuclear Policy Waste Act of 1982, as amended unless: … (2) [s]ignificant and substantial new information or new considerations render such environmental impact state inadequate". In its answer, DOE argues that WHI-NEPA-3 does not raise an issue material to the findings NRC must make because White Pine County has failed to demonstrate that DOE's environmental impact analysis violate NEPA". DOE's Response at 52. Because 10 CFR § 51.109(c) does not require NRC to determine whether DOE's environmental impact analysis violate NEPA, DOE's argument here is without merit. More importantly, as discussed above with respect to the requirements of 10 CFR §§ 51.109 and 2.326, WHI-NEPA-3 demonstrates that "significant and substantial new information or new considerations render DOE's environmental impact statement inadequate without further supplementation.

DOE argues that WHI-NEPA-3 "is not material because, in accordance with DOE guidance for preparation of NEPA documents (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002) [LSN# DN2001714520]), the probability of a volcanic eruption at Yucca Mountain that would release radiologically contaminated tephra is so low that the analysis of the event is not required under NEPA." DOE's Response at 53. This argument is without merit and should be immediately rejected.

First, the document relied upon here by DOE is neither statute or regulation, has no force of law upon DOE, let alone NRC and is therefore immaterial to establishing compliance with NEPA.

Second, DOE provides no evidence that the guidance has been shown to be legally consistent with, NEPA, DOE implementing regulations regarding NEPA or more importantly, NRC's regulations for implementing NEPA.

Third, DOE fails to mention that the guidance document encourages consideration of a range of accident scenarios including those of a low probability. As stated in the guidance, "The key to informative accident analyses is to develop realistic accident scenarios that address a reasonable range of event probabilities and consequences. The set of accident scenarios considered should serve to inform the decision maker and the public of the accident risks associated with a proposed action and alternatives. DOE should consider accident scenarios that represent the range or spectrum of reasonably foreseeable accidents, including low probability/high consequence accidents and higher probability/(usually) lower consequence accidents." (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National

Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]) By limiting its analysis to only the RMEI, DOE has not considered a range of accidents.

Fourth, DOE fails to point out that the guidance document states, "Because one purpose of NEPA analysis is to inform the public, consider analyzing an accident scenario in which the public has expressed a keen interest, even when the scenario is not reasonably foreseeable". (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 5 [LSN# DN2001714520])

Finally, DOE fails to point out that the guidance document appears focused in its applicability upon facilities having operational lifetimes of "only several decades" and that "[a]ccident scenarios that have frequencies less than 10^{-6} per year are so unlikely to occur during the life of *such* [emphasis added] facilities that they are generally not important to consider in making decisions about facilities". DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]). The DOE NEPA guidance relied upon by DOE is not even remotely applicable to the Yucca Mountain geologic repository which has a life of tens of thousands of decades.

DOE would now have the Board believe that it was somehow guided by this irrelevant NEPA guidance document during preparation of the DOE EIS and is therefore justified in its omission from the DOE EIS of any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of

the RMEI. In fact, the subject guidance document is not cited within DOE's EIS as a reference relied upon by DOE in preparation of its NEPA compliance documents.

Despite this attempt by DOE to suggest otherwise, as noted in White Pine County's petition, DOE has provided no evidence that its decision to omit any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI and any related mitigation of said consequences was based upon anything more than a decision to simply present in the DOE EIS the same analysis it had prepared for the LA, an analysis limited in geographic scope not by NEPA but by NRC licensing regulations in Part 63. In fact, in DOE's response to White Pine County comments on the Repository DSEIS contained in Volume III of the Repository FSEIS in which the County once again questions the omission of tephra deposition and related environmental and public health consequences in the County, DOE states, "The EPA and NRC regulations that relate to the licensing of the proposed repository require that DOE's performance assessment must consider all potential pathways of radionuclide transport and exposure for the RMEI. DOE has modified Section S.3.2.1.3 of the SEIS Summary and the introductory section to Chapter 5 to make this clear. The TSPA results in the SEIS consider all potential pathways, including airborne releases. DOE used the same characteristics of the RMEI, including location and lifestyle, for all TSPA calculations…" Petition at 10.

Not surprisingly, DOE's response to White Pine County's comments on the Repository DEIS make no mention of the phantom DOE NEPA guidance document that DOE now seeks to hide behind in defense of its decision to omit significant and

substantial new information or new considerations from the DOE EIS. The fact is, DOE has provided no credible evidence to counter White Pine County's claim that DOE undertook only that limited scope of analysis of the deposition and consequences of radiologically contaminated tephra and related mitigation of said consequences that DOE determined was required to comply with NRC regulations at 10 CFR 63 without any regard for the environmental disclosure requirements of NEPA, DOE's NEPA implementing regulations or NRC's NEPA implementing regulations.

In asserting that "White Pine County's contention is addressed to such a low frequency accident resulting from a natural phenomenon", DOE has failed to point out that the degree of uncertainty surrounding its own estimates of the annual intersection probability associated with its probabilistic volcanic hazard analysis has grown with the availability of new data. In a January 28, 2009 presentation to the Nuclear Waste Technical Review Board, Peter Swift, Lead Laboratory Chief Scientist for Sandia National Laboratories reported that based upon new date obtained through DOE's ongoing probabilistic volcanic hazard analysis, the annual intersection probability has nearly doubled from 1.7×10^{-8} to 3.1×10^{-8}. Peter Swift, Sandia National Laboratories, Presentation Handout, pp. 28-29, Nuclear Waste Technical Review Board, January 28, 2009, Las Vegas, Nevada. The fact is, the probabilistic volcanic hazard analysis reported by DOE in the LA and carried forward into DOE's EIS indicates that over the million year regulatory lifetime of the Yucca Mountain repository that the volcanic eruption scenario postulated by DOE is likely to occur, and perhaps not once, but several times. Most importantly, as additional data is becoming available to DOE, the probability of such a volcanic eruption is increasing. For all of the aforementioned reasons, DOE's

decision to omit any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition and related mitigation of said consequences in White Pine County and other downwind areas, other than for the location of the RMEI from the DOE EIS was misguided, inappropriate and as shown below, inconsistent with NEPA and NRC regulations for implementing NEPA.

