UNITED STATES
NUCLEAR REGULATORY COMMISSION

In re: **U.S. Department of Energy's Application for Authorization to Construct a Geologic Repository at Yucca Mountain, Nevada**	**Docket No. 63-001**

TIMBISHA SHOSHONE TRIBE'S PETITION FOR LEAVE TO INTERVENE IN THE HEARING

INTRODUCTION

I. IDENTIFICATION OF PETITIONER AND BASIS FOR STANDING

The Timbisha Shoshone Tribe of California ("Tribe" or "TST") hereby petitions for leave to intervene in the hearing on the Department of Energy's ("DOE") application for authorization to construct a geologic repository at Yucca Mountain, Nevada. (Docket number 63-001.).

DOE has not fully or properly analyzed the effect of the location of the proposed permanent nuclear waste repository and its close proximity to the Tribe's reservation and special use lands (collectively "Homeland"), as defined under the Timbisha Shoshone Homeland Act of November 1, 2000 ("Homeland Act").

DOE has not fully or properly analyzed the potential risks for groundwater contamination of the Tribe's reservation and special use lands as a result of high-level radioactive disposal at Yucca Mountain. Further, the DOE has not adequately analyzed the impact of emergency response vehicles traveling through or near the Tribe's Homeland, as well as the impact of rail and highway transport routes through or adjacent to tribal land.

DOE proposes to send hundreds of trains and trucks full of radioactive waste from other states through or adjacent to the Tribe's Homeland without first fully and properly analyzing the risks posed by such routes. It is unknown, what, if any, analysis DOE will perform in the future to comply with the National Environmental Policy Act (42 U.S.C. § 4321 et seq.) ("NEPA"). DOE has not committed itself to any future NEPA analysis of the environmental impacts on specific routes prior to starting shipments to the repository. DOE's license application and environmental documents also fail to fully and properly analyze the risk to the Tribe's groundwater resources from the repository. Proceeding with the project in the manner described

by DOE presents a threat to the Tribe, its natural resources, its Homeland, its self-governance, its economic and cultural resources, and its political and cultural integrity. NRC may not approve DOE's license application unless DOE provides an adequate environmental analysis that analyzes and mitigates these threats to the Tribe.

A. Standing as a Matter of Right [10 C.F.R. § 2.309(d)]

1. The name, address and telephone number of the requestor or petitioner [10 C.F.R. § 2.309(d)(1)(i)]

The Timbisha Shoshone Tribe of California (hereinafter "Tribe") seeks to intervene in the above-captioned proceeding. The Tribe's address is 1349 Rocking W Drive, Bishop, California 93541. The Tribe's telephone number is (760) 872-3614. The Tribe is represented in this proceeding by the following individuals:

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Darcie L. Houck is designated as the single representative for the hearing.

2. The nature of the requestor's/petitioner's right under the Act to be made a party to the proceeding [10 C.F.R. § 2.309(d)(1)(ii)]

The Nuclear Regulatory Commission ("Commission" or "NRC") must grant a hearing upon the request of a person whose interest may be affected by a proceeding for the granting of a license or construction permit and must admit any such entity as a party to the proceeding. 42 U.S.C. § 2239; 42 U.S.C. § 2014(s). A person means "(1)...any political entity within a State, any foreign government or nation or any political subdivision of any such government or nation,

or other entity." 42 U.S.C. § 2014(s). In its notice of hearing, NRC explained the scope of the proceeding as follows:

> The matters of fact and law to be considered are whether the application satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC's standards in 10 CFR Part 63 for a construction authorization for a high-level waste geologic repository, and also whether the applicable requirements of the National Environmental Policy Act (NEPA) and NRC's NEPA regulations, 10 CFR Part 51, have been met.

Notice of Hearing and Opportunity to Petition for Leave to Intervene, 73 Fed. Reg. 63029 (Oct. 22, 2008).

NRC's standing requirements specifically contemplate that a affected federally-recognized Tribe may intervene in the licensing proceeding to protect its interests, even if the facility in question is not within its reservation or tribal land boundaries. 10 C.F.R. § 2.309(d)(2) (" . . .any affected federally-recognized Tribe that desires to participate as a party in the proceeding shall submit a request for hearing/petition to intervene. The request/petition must meet the requirements of this section . . . except that a[n]. . .affected federally-recognized Tribe that wishes to be a party in a proceeding for a facility located within its boundaries need not address the standing requirements under this paragraph."). As described below, the Tribe's interests are affected by this proceeding and it must therefore be permitted to intervene.

The Tribe petitioned the Department of the Interior ("DOI") for affected Indian Tribe ("AIT") status in April of 2001 and subsequently amended their petition in February 2006. The DOI, Assistant Secretary – Indian Affairs Carl J. Artman issued a decision on June 29, 2007 formally granting AIT status to the Tribe, stating in part: "The Yucca Mountain high-level radioactive disposal site will be a major tribal concern for the potential adverse health, safety, and environmental impacts...that may be generated as a result of the [Yucca Mountain

repository] location....Therefore, the Department of the Interior, in accordance with section 2(2)(B) of the [Nuclear Policy Waste] Act [of 1982] ["NPWA"], certifies that the Timbisha Shoshone Tribe may be substantially and adversely affected by the proposed geologic repository at Yucca Mountain, Nevada, and is an "affected Indian tribe" for purposes of the Act." Letter from Department of the Interior, Assistant Secretary – Indian Affairs Carl J. Artman to Chairman of Timbisha Shoshone Tribe, June 29, 2007 at page 4 ("Artman letter").

In its letter, Assistant Secretary Carl. J. Artman stated that in order for the Tribe to be granted AIT status under the NPWA, the Tribe must satisfy three conditions: (1) the Tribe must meet the definition of Indian tribe in accordance with 10 C.F.R. § 60.2; (2) the Tribe must possess either Congressionally ratified treaty rights or other Federal legal rights to lands outside the boundaries of its reservation; and (3) the Assistant Secretary – Indian Affairs must find that these rights may be substantially and adversely affected by the location of a high-level nuclear waste repository at Yucca Mountain. Artman letter at 2. The Assistant Secretary determined the Tribe satisfies the definition of "Indian tribe" as defined in 42 U.S.C. § 10101(15) because the Tribe is eligible for services provided to Indians by the Secretary of the Interior because of its status as a Tribe. *Id* at 3. The Assistant Secretary further determined that the Tribe satisfies the second criterion based on its rights to its Homeland conferred by the Homeland Act. *Id* at 3-4. Finally, the Assistant Secretary determined these rights may be substantially and adversely affected by the location of the proposed geologic repository at Yucca Mountain. *Id* at 4.