The low probability of a volcanic eruption is not a reasonable rationale for excluding a discussion of mitigation of radiological contaminated tephra because DOE failed to analyze any mitigation measures associated radiological contaminated tephra. DOE argues that it "may decline to discuss mitigation measures when it believes the environmental impact of the action will be minor. DOE Response at 39 (Quoting *Transmission Access Policy Study Group v. Fed. Energy Regulatory Comm'n*, 225 F.3d 667, 737 (D.C. Cir. 2000).In *Transmission Access Policy Study Group* the Federal Regulatory Energy Commission declined to adopt mitigation measures associated with an order to designed to end discriminatory and anticompetitive practices in the national electricity market. The court found that it was within the agencies discretion to decline to adopt the mitigation measures at issue because the agency had comprehensively analyzed the mitigation measures and had explained why it had declined to adopt them. Further, the holding in *Transmission Access Policy Study Group* is fact specific and merely reflects a general rule that an agency may decline. In this case DOE has not conducted any analysis of proposed mitigation measures nor has DOE explained why it has declined to adopt mitigation measures associated with radiological contaminated tephra. Therefore, it is outside of DOE's discretion to decline to discuss mitigation of radiologically contaminated teprha.

City of Carmel-by-the-Sea, as relied upon by DOE, is immaterial for purposes of this case.. DOE cites *City of Carmel-by-the-Sea* as saying "NEPA requires only that possible mitigation measures 'be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated." DOE Response at 56 Quoting '*City of Carmel-by-the-Sea v. U.S. DOT*, 123 F.3d 1142, 1150 (9th Cir. 1997). In this case DOE has omitted to discuss any mitigation measures associated with radiological contaminated tephra in White Pine County. Therefore, DOE has not discussed mitigation measures in any detail well enough "sufficient detail."

In the end, NRC's finding that the DOE EIS can be adopted must be based upon a determination that the documents fully satisfy NRC's independent NEPA requirements. Accordingly, the Board must be guided at first by NEPA itself. NEPA requires "a detailed statement by the responsible official on … (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented". 42 USC § 4332**,** NEPA Sec 102 1(c)(ii). The environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas is just such an adverse environmental effect which cannot be avoided should the Yucca Mountain project be implemented. Not withstanding DOE's meritless argument to the contrary, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI and related measures to mitigate said consequences would be clearly consistent with NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be guided by Council On Environmental Quality (CEQ) NEPA implementing regulations which require that an EIS consider "[d]irect effects and their significance (40 CFR Sec. 1508.8(a)) and [i]ndirect effects and their significance (Sec. 1508.8(b)). The deposition of radiologically contaminated tephra in White Pine County and its environmental and public health consequences of said deposition is just such a direct effect. The concentration of said radiologically contaminated tephra in White Pine County and the related environmental and public health consequences of said concentration represents an indirect effect. CEQ regulations also require that the agency include in any EIS the "[m]eans to mitigate adverse environmental impacts…" (Sec. 1502.16(h). A finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI and related measures to mitigate said consequences would be explicitly consistent with CEQ regulations for implementing NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be consistent with NRC's regulations for implementation of NEPA. NRC's NEPA implementing regulations require that a draft EIS consider "major points of view concerning the environmental impacts of the proposed action and the alternatives, and contain an analysis of significant problems and objections raised by other Federal, State, and local agencies …"(10 CFR 51.71(b)) As described in great detail in White Pine County's Petition, the County has, in its capacity as a Secretary of Energy

designated affected unit of local government, over the past 13 years and on numerous occasions brought to DOE's attention County's views with regard to either 1) the need for DOE to address in its NEPA compliance documents volcanism as an atmospheric pathway for radiation exposure in White Pine County or 2) the failure by DOE in its NEPA compliance documents to address volcanism as an atmospheric pathway for radiation exposure in White Pine County. Petition pp. 3-7. Nowhere in DOE's answer to White Pine County's petition does it deny that it has failed to consider the volcanic eruption issues consistently raised by the County during the past 13 years. Rather, DOE's answer collectively seeks to reduce County's concerns to a level of insignificance not worthy of inclusion in DOE EIS. The failure of DOE's EIS to explicitly consider the major points of view and include an analysis of the volcanism issues raised repeatedly by White Pine County is contrary to NRC regulations at10 CFR 51.71(b) for implementing NEPA.

Regulations governing NRC's implementation of NEPA further require that a supplement to a final environmental impact statement will be prepared if the proposed action has not been taken and (1) [t]here are substantial changes in the proposed action that are relevant to environmental concerns; or (2) [t]here are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. (10 CFR 51.92(a)) The proposed action for the NRC with regard to the DOE EIS the Board may elect to adopt, with or without further supplementation, is the granting of a license to construct the Yucca Mountain geologic repository. NRC has not yet taken said proposed action. Notwithstanding DOE's arguments to the contrary, which foregoing sections of this reply have shown to be

without merit, WHI-NEPA-3 presents new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Therefore, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI would be fully consistent with NRC regulations for implementing NEPA at 10 CFR 51.92(a).

As noted in White Pine County's petition, in determining whether or not to adopt the DOE EIS with or without further supplementation, NRC should be guided by NUREG-1748 ("Environmental Review Guidance for Licensing Actions Associated with NMSS Programs"), which indicates that the use of a regulatory requirement to limit an analysis of impacts is not necessarily appropriate in the context of NEPA. Petition at 33. White Pine County's petition points out that the DOE EIS admits that "In developing the TSPA-LA model for the analysis in this Repository SEIS, DOE took into consideration the regulatory requirements in the proposed EPA and NRC standards to provide a perspective on potential radiological impacts during the postclosure period. For this SEIS, DOE based the analyses on the TSPA-LA model that serves as the basis for the compliance assessment included in DOE's application to the NRC for constriction and authorization and a license to receive and possess radioactive materials at the repository." Petition at 33. Here, DOE admits that its analysis presented in the EIS is limited in scope to that required to satisfy NRC and EPA regulations. As discussed previously in this reply and in County's petition, the eruptive-scenario evaluated in the LA-SAR does not report any consideration of the transport of contaminated ash to White Pine County,

located northeast of the Yucca Mountain site. Instead, the analysis is focused entirely on the effects of the RMEI location in Amargosa Valley, south of the Yucca Mountain site. Petition at 34. In its answer to WHI-NEPA-3, DOE has not taken issue with the application of NUREG-1748 as an indicator of an inappropriate regulation-based limitation placed by DOE on the scope of analysis within the DOE EIS. A finding by the Board that the DOE inappropriately limited the scope of analysis within the DOE EIS to that considered to satisfy proposed EPA and NRC regulations and that DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI would be fully consistent with NRC guidance for implementing NEPA contained in NUREG-1748.