The Tribe, as an affected Federally-recognized Tribe, has a right to intervene in the proceeding.

3. The nature and extent of the requestor's/petitioner's property, financial or other interest in the proceeding [10 C.F.R. § 2.309(d)(1)(iii)]

The nature and extent of the Tribe's property, financial and other interests in the proceeding arise from its inherent sovereign rights to protect its ancestral homelands occupied since time immemorial but also arise out of the Timbisha Shoshone Homeland Act of November 1, 2000.

i. The Timbisha Shoshone Homeland Act

The Homeland Act provides that the Tribe receive the following land:

(A) Furnace Creek, Death Valley National Park, California, an area of 313.99 acres for community development, residential development, historic restoration, and visitor-related economic development, together with 92 acre feet per annum of surface and ground water for the purposes associated with the transfer of such lands;

(B) Death Valley Junction, California, an area of approximately 1,000 acres, as generally depicted on the map entitled 'Death Valley Junction, California,' together with 15.1 acre feet per annum of ground water for the purposes associated with the transfer of such lands;

(C) Centennial, California, an area of approximately 640 acres, together with an amount of ground water not to exceed 10 acre feet per annum for the purposes associated with transfer of such lands;

(D) Scotty's Junction, Nevada, an area of approximately 2,800 acres, together with 375.5 acre feet per annum of ground water for the purposes associated with the transfer of such lands; and

(E) Lida, Nevada, an area of approximately 3,000 acres, together with 14.7 acre feet per annum of ground water for the purposes associated with transfer of such lands.

Timbisha Shoshone Homeland Act of November 1, 2000, 16 U.S.C. § 410aaa, P.L. 106-423.

The Homeland Act also provides that a Timbisha Shoshone Natural and Cultural Preservation Area would be designated within the Park which would encompass areas of cultural and traditional importance to the Tribe. Other special use areas were identified within the Park

and outside on Bureau of Land Management (BLM) lands and said designated areas will be co-managed by the Tribe and the respective federal agency having jurisdiction over the area.

With the passage of the Homeland Act comes the federal government's trust responsibility to ensure the Tribe's Homeland is protected from nuclear waste and that tribal water sources are not contaminated. Much of the Tribe's Homeland recognized and provided through the Homeland Act is situated in close proximity to Yucca Mountain. This land may be substantially and adversely impacted by site characterization and repository activities at Yucca Mountain.

ii. The Tribe's property, financial, and other interests in the proceeding

In order to protect the interests of its people and lands, it is critical for the Tribe to participate in all aspects of the Yucca Mountain review process as a party to the proceeding. The Tribe must be able to present its specific interests in protecting its Homeland, and information concerning the potential for substantial and adverse impacts to its resources. In order for the Tribe to effectively participate in the review process it must have access to technical information and resources to obtain adequate data and training regarding the areas of potential impact. The potential for transportation route accidents pose a significant risk that will require analysis and resources for emergency response equipment and training and the Tribe is entitled to voice its results f in this proceeding.

The Tribe's historic Homeland have been identified by Congress as the sole site to be investigated as a host territory for a federal geologic repository at Yucca Mountain. President Bush, in 2002, submitted his recommendation to Congress that Yucca Mountain be approved as the site for a federal geologic repository. The Tribe, as well as the Federal government have a responsibility to preserve and protect the Tribe's Homeland and its possessory and usage rights of this land within the area that may be substantially and adversely impacted by the siting of Yucca Mountain.

The Tribe has an interest in maintaining the ongoing historic and political relations with the United States. The Tribe has an interest in protecting tribal self-governance and preventing the interference of its rights, whether direct or indirect, caused from impacts associated with site characterization activities at Yucca Mountain.

The Tribe has an interest as a party to the proceeding in order to insure protection from pre-closure impacts and post-closure impacts of the proposed repository at Yucca Mountain. Some of these adverse impacts include possible contamination of groundwater/drinking water sources, radioactive releases, rail and highway transport routes through or adjacent to the Tribe's Homeland, and economic loss. In order to ensure that these risks are limited, the Tribe needs to: collect data; provide emergency response resources and training; ensure that proper evacuation and radioactive decontamination processes are in place; have access to consultation with DOE and other affected governments on an equal basis; and most importantly, present its findings to the Commission in this proceeding.

As a party to the proceeding, the Tribe has an interest in ensuring appropriate tribal cultural issues are taken into consideration. In order for DOE to fully consider the potential impacts the repository may have on cultural resources, the Tribe must have a full seat at the table. Understanding the tribal community life-ways is crucial to identifying possible future threats that the Yucca Mountain project poses to the Tribe and its people. The Tribe's voice and cultural input on the Yucca Mountain project will be fully addressed in the event the Tribe is able to participate in the proceeding.

The Tribe represents a jurisdiction of sovereign territory that clearly may be substantially and adversely impacted by the siting of Yucca Mountain. The Tribe's land faces the threat of contamination of groundwater/drinking water sources, radioactive releases, rail and highway transport routes through or adjacent to the Tribe's Homeland, and economic loss. The Tribe has a duty to protect its resources, and to do this it must participate in the proceeding to present its concerns regarding the Yucca Mountain proposal. The Tribe's participation and oversight of activities conducted at Yucca Mountain is necessary to ensure confidence by the Tribe and its members in the safe construction, operation, and transport of nuclear waste to the facility.

The need for a tribal voice on the Yucca Mountain project is exemplified by Executive Order 12898, Federal Action to Address Environmental Justice in Minority Populations and Low- Income Populations. Under this Order new opportunities for public participation of minority, low-income, and subsistence lifestyle populations were opened in order to address environmental justice issues. Until the implementation of Executive Order 12898, Federal agencies were without specific direction or policy on how to ensure that low-income and minority populations were considered or given fair treatment when development of Federal projects or the management of Federal programs were considered. Prior to Executive Order 12898 decisions about where to locate hazardous nuclear facilities were being made by scientific experts and government decision-makers without the benefit of tribal leadership input. The past policy placed a disproportionate burden upon tribal and other minority communities which resulted in grave environmental consequences. This past policy of not considering the disproportionate burden placed on low-income and minority populations when establishing hazardous dumps is commonly known as "environmental racism."