DOE does however assert that White Pine County's reliance on NUREG-1748 is unwarranted. DOE's Response at 59. Because NUREG-1748 was relied upon in part by NRC staff in reaching its conclusion that it was practicable to adopt the DOE EIS with supplementation, and because White Pine County's reliance upon NUREG-1748 follows that of NRC staff, and because DOE has already agreed, based upon the NRC staff recommendation, to supplement the DOE EIS, White Pine County finds DOE's criticism of County's reliance upon NUREG 1748 to be unwarranted. In fact, the NRC staff adoption determination report states:

> The NRC staff concludes that the information provided in the EISs does not adequately characterize how potential contaminants may affect groundwater resources in the volcanic-alluvial aquifer, and the potential effects from surface discharge. In the EISs, impacts on groundwater are discussed principally as those defined for regulatory compliance. NRC's NEPA regulations in Part 51 and guidance in NUREG-1748 indicate that compliance with

> regulatory requirements does not necessarily satisfy the need to consider the environmental impacts of the proposed action. The regulations and guidance recognize that further analysis and discussion may be needed [e.g., 10 CFR § 51.71; 10 CFR Part 51, Subpart A, Appendix A(7)]. For impacts on groundwater and from surface discharge, the staff concludes that additional analysis is necessary and EIS supplementation is needed.

U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain, (NRC September 5, 2008), p. 3-10 [LSN # NRC000029699]

White Pine County's petition and supporting contentions conclude similarly that the DOE EIS analysis of the impacts of a DOE postulated volcanic eruption has been limited to that analysis defined for compliance and as a consequence has not addressed the significant and new information regarding impacts of radiologically contaminated tephra and volcanic gas in White Pine County and other downwind areas.

DOE also asserts that the County "does not demonstrate that the types of measures discussed in the NUREG are comparable to those sought in the contention." DOE's Response at 59. The types of mitigation measures discussed in NUREG-1748 are those precisely described within CEQ regulations for implementing NEPA. White Pine County would expect any DOE and NRC consideration of mitigation within any further supplementation of the DOE EIS to comply with CEQ regulations as they pertain to mitigation. NUREG-1748, states:

> Mitigation measures that could reduce adverse impacts should be incorporated in the proposed action and alternatives (40 CFR 1502.14(f) and 1508.20). The mitigation measures discussed in the EIS must cover the range of impacts of the proposal. The measures must include such things as design alternatives that would decrease pollution emissions, construction impacts, esthetic intrusion, as well as relocation assistance, possible land use controls that could be enacted, and other possible efforts.

> Mitigation measures must be considered even for impacts that by themselves would not be considered "significant." If the proposed action as a whole is considered to have significant effects, all of its specific effects on the environment (whether or not "significant") must be considered, and mitigation measures must be developed where it is feasible to do so (CEQ, 1981). Mitigation measures should be tangible and specific. For example, mitigation measures that avoid, minimize, rectify, reduce over time, or compensate are tangible as opposed to measures that include activities such as further consultation, coordination, and study. A more detailed synopsis is provided in "The NEPA Book," (Bass, Herson, and Bogdan, 2001).
> All relevant, reasonable mitigation measures that could improve the project should be identified, even if they are outside the jurisdiction of the NRC. The probability of the mitigation measures being implemented and the time line for their implementation should also be discussed for both NRC activities and activities under the jurisdiction of another agency.
> NUREG 1748, p.5-25

Again, as a contention of omission, White Pine County can not be held responsible in its defense of WHI-NEPA-3 for completing the very analysis and information that the County argues was omitted and must be incorporated through further supplementation of the DOE EIS. It is the County's burden to show that said omission has occurred and that the omitted information is a significant public health or environmental issue. The information which WHI-NEPA-3 asserts has been omitted can be found nowhere in the DOE EIS and its supporting documents. It is the responsibility of NRC to ensure that, if warranted, said omission is cured through further supplementation of the DOE EIS. The technical and factual basis in White Pine County's motion proves that radiation contaminated tephra deposition is a significant public health and environmental issue which DOE has omitted from the EIS. Because the information contained in WHI-NEPA-3 and described above presents a significant public health and environmental issue it must be addressed in greater detail through further review.

Pursuant to NEPA, and CEQ and NRC regulations for implementing NEPA, a discussion of measures to mitigate relevant impacts should be companion to further supplemental analysis within the DOE EIS to address the environmental and public health consequences of tephra deposition in White Pine County and other downwind areas.

B. WHI-NEPA-3 Does Not Represent a Potential Battle of the Experts

There is no "battle of the experts" in this case because the DOE EIS has omitted any analysis or consideration of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI. In a final act of desperation, DOE plays the "battle of the experts" trump card in an attempt to fend off the likely conclusion of the Board that White Pine County's extensive factual and technical evidence is supported by qualified experts. With regard to WHI-NEPA-3, DOE states in its answer, "[a]ccordingly, a NEPA contention such as this one that is premised on a disagreement between an intervener's expert and DOE's expert analysis in an EIS, does not create a triable issue and should not be admitted." DOE's Response at 59. Because DOE has clearly omitted from the DOE EIS any analysis or consideration of the environmental and public health consequences of radioactive tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI and related mitigation of said consequences, there can not possibly be, and there is not any disagreement between White Pine County's experts and DOE's expert analysis in the DOE EIS. As noted by Dr.

Geist "White Pine County is down prevailing wind from Yucca Mountain, and that is by far the most important consideration. Unfortunately, the computer simulations (ASHPLUME code) reported in the SAR and Sandia's more detailed 2007 report are truncated beyond Forty-Mile Wash". Petition, Attachment 2. In fact, at no point within its response does DOE deny that it has omitted any analysis or consideration of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI and mitigation of said consequences. With regard to the admissibility of WHI-NEPA-3, there is no merit or applicability to the disingenuous "battle of the experts" argument put forth by DOE.

C. WHI-NEPA-3 Contains All Requisite Supporting Facts, Expert Opinion and References

For the reasons discussed above with respect to the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v), WHI-NEPA-3 succeeds in providing the requisite supporting facts, expert opinion and references. DOE's answer falls far short of proving that WHI-NEPA-3 is non-compliant with the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v).

D. WHI-NEPA-3 Exposes the Existence of a Genuine Dispute on a Material Issue of Law or Fact

As substantiated above, WHI-NEPA-3 clearly describes an omission of significant and substantial new information or new consideration that would render the FEIS and SFEIS impractical for adoption by NRC without additional supplementation.

Because DOE disagrees with the addition of further supplementary information to the DOE EIS, a genuine dispute on a material issue of law or fact does exist.