DOE and the Secretary have failed to implement Executive Order 12898 in the development of Yucca Mountain. The Yucca Mountain project places a disproportionate burden upon the Tribe and other Indian Tribes in the area. The Tribe is an unwilling host of the proposed high-level nuclear waste repository. The Tribe is entitled to full and equal participation in the proceeding given that the Tribe's Homeland will be impacted by the development of Yucca Mountain. The DOE has created an internal Consolidated Group of Tribes to comment on the Yucca Mountain project consisting of individuals and DOE contractors and employees in an effort to avoid a direct consultation in violation of the United States policy of government-to-government relations. The Tribe faces potential significant and adverse impacts to its Homeland and is entitled to direct consultation and full participation in the review and licensing of Yucca Mountain.

The Tribe has an interest in protecting its members, economy, and natural resources from hazards posed by radioactive waste. The health and safety of The Tribe's members and the vitality of its economic and natural resources are threatened by the issuance of a license for Yucca Mountain without sufficient analysis and mitigation of the impacts of the repository on the Tribe. The threats to the Tribe that must be analyzed and mitigated are discussed in greater detail contentions set forth below. In general, however, the threats to the Tribe interests are of two types: those threats posed by transportation of radioactive waste through or adjacent to the Tribe's Homeland from sites within and outside of California, and those threats posed by the migration of radioactive material from the repository into the Tribe's groundwater. In addition to these substantive threats to the Tribe's interests, the Tribe has a legal and procedural interest in being provided with a proper environmental impact analysis as required by NEPA and in having the licensing decision made by a fully informed Commission.

DOE has not conducted sufficient analysis or provided sufficient evidence that such shipments will be conducted in the safest manner. If the license is granted, the Tribe's crucial groundwater resources will also be threatened. That the threatened injuries will occur in the future, not today, is no bar to standing. *In the Matter of Yankee Atomic Electric Company (Yankee Nuclear Power Station)*, 48 N.R.C. 185, 195 (1998) (explaining that for standing analysis, "The injury may be either actual or threatened.") (citing *Wilderness Society v. Griles*, 824 F.2d 4, 11 (D.C. Cir. 1987)).

The Tribe is a proper party to assert the interests of its members as well as to safeguard its own property and its ability to protect the health and welfare of its people and natural and economic resources. *Massachusetts v. Environmental Protection Agency*, 127 S.Ct. 1438, 1454, 549 U.S. 497(2007) (stating that in its capacity of "quasi-sovereign" "the State has an interest

independent of and behind the titles of its citizens, in all the earth and air within its domain. It has the last word as to whether its mountains shall be stripped of their forests and its inhabitants shall breathe pure air." Similarly, the Tribe, as an independent sovereign, has a "well-founded desire to preserve its sovereign territory today." *Id.*) (quoting *Georgia v. Tennessee Copper Co.*, 206 U.S. 230, 237 (1907)); *Alfred L. Snapp & Son, Inc. v. Puerto Rico ex rel Barez*, 458 U.S. 592, 602 & 607 (1982) ("[A] State has a quasi-sovereign interest in the health and economic well-being – both physical and economic – of its residents in general".) In addition, with respect to this licensing decision, Congress and NRC have granted affected Federally-recognized Tribes the procedural opportunity to protect their rights. 42 U.S.C. § 2239; 10 C.F.R. § 2.309(d)(2). The provision of this procedural right and the Tribe's stake in protecting its sovereign interests entitles the Tribe to "special solicitude" in standing analysis. *Massachusetts v. EPA*, 127 S.Ct. at 1454-55.

The transportation threats to the Tribe arise from transportation from California facilities to the repository and transportation of waste from sites around the United States through or adjacent to the Tribe's Homeland en route to the repository. The first type of transportation risk relates to DOE's failure to analyze or mitigate the risks posed by loading and transporting radioactive waste at California sites. California has two sets of operating nuclear plants, Diablo Canyon Units 1 and 2, and San Onofre Units 2 and 3. There are also three decommissioned nuclear plants in California that currently store nuclear waste, namely Humboldt, Rancho Seco, and San Onofre Unit 1.

The second transportation risk arises from the hundreds or thousands of radioactive waste casks that will enter pass through or adjacent to the Tribe's Homeland from other states en route to the repository. DOE's environmental documents discuss the localized impacts of the

construction of the Mina or Caliente rail lines in Nevada. DOE understood that it needed to fully and specifically analyze environmental impacts from transportation in the state where the repository is located, yet it illogically did not do this analysis for the likely transportation routes in the rest of the country, and specifically did not address impacts to tribal lands. By looking only at fatalities from cancer, exposure to vehicle emissions, and traffic accidents outside of Nevada, DOE concluded that variations in the routing of waste to Yucca Mountain will not have significant impacts. DOE failed to analyze any other type of risk from transportation outside of Nevada, such as whether certain routes through or adjacent to the Tribe's Homeland pose greater or lesser risk of accident or sabotage and how those risks can be mitigated through routing or emergency response. Thus, DOE's environmental documents do not sufficiently analyze the impacts on the Tribe of these shipments and are inadequate to serve as the basis for construction authorization.

In fact, however, the impacts on the Tribe could easily be much greater than estimated by DOE because routes other than DOE's computer model's "representative routes" may take far more radioactive waste through or adjacent to the Tribe's Homeland compared to what DOE projected. DOE's alternative computer simulation with "constraints in the rail network that illustrate another way the railroads might route shipments" show the potential for greater impacts than what DOE addressed. Repository SEIS, at pp. A-5 to A-7.

DOE's environmental documents do not discuss the relative risks between routes that may pass through or adjacent to the Tribe's Homeland, nor do they discuss mitigation measures that should be taken to reduce transportation risks. These documents do not comply with NEPA and therefore cannot serve as the basis for the grant of the license. Furthermore, these

unanswered questions about the safety of transportation through California prevent NRC from making the safety findings necessary to issue the license.

Finally, the Tribe and its members have a legal and procedural interest under NEPA to be informed of the environmental impacts of NRC's licensing decision and to have NRC's make its decision after considering all relevant environmental, health, and safety information and economic interest. NEPA requires all federal agencies to examine environmental impacts that could be caused by their discretionary actions. The Supreme Court has identified NEPA's twin aims as (1) obligating a federal agency to consider every significant aspect of the environmental impact of a proposed action and (2) ensuring that the federal agency will inform the public that it has indeed considered environmental concerns in its decision-making process. *Baltimore Gas & Elec. Co. v. Natural Resources Defense Council*, 462 U.S. 87, 97 (1983); *see also* 42 U.S.C. § 4332(2)(c) (identifying requirements of an EIS).