IV. CONTENTION WHI-NEPA-4 IS ADMISSIBLE

A. WHI-NEPA-4 and Its Supporting Affidavits Address the Mandatory Requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309

Contention WHI-NEPA-4 alleges that it is not practicable to adopt the DOE EIS because of the DOE EIS omits any discussion of means to mitigate adverse the environmental and public health of atmospheric transport of radionuclides in volcanic gases originating from a volcanic eruption through the Yucca Mountain repository for the RMEI and in White Pine County and other downwind areas. Petition at 38. DOE and Staff take issue with the extent to which WHI-NEPA-4 addresses the requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309. WHI-NEPA-4 and its supporting affidavits address the mandatory requirements of 10 C.F.R § 51.109, 10 C.F.R § 2.326 and 10 C.F.R § 2.309.

1. WHI-NEPA-4 Fully Complies with the Express Requirements of 10 C.F.R § 51.109

While DOE asserts that WHI-NEPA-4 does not comply with 51.109 DOE fails to provide any factual support for this article. WHI-NEPA-4 is accompanied by the affidavit and related technical documentation of Dr. Dennis Geist. 10 C.F.R § 51.109(a)(2) requires that any party contending that it is not practicable to adopt the DOE environmental impact statements must file a contention accompanied by an affidavit setting forth the factual and or technical/basis for the claim. The affidavit and included technical documents of Dr. Geist included in WHI-NEPA-4 clearly set forth the required

technical/factual basis for White Pine County's claim. (Petition, Attachments 1 and 2. Therefore, WHI-NEPA-4 therefore meets the requirement of 10 C.F.R § 51.109(a)(2). WHI-NEPA-4 provides substantiated evidence that the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the Reasonably Maximally Exposed Individual (RMEI) and in White Pine County and other downwind areas and mitigation of said consequences, were omitted from consideration in the DOE EIS and said consequences represent "significant and substantial new information or new considerations" that render the DOE EIS inadequate without further. WHI-NEPA-4 therefore meets the requirement of 10 C.F.R § 51.109(c)(2).

2. WHI-NEPA-4 Fully Complies with the Express Requirements of 10 C.F.R § 2.326

WHI-NEPA-4 raises a "significant environmental issue" supported by a factual and technical basis as required by 10 C.F.R § 2.326(a)(2).WHI-NEPA-4 concludes that DOE has postulated as a credible volcanic eruption intersecting the Yucca Mountain repository. Petition at 38. WHI-NEPA-4 offers evidence supported by affidavit, including a related technical report, of a qualified volcanologist that if such a volcanic event were to occur, the contribution of volcanic gases on atmospheric transport of radionuclides may be significant. Petition at 34; Petition Attachment 2. White Pine County's expert volcanologist further concludes that reasonable estimates for ash deposition in White Pine County on the basis of experience with actual eruptions similar to that postulated by DOE in the Repository FSEIS range from 20 to 1000gm/$m^{2.}$ Petition, Attachment 2. This compares to estimates of deposition of tephra at the RMEI location utilized by DOE in the TSPA-LA of 0.02 gm/m^2. As shown in Figure 6.5-14 of the TSPA-LA, the DOE estimate of the annual dosage from the primary tephra fallout at the RMEI location is 4 x

10^{-6} mrem. TSPA-LA at F6.5-14) Assuming the estimates of tephra deposition rates in White Pine County stated above, and a linear relationship between tephra mass and dosage, one anticipates annual dosages of 0.004 to 0.2 mrem from primary ash deposition in White Pine County, many times greater than that predicted by DOE for the RMEI and disclosed in the DOE EIS. Petition, Attachment 2. Dr. Geist provides analogous evidence from his scientific experience with studying tephra redistribution and concentration in the Pacific Northwest as a basis for concluding that such mechanisms may increase these dosages by 100-fold. Petition, Attachment 2. In the technical report which accompanies his affidavit, Dr. Geist, concludes, based upon analogous volcanic events, that acidic fumes (Vog) routinely are carried 200 km downwind from the volcanic vent in Kilauea, Hawaii. Petition at 42. Accordingly, DOE's assertion that White Pine County's expert has failed to set forth the required factual and/or technical bases is unfounded. DOE's Response at 62.

WHI-NEPA-4 meets the requirements of 10. C.F.R. § 2.326(a)(3) because if true a materially different result would be likely (from the result wherein NRC adopts the DOE EIS without any requirement for supplementation beyond that already recommended by Staff). Specifically, NRC would have to reach a conclusion that it would only be practicable to adopt the DOE EIS with additional supplementation to that already recommended by Staff.

WHI-NEPA-4 meets the requirement of 10 C.F.R. § 2.326(b). WHI-NEPA-4 is supported by affidavits, given by competent individuals with knowledge of the facts and expertise in volcanism and/or NEPA compliance that set forth the factual and/or technical basis for White Pine County's claims of omission and significance. Therefore, the

contention meets the requirement of 10 C.F.R. § 2.326(b). Because both the DOE and Staff appear to lack any substantive technical basis to debase WHI-NEPA-4, both DOE and Staff expend considerable verbiage in their answers seeking to disqualify White Pine County's important issue on the basis of technicalities surrounding the legitimacy of affidavits proffered by the County. Principal among various complaints, both DOE and Staff asserts that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b)".

DOE argues that "neither expert provides the analysis that is explicitly called for by the terms of § 2.326(b). (DOE's Response at 62) WHI-NEPA-4 simply contends that the DOE EIS omits any discussion of means to mitigate adverse the environmental and public health of atmospheric transport of radionuclides in volcanic gases originating from a volcanic eruption through the Yucca Mountain repository for the RMEI and in White Pine County and other downwind areas. Petition at 38. The White Pine County proffered affidavits of both Dr. Geist (an expert in volcanism) and Dr. Baughman (an expert in NEPA compliance) clearly state that upon review of the DOE EIS, both experts determined that the DOE EIS failed to include (and therefore omitted) any discussion of means to mitigate adverse the environmental and public health of atmospheric transport of radionuclides in volcanic gases originating from a volcanic eruption through the Yucca Mountain repository for the RMEI and in White Pine County and other downwind areas. Thus, the affidavits of Dr. Geist and Dr. Baughman conclude factually that the DOE EIS failed to include (and therefore omitted) any discussion of means to mitigate adverse the environmental and public health of atmospheric transport of radionuclides in volcanic gases originating from a volcanic eruption through the Yucca Mountain repository for the

RMEI and in White Pine County and other downwind areas. Dr. Geist, in his affidavit and related technical report, goes a step further in that he provides factual evidence supporting the likely significance of the omitted information to public health and the environment. Accordingly, WHI-NEPA-4 meets the requirement of 10 C.F.R. § 2.326(b).

As a contention of omission, White Pine County can not be held responsible in its defense of WHI-NEPA-4 for completing the very analysis and information that the County argues was omitted and must be incorporated through further supplementation of the DOE EIS. It is the County's burden to show that said omission has occurred and that the omitted information is a significant public health or environmental issue. The information which WHI-NEPA-4 asserts has been omitted can be found nowhere in the DOE EIS and its supporting documents. It is the responsibility of NRC to ensure that, if warranted, said omission is cured through further supplementation of the DOE EIS. The technical and factual basis in White Pine County's motion proves that tephra deposition is a significant public health and environmental issue which DOE has omitted from the EIS. Because the information contained in WHI-NEPA-4 and described above presents a significant public health and environmental issue it must be addressed in greater detail through further review.

DOE questions the qualifications of Dr. Geist and Dr. Baughman to offer the opinions they proffer in their affidavits. With regard to Dr. Geist, DOE challenges his qualifications to "offer speculation on the computer models DOE used to estimate tephra transport". DOE's Response at 62. While Dr. Geist admits he is "not an expert on the computer models" that does not mean that he does not understand the basis of how the model works, its limitations and the interpretation of its output. Petition, Attachment 2 at

2. If DOE's assertion regarding Dr. Geist's expertise were true, than one would also have to conclude that DOE's own volcanologists are not experts in the computer model because they are not expert in the data management software (Microsoft Excel) used by the model. An appropriate analogy would be a NASCAR driver who doesn't understand the engineering of each component of his/her car, but understands how it works and is able to operate it in a professional manner. In fact, nowhere in Dr. Geist's affidavit and related technical report does he offer speculation on the computer models DOE used to estimate tephra transport, beyond what is in DOE's self-assessment of said model. Petition, Attachments 1 and 2.

With regard to Dr. Baughman, DOE asserts that he "fails to present any grounds for concluding that he is an expert in the matters addressed in the contention regarding mitigation of volcanic gas transport of radionuclides". DOE's Response at 62. White Pine County did not retain Dr. Baughman as an expert in mitigation of volcanic gas transport of radionuclides. Rather, Dr. Baughman has been retained by the County owing to his expertise with NEPA and the preparation and review of NEPA compliance documents. The statements in Dr. Baughman's affidavit are clearly limited to his conclusions, based upon his review of the DOE EIS, regarding the omission of information which is the subject of WHI-NEPA-4 from said DOE EIS. DOE's challenge therefore of Dr. Baughman as an expert regarding in mitigation of volcanic gas transport of radionuclides is not relevant. DOE has not challenged Dr. Baughman's expertise regarding NEPA.

Astonishingly, DOE's answer now seeks to imply that the probabilistic assessment of volcanic hazard contained within the SAR and characterized within the DOE EIS includes the assessment of probability regarding volcanic gas transport. DOE's

Response at 65. It is not surprising that DOE's answer provides no reference to where this analysis can be found within the DOE EIS and its supporting documents. In preparing WHI-NEPA-4 and this reply, White Pine County has undertaken an extensive LSN-based search of the DOE EIS; the underlying TSPA-LA; the SAR and all related source documents. This extensive review makes it perfectly clear that while DOE and DOE contractor scientists and others preparing source documents relied upon by DOE and DOE contractor scientists were fully aware that a volcanic eruption at Yucca Mountain would be attended by volcanic gases being emitted into the atmosphere, neither the TSPA-LA, the SAR or the DOE EIS include any explicit consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas, let alone consideration of mitigation of these consequences. The deception that DOE seeks to introduce into the Yucca Mountain licensing proceedings by now suggesting that its TSPA-LA, the SAR or the DOE EIS include any explicit consideration or analysis of the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas is deplorable and should be discounted on its face.

WHI-NEPA-4 is clearly distinct from the re-opening motion in *Pub. Serv. Co. of N.H.* and is therefore not an "out of hand reopening motion" that should be rejected under the standard set in *Pub. Serv. Co. of N.H.* DOE relies upon *Pub.Serv. Co. of N.H.* for the proposition that "the Commission expects its adjudicatory boards to enforce the [section 2.326] requirements rigorously – *i.e.*, to reject out-of-hand re-opening motions that do not meet those requirements within their four corners." DOE Response at 34 (quoting *Pub.*

Serv. Co of N.H. (Seabrook Station, Units 1 and 2) ALAB-915, 29 NRC 427, 432 (1989). In *Pub. Serv. Co. of N.H.* a motion to reopen the record concerning the licensing of the Seabrook Nuclear Facility was denied. Specifically, the adjudicatory board found the motion did not meet the criteria because 1) it only contained the opinion of the petitioner who had not qualified himself as an expert; 2) did not suggest that the petitioner had any formal education or professional experience in the fields of geology, seismology, and earthquake engineering; 3) that the petitioner only had a lay claim as to the knowledge of the facts alleged; and 4) did not supply a sworn affidavit of a qualified expert. WHI-NEPA-4 clearly exceeds these standards. WHI-NEPA-4 contains the opinions of Dr. Geist and Dr. Baughman who are both, based on sworn affidavits, qualified as experts. WHI-NEPA-4 clearly states that Dr. Geist and Dr. Baughman have formal training and professional experience in volcanology and NEPA compliance, respectively. Dr. Geist's knowledge of the facts alleged is based on thorough research and far exceeds a lay opinion. Both Dr. Geist and Dr. Baughman, qualified experts, have supplied sworn affidavits. Therefore, WHI-NEPA-4 is not an out-of-hand reopening motion that should be rejected

3. WHI-NEPA-4 is Material to the Findings that the NRC Must Make

Pursuant to Section 114(f) the Nuclear Waste Policy Act (NWPA) and consistent with (10 CFR § 51.109(c) the Board must "find that it is practicable to adopt any environmental impact statement prepared by the Secretary of energy in connection with a geologic repository proposed to be constructed under Title I of the Nuclear Policy Waste Act of 1982, as amended unless: … (2) [s]ignificant and substantial new information or new considerations render such environmental impact state inadequate". In its answer,

DOE argues that WHI-NEPA-4 does not raise an issue material to the findings NRC must make because White Pine County has failed to demonstrate that DOE's environmental impact analysis violate NEPA. DOE's Response at 64. Because 10 CFR § 51.109(c) does not require NRC to determine whether DOE's environmental impact analysis violate NEPA, DOE's argument here is without merit. More importantly, as discussed above with respect to the requirements of 10 CFR §§ 51.109 and 2.326, WHI-NEPA-4 demonstrates that "significant and substantial new information or new considerations render DOE's environmental impact statement inadequate without further supplementation.