Under NEPA, an environmental impact statement ("EIS") must "set forth sufficient information for the general public to make an informed evaluation . . . and for the decision maker to consider fully the environmental factors involved and to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the proposed action." *Sierra Club v. United States Army Corps of Engineers*, 701 F.2d 1011, 1029, n.18 (2d Cir. 1983). An EIS must permit those who do not participate in its preparation to understand and consider meaningfully the reasoning, premises, and data relied upon, and to permit a reasoned choice among different courses of action. *See Friends of the River v. FERC*, 720 F.2d 93, 120 (D.C. Cir. 1983). NEPA requires that an EIS contain a reasonably thorough discussion of the significant aspects of the probable consequences of an action. *Oregon Natural Resources Council v. Lowe*, 109 F.3d 521, 526 (9th Cir. 1997). The Tribe's contentions identify

numerous inadequacies in DOE's environmental documents that make them inadequate under NEPA and therefore not practicable for adoption by DOE.

4. The possible effect of any decision or order that may be issued in the proceeding on the requestor's/petitioner's interest. [10 C.F.R. § 2.309(d)(1)(iv)]

NRC's decision on DOE's license application will determine whether hundreds or thousands of shipments of radioactive waste will travel through or adjacent to the Tribe's Homeland on the way to Yucca Mountain on routes of unknown danger. If NRC grants the license, radioactive waste destined for Yucca Mountain will travel through or adjacent to the Tribe's Homeland; if NRC does not grant the license, those shipments will not occur.

These risks are currently unknown because DOE did not fulfill its obligation to analyze them and determine what are the safest routes and modes of transport through or adjacent to the Tribe's Homeland, nor did it propose mitigation measures to protect the Tribe's resources and its members. Likewise, DOE failed to analyze the repository's threat to the Tribe's groundwater or propose how to mitigate it. See *Foundation for North American Wild Sheep v. U.S. Dept of Agriculture*, 681 F. 2d 1172, 1179 (9th Cir. 1982) ("the very purpose of NEPA's requirement that an EIS be prepared for all actions that may significantly affect the environment is to obviate the need for . . . speculation by insuring that available data is gathered and analyzed prior to the implementation of the proposed action."); *Sierra Club v. U.S. Forest Service*, 843 F.2d 1190, 1195 (9th Cir. 1988) ("The purpose of an EIS is to obviate the need for speculation by insuring that available data are gathered and analyzed prior to the implementation of the proposed action.").

NRC cannot approve the license application because it is prohibited by 10 C.F.R. § 51.109(c) from adopting this flawed environmental analysis.

The threatened injuries to the Tribe can be redressed in this proceeding. If DOE were to be required to conduct an adequate environmental review before receiving the license, transportation of radioactive waste to Yucca Mountain through or adjacent to the Tribe's Homeland would be conducted more safely. Routes and shipping conditions with greater risk could be identified and minimized; those with relatively less risk could be used instead, and proper mitigation measures could be imposed. Threats to groundwater could be analyzed and evaluated and mitigation measures could be devised. "NEPA is not designed to postpone analysis of an environmental consequence to the last possible moment. Rather, it is designed to require such analysis as soon as it can reasonably be done. *Kern v. U.S. Bureau of Land Mgmt.*, 284 F. 3d 1062, 1072 (9th Cir. 2002) (citing *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1246 n. 9 (9th Cir. 1984)). If NRC grants the license without proper NEPA review, however, these risks will remain unknown and unaddressed.

B. Discretionary Intervention. [10 C.F.R. § 2.309(e)]

In the event that the Tribe is determined to lack standing to intervene as a matter of right under paragraph (d)(1) of 10 C.F.R. § 2.309, the Tribe alternatively seeks to intervene as a matter of discretion on the following grounds:

1. Factors weighing in favor of allowing intervention:

a. The extent to which the requestor's/petitioner's participation may reasonably be expected to assist in developing a sound record [10 C.F.R. § 2.309(e)(1)(i)]

The Tribe will be significantly impacted by shipments of radioactive waste traveling to the repository and how they are routed and safeguarded. Other sovereign territories are not so affected by routing or by the choice between the Mina and Caliente lines in Nevada. While other sovereign territories will have waste transported through them, the Tribe's Homeland is uniquely situated because decisions DOE makes about transportation in Nevada will determine the routes used in or near the Tribe's Homeland, the areas of the Tribe's Homeland at risk, and the degree of that risk. The Tribe will provide expert testimony to NRC demonstrating that it is not practicable to adopt DOE's environmental documents due to its failure to analyze risks that are specific to the Tribe and demonstrating that the license application does not contain information showing that the health and welfare of the Tribe and its members will be protected.

b. The nature and extent of the requestor's/petitioner's property, financial or other interests in the proceeding [10 C.F.R. § 2.309(e)(1)(ii)]

(Please refer to the discussion above in section I.A.3.)

c. The possible effect of any decision or order that may be issued in the proceeding on the requestor's/petitioner's interest [10 C.F.R. § 2.309(e)(1)(iii)]

(Please refer to the discussion above in section I.A.4.)

2. Factors weighing against allowing intervention [10 C.F.R. § 2.309(e)(2)]

a. The availability of other means whereby the requestor's/petitioner's interest will be protected [10 C.F.R. § 2.309(e)(2)(i)]

DOE will likely argue that its generic analysis of transportation risks is a sufficient basis for NRC to grant the license and set in motion the shipment of hundreds or thousands of

radioactive waste casks through or adjacent to the Tribe's Homeland. But DOE has not committed to conduct any further environmental review before these shipments through or adjacent to the Tribe's Homeland begin. DOE has not committed to selecting the safest routes through California or even evaluating what they are. DOE has not committed to abandoning use of the Mina route. The Tribe believes that if it challenges DOE's NEPA compliance with respect to these shipments in the future in some other forum, DOE will contend that the challenge is moot because of NRC's decision on the license application or because routing decisions are not within its control. Thus, this proceeding may be the only opportunity for the Tribe to raise substantive health, safety, and environmental concerns with the shipment of waste to the repository.

b. The extent to which the requestor's/petitioner's interest will be represented by existing parties [10 C.F.R. § 2.309(e)(2)(ii)]

No other likely party to this proceeding will represent the Tribe's interests, as no other sovereign territory or party – except California – is subject to the same risks from the repository and radioactive waste transportation. For instance, Nevada does not have an interest in ensuring safe transportation of waste within the Tribe's Homeland or the protection of groundwater resources therein.

c. The extent to which the requestor's/petitioner's participation will inappropriately broaden the issues or delay the proceeding [10 C.F.R. § 2.309(e)(2)(iii)]

The Tribe's contentions are all related to legal deficiencies in DOE's environmental documents or to the absence of information in its license application, either of which would prevent NRC from issuing the license. DOE is required to submit an environmental impact

statement with its license application 10 C.F.R. § 63.21(a); 10 C.F.R. § 51.67(a). NRC may not adopt DOE's environmental impact statement, as required by 10 C.F.R. 51.109(c), if it is not adequate under NEPA. As will be argued more specifically in the Tribe's contentions, DOE has not provided adequate analysis on a number of subjects. An Environmental Impact Statement ("EIS") must "set forth sufficient information for the general public to make an informed evaluation . . . and for the decision maker to consider fully the environmental factors involved and to make a reasoned decision after balancing the risks of harm to the environment against the benefits to be derived from the proposed action." *Sierra Club v. United States Army Corps of Engineers*, 701 F.2d 1011, 1029, n.18 (2d Cir. 1983). An EIS must permit those who do not participate in its preparation to understand and consider meaningfully the reasoning, premises, and data relied upon, and to permit a reasoned choice among different courses of action. See *Friends of the River v. FERC*, 720 F.2d 93, 120 (D.C. Cir. 1983). NEPA requires that an EIS contain a reasonably thorough discussion of the significant aspects of the probable consequences of an action. *Oregon Natural Resources Council v. Lowe*, 109 F.3d 521, 526 (9th Cir. 1997). DOE both inadequately analyses environmental impacts during transportation of high level radioactive waste in areas outside of Nevada, and illegally defers the analysis of non-Nevada impacts to another day. Without adequate analysis of all of the environmental impacts of the likely routes, as well as the risks posed by such routes, DOE's NEPA Documents do not fulfill their statutory obligations.

Furthermore, NRC's regulations in 10 CFR § 63.31 provide that NRC cannot authorize construction unless it determines (among other things) that there are "reasonable assurances" that the repository can receive waste "without unreasonable risk to the health and safety of the

public" and that DOE's proposal "will not be inimical to the common defense and security." 10 C.F.R. § 63.31(a) & (c). NRC's Notice of Hearing established that:

> The matters of fact and law to be considered are whether the application satisfies the applicable safety, security, and technical standards of the AEA and NWPA and the NRC's standards in 10 CFR Part 63 for a construction authorization for a high-level waste geologic repository, and also whether the applicable requirements of the National Environmental Policy Act (NEPA) and NRC's NEPA regulations, 10 CFR Part 51, have been met.

Notice of Hearing and Opportunity to Petition for Leave to Intervene, 73 Fed. Reg. 63029 (Oct. 22, 2008). The Tribe's challenges are squarely within the scope of the hearing as defined by NRC , as it is arguing that the applicable requirements of NEPA have not been met. Therefore, the Tribe's intervention will not inappropriately broaden the issues or delay the proceeding.

CONTENTIONS

TIM-NEPA-01: DOSES RELATED TO INGESTION OF PARTICULATE MATTER

1. A one-sentence statement of the contention itself

Dose calculations presented in the FEIS and SFEIS, based on a "reasonably maximally exposed individual" (RMEI) as defined in Federal Register Vol. 73 No. 200, pp 61256-61289, fails to consider doses attributable to the full diet and associated particulate contamination of dietary components during the postclosure period, and doses related to airborne dust and sand containing radionuclides derived from the repository and had these deficiencies been remedied the disclosure of impacts would have been materially different, therefore the FEIS and FSEIS can not be adopted by the NRC.

2. A brief one-sentence summary of the basis of the contention

Particulate materials, derived in part from groundwater-discharge deposits that are widespread in the region, will be ingested and in the future in quantities exceeding DOE's estimates, and can be reasonably expected to contain concentrations of radioelements greater than in the observable deposits.

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

Because this contention raises an issue whether DOE has complied with NEPA, the CEQ regulations, and the NRC NEPA regulations; pursuant to 10 C.F.R. section 51.109(a)(2), 10 C.F.R. section 63.31(c) and section II, paragraph 1 of the Notice of Hearing, this contention is within the scope of the hearing.

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

Before it may adopt the NEPA documents for the Yucca Mountain repository, the NRC must find that all requirements of NEPA have been satisfied. (*NEI v EPA*, 373 F.3d at 1314). Pursuant to 10 C.F.R. §§ 51.67(a) and 63.21(a) DOE is required to include an environmental impact statement (EIS) with its licensing application. Doe is required to supplement this EIS pursuant to 10 C.F.R. § 63.24(c) to consider the environmental impacts of any substantial changes in its proposed actions or any significant new circumstances or information relevant to environmental concerns related to the proposed action or its impacts. An attack on DOE's NEPA documents based on substantial and significant new information is a new consideration under 10 C.F.R. section 51.109(c), therefore the NEPA documents are not practicable for adoption. (Notice of Hearing Section III.B, 73 Fed. Reg. 63031 (October 22, 2008).) The NEPA documents fail to assess the environmental impacts of the proposed Yucca Mountain Repository. This contention alleges non-compliance with the relevant case law and regulatory provisions and therefore raises material issues relevant to the proceedings.

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

Wetlands attract human occupation, and as the wetlands dessicate from climatic cycles human abandonment will lag hydrologic changes. There is abundant evidence in the archaeological record and oral history of the region of dietary components of aboriginal cultures. Tooth wear attributable to grit in the diet is ubiquitous in aboriginal skeletal remains found in the southwestern deserts. Modern air-quality data suggest that fine-grained, carbonate-rich deposits attributable to discharging groundwater represent a major source of airborne particulates.

Evaporation of discharging groundwater will concentrate and precipitate solids from solution, including any radionuclides dissolved or suspended in the groundwater. DOE has failed to demonstrate, that within the regulated time frame of one million years, that radionuclides will not reach the land surface and be incorporated in chemical precipitates at locations where such precipitates are present in the geologic record, that those precipitates will not contribute to airborne particulates or what the area affected by those particulates might be, and that radionuclide-enriched particulates will not represent a contribution to whole-body and organ doses from dietary and respiratory pathways.

FEIS Subsection 5.4 at 5-22 through 5-31, and Tables 5.6 at 5-24, 5.10 at 5-28, and 5.12 at 5-29, provides calculated ground water radionuclide dose levels at the Franklin Lake Playa discharge location, 60 kilometers (37 miles) from the repository boundary. These results, scaled for distance and radionuclide dispersion, are based on the calculated radionuclide dose at the location of the RMEI, 18 kilometers (11 miles) from the repository boundary. An alternative RMEI boundary representing full pluvial coincides approximately with the location of ground-water discharge deposits at and near Crater Flat. There is no consideration given to the probability that ground-water discharge will recur in the future in these locations, or how the radionuclide concentrations in those waters and resultant deposits would vary as a function of time and location. Together, these processes can result in concentration of radionuclides in water, mineral precipitates, soils, and plants, and make some portion of the concentrated radionuclides available for redistribution in the environment and uptake by exposed individuals. These concentration and redistribution processes have the potential to result in higher radiological impacts to individuals accessing the contaminated areas than those arising from the

chosen RMEI, as the water use and habits of the latter are strongly constrained by regulation.