DOE argues that WHI-NEPA-4 "is not material because, in accordance with DOE guidance for preparation of NEPA documents (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002) [LSN# DN2001714520]), the probability of a volcanic eruption at Yucca Mountain that would release radionuclides in volcanic gases is so low that the analysis of the event is not required under NEPA." DOE's Response at 64. This argument is without merit and should be immediately rejected.

First, the document relied upon here by DOE is neither statute nor regulation, has no force of law upon DOE, let alone NRC and is therefore immaterial to establishing compliance with NEPA.

Second, DOE provides no evidence that the guidance has been shown to be legally consistent with, NEPA, DOE implementing regulations regarding NEPA or more importantly, NRC's regulations for implementing NEPA.

Third, DOE fails to mention that the guidance document encourages consideration of a range of accident scenarios including those of a low probability. As stated in the guidance, "The key to informative accident analyses is to develop realistic accident scenarios that address a reasonable range of event probabilities and consequences. The set of accident scenarios considered should serve to inform the decision maker and the public of the accident risks associated with a proposed action and alternatives. DOE should consider accident scenarios that represent the range or spectrum of reasonably foreseeable accidents, including low probability/high consequence accidents and higher probability/(usually) lower consequence accidents." (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]) By limiting its analysis to only the RMEI, DOE has not considered a range of accidents.

Fourth, DOE fails to point out that the guidance document states, "Because one purpose of NEPA analysis is to inform the public, consider analyzing an accident scenario in which the public has expressed a keen interest, even when the scenario is not reasonably foreseeable". (DOE Guidance on NEPA Document Preparation, Recommendations for Analyzing Accidents Under the National Environmental Policy Act (DOE 2002, p. 5 [LSN# DN2001714520])

Finally, DOE fails to point out that the guidance document appears focused in its applicability upon facilities having operational lifetimes of "only several decades" and that "[a]ccident scenarios that have frequencies less than 10^{-6} per year are so unlikely to occur during the life of *such* [emphasis added] facilities that they are generally not important to consider in making decisions about facilities". DOE Guidance on NEPA

Document Preparation, Recommendations for Analyzing Accidents under the National Environmental Policy Act (DOE 2002, p. 9 [LSN# DN2001714520]). The DOE NEPA guidance relied upon by DOE is not even remotely applicable to the Yucca Mountain geologic repository which has a regulatory life of 1 million years.

DOE would now have the Board believe that it was somehow guided by this irrelevant NEPA guidance document during preparation of the DOE EIS and is therefore justified in its omission from the DOE EIS of any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI. In fact, the subject guidance document is not cited within DOE's EIS as a reference relied upon by DOE in preparation of its NEPA compliance documents.

Despite this attempt by DOE to suggest otherwise, as noted in White Pine County's petition, DOE has provided no evidence that its decision to omit any consideration or analysis of the environmental and public health of atmospheric transport of radionuclides in volcanic gases originating from a volcanic eruption through the Yucca Mountain repository for the RMEI and in White Pine County and other downwind areas and mitigation of said was based upon anything more than a decision to simply present in the DOE EIS the same analysis it had prepared for the LA, an analysis limited in geographic scope not by NEPA but by NRC licensing regulations in Part 63. In fact, in DOE's response to White Pine County comments on the Repository DSEIS contained in Volume III of the Repository FSEIS in which the County once again questions the omission of tephra deposition and related environmental and public health consequences in the County, DOE states, "The EPA and NRC regulations that relate to the licensing of

the proposed repository require that DOE's performance assessment must consider all potential pathways of radionuclide transport and exposure for the RMEI. DOE has modified Section S.3.2.1.3 of the SEIS Summary and the introductory section to Chapter 5 to make this clear. The TSPA results in the SEIS consider all potential pathways, including airborne releases. DOE used the same characteristics of the RMEI, including location and lifestyle, for all TSPA calculations…" Petition at 10.

Not surprisingly, DOE's response to White Pine County's comments on the Repository DEIS make no mention of the phantom DOE NEPA guidance document that DOE now seeks to hide behind in defense of its decision to omit significant and substantial new information or new considerations from the DOE EIS. The fact is, DOE has provided no credible evidence to counter White Pine County's claim that DOE has failed, in absolute disregard for NEPA, DOE's NEPA implementing regulations and NRC's NEPA implementing regulations, to consider the environmental and public health consequences of atmospheric transport of radionuclides in volcanic gases for the RMEI and in White Pine County and other downwind areas or that DOE purposefully limited the scope of its analysis regarding a volcanic eruption at Yucca Mountain to the deposition and consequences of radiologically contaminated tephra that DOE narrowly determined was required to comply with NRC regulations at 10 CFR 63.

In asserting that "White Pine County's contention is addressed to such a low frequency accident resulting from a natural phenomenon", DOE has failed to point out that the degree of uncertainty surrounding its own estimates of the annual intersection probability associated with its probabilistic volcanic hazard analysis has grown with the availability of new data. In a January 28, 2009 presentation to the Nuclear Waste

Technical Review Board, Peter Swift, Lead Laboratory Chief Scientist for Sandia National Laboratories reported that based upon new date obtained through DOE's ongoing probabilistic volcanic hazard analysis, the annual intersection probability has nearly doubled from 1.7×10^{-8} to 3.1×10^{-8}. Peter Swift, Sandia National Laboratories, Presentation Handout, pp. 28-29, Nuclear Waste Technical Review Board, January 28, 2009, Las Vegas, Nevada. The fact is, the probabilistic volcanic hazard analysis reported by DOE in the LA and carried forward into DOE's EIS indicates that over the million year regulatory lifetime of the Yucca Mountain repository that the volcanic eruption scenario postulated by DOE is likely to occur, and perhaps not once, but several times. Most importantly, as additional data is becoming available to DOE, the probability of such a volcanic eruption is increasing. For all of the aforementioned reasons, DOE's decision to omit any consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition and related mitigation of said consequences in White Pine County and other downwind areas, other than for the location of the RMEI from the DOE EIS was misguided, inappropriate and as shown below, inconsistent with NEPA and NRC regulations for implementing NEPA.

DOE's attempt to establish a legal basis for its assertions regarding the immateriality of WHI-NEPA-4 fails because the cases cited by DOE (D.C. Circuit in *Transmission Access Policy Study Group v. Fed. Energy Regulatory Comm'n*, 225 F.3d 667, 737 (D.C. Cir. 2000) and 9th Circuit in *City of Carmel-by-the-Sea v. U.S. DOT*, 123 F.3d 1142, 1150 (9th Cir. 1997)) concern consideration of mitigation in NEPA documents for which the consequences of an impact are known. DOE's Response at 66 and 67. Because DOE has omitted any consideration or analysis of the environmental and

public health consequences of radiation contaminated volcanic gas at the location of the RMEI, in White Pine County or in other downwind areas the consequences of radiation contaminated volcanic gases to these areas is unknown.