FEIS and SEIS fail to discuss how rejuvenated springs near Crater Flat may discharge water contaminated by releases from the repository. Again, there is no consideration of the types of processes to be expected at these spring locations, resulting in concentration and redistribution of radionuclides in the environment.

The approach taken in the FEIS and FSEIS does not provide an adequate analysis of the impacts of radiological contaminants in the aquifer at the most reasonable alternative RMEI location. Those radiological impacts are determined by local concentrations of radionuclides at any downstream location that is selected at some time in the future for groundwater abstraction. Because of the subjective treatment of water-table rise that prevents future changes in the direction of the hydraulic gradient in the Saturated Zone Site-Scale Model (SNL, 2007 [LSN # DOC.20070626.0004]), concentrations of radionuclides in a downstream location selected for ground water abstraction could be higher than those calculated by abstraction for the RMEI.

The FEIS should include a description of the following phenomena:

- an objective assessment of potential long-term changes in the alluvial aquifer flow and transport system (including discharge) due to climate variation.
- flow paths to groundwater-discharge deposits in the region for both modern and full-pluvial climates
- hydrologic sinks (discharge areas) for repository-derived waters under full-pluvial flow regimes, based on objective evidence
- limiting concentrations of radioelements in groundwater-discharge deposits, based on the assumption that the retardation capacity of the up-gradient aquifer is exhausted or, equivalently, ineffective in limiting radionuclide concentrations in discharging groundwater
- amount of particulate material expected in a post-industrial diet, based on archaeological evidence

- an analysis of the contribution of groundwater-discharge deposits to airborne particulate loads and respiratory uptake of individuals
- dose calculations for a maximally exposed individual in a dusty setting typical of a primitive camp, considering digestive, respiratory, and skin doses

In summary, a groundwater flow and transport model calibrated to replicate past-discharge conditions at Crater Flat is needed to support adequate analysis of the environmental impacts of radionuclide releases from the repository.

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

FEIS Subsections 5.4 and 5.6, and FSEIS Subsections 5.4 and 5.7 fail to analyze the impacts of discharge of ground water contaminated with radionuclides and nonradiological materials from releases from the repository at locations suggested by the geologic record. For this reason the FEIS and FSEIS are incomplete and inadequate in their analysis of impacts of the repository. Because the discharge locations concentrate the radionuclides released to the environment at the land surface, these impacts are potentially the most severe among the impacts of the repository in the postclosure period. For the reasons stated above, the FEIS and FSEIS are incomplete and can not be adopted by the NRC.

Readily available references are excluded from the requirement to provide electronic access. 10 C.F.R. § 2.1005.

<u>References</u>

Sandia National Laboratories (SNL), 2007. Saturated zone site-scale flow model, Rev 3, ACN-001. [DOC.20070626.0004] LSN #: DN2002478808.

TIM-NEPA-02: ANALYSIS OF ALTERNATIVES TO THE PROPOSED ACTION

1. A one-sentence statement of the contention itself

DOE's discussion of alternatives the the proposed repository at Yucca Mountain is inadequate in the context of the National Environmental Policy Act (40 CFR 1502.14), which indicates that the discussion of alternatives is "…the heart of the EIS"; DOE presents only a single, "No-action" alternative that does not include Yucca Mountain as a component in an alternative waste-management strategy that utilizes the site as Congress intended.

2. A brief one-sentence summary of the basis of the contention

While seeking shelter behind specific language of Sections 114(f)(2) and 114(f)(3) of the NWPA (40 CFR 197) and of the National Research Council (1990) Position Statement, DOE has not adhered to requirements and recommendations that, in this case, compel consideration of site-specific alternatives to the proposed Mined Geologic Disposal System (MGDS).

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

Because this contention raises an issue whether DOE has complied with NEPA, the CEQ regulations, and the NRC NEPA regulations; pursuant to 10 C.F.R. section 51.109(a)(2), 10 C.F.R. section 63.31(c) and section II, paragraph 1 of the Notice of Hearing, this contention is within the scope of the hearing.

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

Before it may adopt the NEPA documents for the Yucca Mountain repository, the NRC must find that all requirements of NEPA have been satisfied. (*NEI v EPA*, 373 F.3d at 1314). Pursuant to 10 C.F.R. §§ 51.67(a) and 63.21(a) DOE is required to include an environmental impact statement (EIS) with its licensing application. Doe is required to supplement this EIS pursuant to 10 C.F.R. § 63.24(c) to consider the environmental impacts of any substantial changes in its proposed actions or any significant new circumstances or information relevant to environmental concerns related to the proposed action or its impacts. An attack on DOE's NEPA documents based on substantial and significant new information is a new consideration under 10 C.F.R. section 51.109(c), therefore the NEPA documents are not practicable for adoption. (Notice of Hearing Section III.B, 73 Fed. Reg. 63031 (October 22, 2008).) The NEPA documents fail to assess the environmental impacts of the proposed Yucca Mountain Repository. This contention alleges non-compliance with the relevant case law and regulatory provisions and therefore raises material issues relevant to the proceedings.

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

DOE claims (FEIS, Section 2.3.1) that the NWPA [Section 114(f)(2)] relieves it of responsibility to consider all alternatives to the isolation of spent nuclear fuel and high-level radioactive waste in a repository; that Section 114(f)(3) relieves it of considering alternative sites

to Yucca Mountain for the repository, and that disregard for alternatives to the Proposed Action is supported by the National Research Council (1990; DIRS 100061) Position Statement.

The geographic area in use or under consideration for repository operations clearly extends beyond the physiographic limits of Yucca Mountain, the landform. DOE's plans and actions therefore affect an area represented more appropriately by the "controlled area" concept, within which alternative storage and disposal schemes can and should be developed. NWPA 114(f)(3) offers DOE no relief from broadening the definition of "Yucca Mountain" in a practical sense, or from demonstrating how the MGDS is superior, in terms of its ability to isolate spent fuel and high-level waste (HLW), to a surface-based system at this site.

While NWPA 114(f)(2) rules that no alternatives to isolation in a repository need be considered by DOE, there are no descriptors such as "deep" or "mined" modifying the word "repository". Given the accumulating evidence of fast-flow paths between the proposed repository horizon and the accessible environment, and the cost escalation associated with increasingly complex and costly engineered barrier systems to compensate for unexpected subsurface conditions, a comparison with the expected performance of an alternative, surface-based storage facility should be available to decision-makers.