DOE's argument that "the low probability of a volcanic eruption is also a reasonable rationale for excluding a discussion of mitigation of radiological contaminated tephra" is immaterial to the ruling the board must make in response to WHI-NEPA-4. DOE argues that it "may decline to discuss mitigation measures when it believes the environmental impact of the action will be minor. DOE Response at 39 (Quoting *Transmission Access Policy Study Group v. Fed. Energy Regulatory Comm'n*, 225 F.3d 667, 737 (D.C. Cir. 2000). This argument must fail as WHI-NEPA-4 does not concern the failure of DOE to discuss mitigation measures but rather concerns the complete omission of analysis of tephra deposition in White Pine County. Therefore, this argument is immaterial and the board should not consider it.

Similarly, DOE argues that "NEPA requires only possible mitigation measures to 'be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated.'" DOE Response at 39 (Quoting Circuit in *City of Carmel-by-the-Sea v. U.S. DOT*, 123 F.3d 1142, 1150 (9th Cir. 1997). WHI-NEPA-4 does not concern the detail of mitigation analysis DOE has conducted but rather concerns the complete omission of analysis of tephra deposition in White Pine County. Therefore, this argument is immaterial and the board should not consider it.

In the end, NRC's finding that the DOE EIS can be adopted must be based upon a determination that the documents fully satisfy NRC's independent NEPA requirements. Accordingly, the Board must be guided at first by NEPA itself. NEPA requires "a

detailed statement by the responsible official on … (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented" (42 USC § 4332**,** NEPA Sec 102 1(c)(ii)) The environmental and public health consequences of radiation contaminated volcanic gas at the location of the RMEI, in White Pine County and in other downwind areas is just such an adverse environmental effect which cannot be avoided should the Yucca Mountain project be implemented. Not withstanding DOE's meritless argument to the contrary, a finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of radiation contaminated tephra deposition in White Pine County and other downwind areas, other than for the location of the RMEI and related measures to mitigate said consequences would be clearly consistent with NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be guided by Council On Environmental Quality (CEQ) NEPA implementing regulations which require that an EIS consider "[d]irect effects and their significance (40 CFR Sec. 1508.8(a)) and [i]ndirect effects and their significance (Sec. 1508.8(b)). The deposition of radiologically contaminated tephra in White Pine County and its environmental and public health consequences of said deposition is just such a direct effect. The concentration of said radiologically contaminated tephra in White Pine County and the related environmental and public health consequences of said concentration represents an indirect effect. CEQ regulations also require that the agency include in any EIS the "[m]eans to mitigate adverse environmental impacts…" (Sec. 1502.16(h). A finding by the Board that the DOE EIS must be further supplemented to include consideration or analysis of the environmental and public health consequences of

atmospheric transport of radionuclides in volcanic gases for the RMEI, in White Pine County and in other downwind areas and related measures to mitigate said consequences would be explicitly consistent with CEQ regulations for implementing NEPA.

NRC's decision regarding adoption of the DOE EIS with or without further supplementation must also be consistent with NRC's regulations for implementation of NEPA. NRC's NEPA implementing regulations require that a draft EIS consider "major points of view concerning the environmental impacts of the proposed action and the alternatives, and contain an analysis of significant problems and objections raised by other Federal, State, and local agencies …"(10 CFR 51.71(b)) As described in great detail in White Pine County's Petition, the County has, in its capacity as a Secretary of Energy designated affected unit of local government, over the past 13 years and on numerous occasions brought to DOE's attention County's views with regard to either 1) the need for DOE to address in its NEPA compliance documents volcanism as an atmospheric pathway for radiation exposure in White Pine County or 2) the failure by DOE in its NEPA compliance documents to address volcanism as an atmospheric pathway for radiation exposure in White Pine County. Petition pp. 3-7. Nowhere in DOE's answer to White Pine County's petition does it deny that it has failed to consider the volcanic eruption issues consistently raised by the County during the past 13 years. Rather, DOE's answer collectively seeks to reduce County's concerns to a level of insignificance not worthy of inclusion in DOE EIS. The failure of DOE's EIS to explicitly consider the major points of view and include an analysis of the volcanism issues raised repeatedly by White Pine County is contrary to NRC regulations at10 CFR 51.71(b) for implementing NEPA.

Regulations governing NRC's implementation of NEPA further require that a supplement to a final environmental impact statement will be prepared if the proposed action has not been taken and (1) [t]here are substantial changes in the proposed action that are relevant to environmental concerns; or (2) [t]here are new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. (10 CFR 51.92(a)) The proposed action for the NRC with regard to the DOE EIS the Board may elect to adopt, with or without further supplementation, is the granting of a license to construct the Yucca Mountain geologic repository. NRC has not yet taken said proposed action. Notwithstanding DOE's arguments to the contrary, which foregoing sections of this reply have shown to be without merit, WHI-NEPA-4 presents new and significant circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Therefore, a finding by the Board that the DOE EIS must be further supplemented to include consideration and analysis environmental and public health consequences of radiation contaminated volcanic gas at the location of the RMEI, in White Pine County and in other downwind areas including mitigation of said consequences would be fully consistent with NRC regulations for implementing NEPA at 10 CFR 51.92(a).

As noted in White Pine County's petition, in determining whether or not to adopt the DOE EIS with or without further supplementation, NRC should be guided by NUREG-1748 ("Environmental Review Guidance for Licensing Actions Associated with NMSS Programs"), which indicates that the use of a regulatory requirement to limit an analysis of impacts is not necessarily appropriate in the context of NEPA. Petition at 41. White Pine County's petition points out that the DOE EIS admits that "In developing the

TSPA-LA model for the analysis in this Repository SEIS, DOE took into consideration the regulatory requirements in the proposed EPA and NRC standards to provide a perspective on potential radiological impacts during the postclosure period. For this SEIS, DOE based the analyses on the TSPA-LA model that serves as the basis for the compliance assessment included in DOE's application to the NRC for constriction and authorization and a license to receive and possess radioactive materials at the repository." Petition at 41. Here, DOE admits that its analysis presented in the EIS is limited in scope to that required to satisfy NRC and EPA regulations. As discussed previously in this reply and in County's petition, the eruptive-scenario evaluated in the LA-SAR does not report any consideration of the transport of contaminated volcanic gas to the RMEI, White Pine County or other downwind areas. Petition at 42. In its answer to WHI-NEPA-4, DOE has not taken issue with the application of NUREG-1748 as an indicator of an inappropriate regulation-based limitation placed by DOE on the scope of analysis within the DOE EIS. A finding by the Board that the DOE inappropriately limited the scope of analysis within the DOE EIS to that considered to satisfy proposed EPA and NRC regulations and that DOE EIS must be further supplemented to include consideration and analysis environmental and public health consequences of radiation contaminated volcanic gas at the location of the RMEI, in White Pine County and in other downwind areas including mitigation of said consequences would be fully consistent with NRC guidance for implementing NEPA contained in NUREG-1748.