NEPA (40 CFR 1502.14) clearly states that consideration of alternatives to the Proposed Action is "the heart of the EIS". The NRC (1990, p. 8) states "In judging disposal options, therefore, it is essential to bear in mind that the comparison is not so much between ideal systems

and imperfect reality as it is between a geologic repository and at-surface storage". DOE's FEIS and SFEIS contribute nothing to the furtherance of that comparison. Also, "The debate will hinge in part on a clear understanding of the alternatives against which a proposed 'solution' will be judged" (NRC, 1990, p. 28). DOE's invocation of the NRC report of 1990 as justification for not developing substantially contrasting repository alternatives mis-represents the focus of a Position Statement that is highly critical of DOE policies that have changed very little since 1990.

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

FEIS Subsection 2.3, and FSEIS Subsection 2.3.3 fail to analyze an alternative repository configuration at Yucca Mountain, thereby failing to demonstrate any advantage to the waste-isolation objective from deep burial as compared to near-surface storage.

Readily available references are excluded from the requirement to provide electronic access. 10 C.F.R. § 2.1005.

<u>References</u>

National Research Council 1990. *Re-thinking high-level radioactive waste disposal – A position statement of the Board on Radioactive Waste Management*. Washington, D.C.: National Academy of Sciences, report prepared under DOE contract DE-AC01-86DP48039. 34 p. LSN #: NRC000024692.

TIM-NEPA-03: REPOSITORY THERMAL EFFECTS

1. A one-sentence statement of the contention itself

DOE's use in the FEIS and FSEIS of a constant-temperature boundary condition at land surface, combined with material-property and thermodynamic assumptions that limit heat-pipe effects in their Multiscale Thermohydrologic Model (MTHM; SNL, 2008 [LSN # DOC.20080201.0003]) results in non-conservative estimates of mechanical strains resulting from repository heating by minimizing the horizontal components of thermal gradients in the subsurface, prevents thermal effects on the biosphere from being rigorously assessed, and underestimates the magnitude of gaseous radionuclide releases. Had these deficiencies been remediated the disclosure of impacts in the FEIS and SFEIS would have been materially different, therefore the FEIS and SFEIS can not be adopted by NRC.

2. A brief one-sentence summary of the basis of the contention

Failure to adequately characterize pneumatic pathways, reliance on dual-continuum modeling approaches with their embedded assumption of thermodynamic equilibrium between fractures and matrix, and choice of boundary conditions that force ground-temperatures to remain constant during the simulation period, resulted in abstractions provided to Performance Assessment that mis-represent a range of processes important to repository performance, including drift stability, dryout/rewetting, and venting of gaseous radionuclides to the atmosphere.

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

Because this contention raises an issue whether DOE has complied with NEPA, the CEQ regulations, and the NRC NEPA regulations; pursuant to 10 C.F.R. section 51.109(a)(2), 10 C.F.R. section 63.31(c) and section II, paragraph 1 of the Notice of Hearing, this contention is within the scope of the hearing.

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

Before it may adopt the NEPA documents for the Yucca Mountain repository, the NRC must find that all requirements of NEPA have been satisfied. (*NEI v EPA*, 373 F.3d at 1314). Pursuant to 10 C.F.R. §§ 51.67(a) and 63.21(a) DOE is required to include an environmental impact statement (EIS) with its licensing application. Doe is required to supplement this EIS pursuant to 10 C.F.R. § 63.24(c) to consider the environmental impacts of any substantial changes in its proposed actions or any significant new circumstances or information relevant to environmental concerns related to the proposed action or its impacts. An attack on DOE's NEPA documents based on substantial and significant new information is a new consideration under 10 C.F.R. section 51.109(c), therefore the NEPA documents are not practicable for adoption. (Notice of Hearing Section III.B, 73 Fed. Reg. 63031 (October 22, 2008).) The NEPA documents fail to assess the environmental impacts of the proposed Yucca Mountain Repository. This contention alleges non-compliance with the relevant case law and regulatory provisions and therefore raises material issues relevant to the proceedings.

5. A concise statement of the facts or expert opinions supporting the contention, along with

appropriate citations to supporting scientific or factual materials

The FEIS (Sec. I-7.3) cites a preliminary analysis by Wu, Chen, and Bodvarsson (1995; [LSN # MOL.19971204.0764]) of gas and heat flow that pre-dates observations by Rousseau and others (1999; [LSN # MOL.19970626.0351]) and LeCain and others (2000; [LSN # MOL.19980625.0344]) that together demonstrate fault-zone permeabilities may be orders of magnitude higher than assumed in 1995. Indeed, USGS staff have been promoting studies of the feasibility of passively ventilating the repository using the Ghost Dance and Solitario Faults as "chimneys" (Stuckless and Toomey, 2003 [LSN # MOL.20030717.0334]). Available evidence is therefore completely at odds with predictions of zero temperature rise at the ground surface, gas-travel sufficiently long to significantly attenuate radon-222 doses, and a "smooth" thermal field above the repository that would limit thermally induced strains.

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

In dose calculations presented in the FEIS and SFEIS, based on a "reasonably maximally exposed individual" (RMEI) as defined in Federal Register Vol. 73 No. 200, pp 61256-61289, DOE did not consider exposure of an individuals attracted to repository-induced "blowholes" on Yucca Mountain, which would be analogous to aboriginal communities that developed at Wupatki National Monument in Arizona.

The subject of pneumatic pathways and the adequacy of their characterization was the subject of a Differing Professional View (DPV) processed in the OCRWM Concerns Program in 1996-97 (Concern 96-010). DOE's disposition of the DPV [MOL.19970409.0026] was sharply

at odds with recommendations [LSN # DN2002470900] of the Technical Professional Review Team (TPRT) convened to address the specific issue, and inconsistent with broader programmatic guidance provided by the National Research Council (NRC000024692).

For reasons described above the FEIS and SFEIS can not be adopted by NRC.

Readily available references are excluded from the requirement to provide electronic access. 10 C.F.R. § 2.1005.

References

LeCain, Gary D., 1997. Air-injection testing in vertical boreholes in welded and nonwelded tuff, Yucca Mountain, Nevada: U.S. Geological Survey Water-Resources Investigations Report 96-4262, 38p. [MOL.19980310.0148]

LeCain, Gary D., 1998. Results from air-injection and tracer testing in the Upper Tiva Canyon, Bow Ridge Fault, and Upper Paintbrush contact alcoves of the Exploratory Studies Facility, August 1994 through July 1996, Yucca Mountain, Nevada. U.S. Geological Survey Water-Resources Investigations Report 98-4058 [MOL.19980625.0344], 33p.