DOE does however assert that White Pine County's reliance on NUREG-1748 is unwarranted. DOE's Response at 67. Because NUREG-1748 was relied upon in part by NRC staff in reaching its conclusion that it was practicable to adopt the DOE EIS with

supplementation, and because White Pine County's reliance upon NUREG-1748 follows that of NRC staff, and because DOE has already agreed, based upon the NRC staff recommendation, to supplement the DOE EIS, White Pine County finds DOE's criticism of County's reliance upon NUREG 1748 to be baseless. In fact, the NRC staff adoption determination report states:

> The NRC staff concludes that the information provided in the EISs does not adequately characterize how potential contaminants may affect groundwater resources in the volcanic-alluvial aquifer, and the potential effects from surface discharge. In the EISs, impacts on groundwater are discussed principally as those defined for regulatory compliance. NRC's NEPA regulations in Part 51 and guidance in NUREG-1748 indicate that compliance with regulatory requirements does not necessarily satisfy the need to consider the environmental impacts of the proposed action. The regulations and guidance recognize that further analysis and discussion may be needed [e.g., 10 CFR § 51.71; 10 CFR Part 51, Subpart A, Appendix A(7)]. For impacts on groundwater and from surface discharge, the staff concludes that additional analysis is necessary and EIS supplementation is needed.

U.S. Nuclear Regulatory Commission Staff's Adoption Determination Report for the U.S. Department of energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain, (NRC September 5, 2008), p. 3-10 [LSN # NRC000029699]

White Pine County's petition and supporting contentions conclude similarly that the DOE EIS analysis of the impacts of a DOE postulated volcanic eruption has been limited to that analysis defined for compliance and as a consequence has not addressed the significant and new information regarding impacts of radiologically contaminated tephra and volcanic gas in White Pine County and other downwind areas.

DOE also asserts that the County "does not demonstrate that the types of measures discussed in the NUREG are comparable to those sought in the contention."

DOE's Response at 67. The types of mitigation measures discussed in NUREG-1748 are those precisely described within CEQ regulations for implementing NEPA. White Pine County would expect any DOE and NRC consideration of mitigation within any further supplementation of the DOE EIS to comply with CEQ regulations as they pertain to mitigation. NUREG-1748, states:

> Mitigation measures that could reduce adverse impacts should be incorporated in the proposed action and alternatives (40 CFR 1502.14(f) and 1508.20). The mitigation measures discussed in the EIS must cover the range of impacts of the proposal. The measures must include such things as design alternatives that would decrease pollution emissions, construction impacts, esthetic intrusion, as well as relocation assistance, possible land use controls that could be enacted, and other possible efforts. Mitigation measures must be considered even for impacts that by themselves would not be considered "significant." If the proposed action as a whole is considered to have significant effects, all of its specific effects on the environment (whether or not "significant") must be considered, and mitigation measures must be developed where it is feasible to do so (CEQ, 1981). Mitigation measures should be tangible and specific. For example, mitigation measures that avoid, minimize, rectify, reduce over time, or compensate are tangible as opposed to measures that include activities such as further consultation, coordination, and study. A more detailed synopsis is provided in "The NEPA Book," (Bass, Herson, and Bogdan, 2001).
> All relevant, reasonable mitigation measures that could improve the project should be identified, even if they are outside the jurisdiction of the NRC. The probability of the mitigation measures being implemented and the time line for their implementation should also be discussed for both NRC activities and activities under the jurisdiction of another agency.
> NUREG 1748, p.5-25

Again, as a contention of omission, White Pine County can not be held responsible in its defense of WHI-NEPA-4 for completing the very analysis and information that the County argues was omitted and must be incorporated through further supplementation of the DOE EIS. It is the County's burden to show that said omission

has occurred and that the omitted information is a significant public health or environmental issue. The information which WHI-NEPA-4 asserts has been omitted can be found nowhere in the DOE EIS and its supporting documents. It is the responsibility of NRC to ensure that, if warranted, said omission is cured through further supplementation of the DOE EIS. The technical and factual basis in White Pine County's motion proves that radiation contaminated volcanic gas is a significant public health and environmental issue which DOE has omitted from the EIS. Because the information contained in WHI-NEPA-4 and described above presents a significant public health and environmental issue it must be addressed in greater detail through further review. Pursuant to NEPA, and CEQ and NRC regulations for implementing NEPA, a discussion of measures to mitigate relevant impacts should be companion to further supplemental analysis within the DOE EIS to address the environmental and public health consequences of radiation contaminated volcanic gas at the location of the RMEI, in White Pine County and in other downwind areas.

B. WHI-NEPA-4 Contains All Requisite Supporting Facts, Expert Opinion and References

For the reasons discussed above with respect to the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v), WHI-NEPA-4 succeeds in providing the requisite supporting facts, expert opinion and references. DOE's answer falls far short of proving that WHI-NEPA-4 is non-compliant with the requirements of 10 CFR 51.109 and 2.326 and 10 CFR 2.309(f)(1)(v).

C. WHI-NEPA-4 Exposes the Existence of a Genuine Dispute on a Material Issue of Law or Fact

As substantiated above, WHI-NEPA-4 clearly describes an omission of significant and substantial new information or new consideration that would render the FEIS and SFEIS impractical for adoption by NRC without additional supplementation. Because DOE disagrees with the addition of further supplementary information to the DOE EIS, a genuine dispute on a material issue of law or fact does exist.

CONCLUSION

For the foregoing reasons, the DOE and Staff objections to the admission of WHI-NEPA-1, WHI-NEPA-2, WHI-NEPA-3 and WHI-NEPA-4 are without merit. Accordingly, WHI-NEPA-1, WHI-NEPA-2, WHI-NEPA-3 and WHI-NEPA-4 should be admitted and White Pine County's petition for intervener status should be granted.

DATED this _____ day of February, 2009.

Respectfully submitted,
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DATED this 23rd day of February, 2009.

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