LeCain, Gary D.; Anna, Lawrence O.; and Fahy, Michael F., 2000. Results from geothermal logging, air and core-water chemistry sampling, air-injection testing, and tracer testing in the northern Ghost Dance Fault, Yucca Mountain, Nevada, November 1996 to August 1998. U.S. Geological Survey Water-Resources Investigations Report 99-4210, 54p. [MOL.20070108.0353]

National Research Council 1990. *Re-thinking high-level radioactive waste disposal – A position statement of the Board on Radioactive Waste Management*. Washington, D.C.: National Academy of Sciences, report prepared under DOE contract DE-AC01-86DP48039. 34 p. [NRC000024692].

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Rousseau, Joseph P.; Loskot, Carole L.; Thamir, Falah; and Lu, Ning, 1997. Results of borehole monitoring in the unsaturated zone within the Main Drift area of the Exploratory Studies

Facility, Yucca Mountain, Nevada. U.S. Geological Survey Administrative Report, Level 3 Milestone SPH22M3 [MOL.19970626.0351], 100 p.

SNL (Sandia National Laboratories) 2008. Multiscale Thermohydrologic Model. ANL-EBS-MD-000049 Rev 03 AD 02. Las Vegas, Nevada: Sandia National Laboratories. ACC: DOC.20080201.0003.

Stuckless,, John S. and Toomey, Rickard S. III, 2003. A Case for Long-Term Passive Ventilation of the Proposed Repository at Yucca Mountain, Nevada - Evidence from Natural Analogues. IHLRWM 2003, Las Vegas, NV, March 30-April 2, 2003, p. 267-278. [MOL.20030717.0334]

Wu, Y.S.; Chen, G.; and Bodvarsson, G. 1995. *Preliminary Analysis of Effects of Thermal Loading on Gas and Heat Flow Within the Framework of the LBNL/USGS Site-Scale Model*. LBL- 37729. Berkeley, California: Lawrence Berkeley National Laboratory. [LSN # MOL.19971204.0764]

TIM-NEPA-04: SATURATED ZONE FLOW MODEL

1. A one-sentence statement of the contention itself

Abstractions from the Site Scale Saturated-Zone Flow Model to support Performance Assessment (PA) in the FEIS and FSEIS are invalid because process-level analyses incorporated in the Model are not representative of physical evidence from aquifer tests and groundwater temperatures, nor do they honor evidence from paleo-discharge deposits in the region. Were these deficiencies to be remedied, the disclosure of impacts would be materially different, and therefore the FEIS and FSEIS can not be adopted by the NRC.

2. A brief one-sentence summary of the basis of the contention

Hydraulic conductivites do not agree with aquifer-test results, the base of the Model flow domain does not agree with geothermal data, and postulated fluxes and flow directions for the pluvial state are inconsistent with elevations of groundwater-discharge deposits that represent the state of the system under pluvial conditions.

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

Because this contention raises an issue whether DOE has complied with NEPA, the CEQ regulations, and the NRC NEPA regulations; pursuant to 10 C.F.R. section 51.109(a)(2), 10 C.F.R. section 63.31(c) and section II, paragraph 1 of the Notice of Hearing, this contention is within the scope of the hearing.

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

Before it may adopt the NEPA documents for the Yucca Mountain repository, the NRC must find that all requirements of NEPA have been satisfied. (*NEI v EPA*, 373 F.3d at 1314). Pursuant to 10 C.F.R. §§ 51.67(a) and 63.21(a) DOE is required to include an environmental impact statement (EIS) with its licensing application. Doe is required to supplement this EIS pursuant to 10 C.F.R. § 63.24(c) to consider the environmental impacts of any substantial changes in its proposed actions or any significant new circumstances or information relevant to environmental concerns related to the proposed action or its impacts. An attack on DOE's NEPA documents based on substantial and significant new information is a new consideration under 10 C.F.R. section 51.109(c), therefore the NEPA documents are not practicable for adoption. (Notice of Hearing Section III.B, 73 Fed. Reg. 63031 (October 22, 2008).) The NEPA documents fail to assess the environmental impacts of the proposed Yucca Mountain Repository. This contention alleges non-compliance with the relevant case law and regulatory provisions and therefore raises material issues relevant to the proceedings.

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

The FEIS and SEIS present several specious arguments for site suitability that are rooted in the Site Saturated Zone Flow Model (LSN # DOC.20070626.0004). Notably, the base of the Model system is established at 4000 m below mean sea level, and responses to monsoonal and interglacial climates are represented by raised water levels that are arbitrarily prescribed at the Model boundaries. In combination, these conceptual errors lead to sluggish particle velocities and suppress the response to pluvial climates by the flow system. There is no support in temperatures of waters from the region that the base of the active-flow domain is nearly so deep,

and the record of pluvial-state water levels preserved in ground-water discharge deposits of the region indicate substantially different flow directions. The evidence provided by Mifflin and Wheat (1979) that effective moisture under full-pluvial conditions is a order of magnitude greater than at present provides supporting evidence that the Model is grossly deficient in representing the pluvial state.

Volumetric flow rates inherited from the Regional Model (ref) that represent calibration targets for the Site-Scale Model require a much thinner flow domain to be consistent with aquifer tests in the vicinity of Yucca Mountain (Geldon, 1996 [LSN # MOL.19980724.0389 and references therein]).

Abstractions of specific discharge required by PA can provided directly and conservatively, without the obfuscation and distortions provided by the Site-scale Model. Simple approximations of uniform flow under modern and expected pluvial conditions, based on actual field data, provide two realizations of flow conditions with corresponding fluxes and hydraulic gradients that only require estimates of their applicability over the next million years to be utilized effectively.

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

FEIS Subsections 5.3 and 5.4, and SEIS Subsections 5.5.1 and 5.5.2 fail to analyze a groundwater flow regime that is representative of pluvial conditions, which in combination with the excessively thick flow domain used to represent modern conditions results in erroneous conclusions regarding the effects of future climates, in terms of both impact locations and of

ground-water flux. These deficiencies are manifested by erroneous, misleading, or incomplete statements throughout Section 2.3.9 of the LA Safety Analysis Report, including:

- The reference to Luckey et al. (1996 [LSN# NRC000013779])on page 2.3.9-16 (Sec. 2.3.9.2.2.2) does not mention the hydraulic data contained therein, those authors' perspective that knowledge of such data is "critical to understanding the hydrogeology" and "required for numerical models" (Luckey et al., 1996 [LSN# NRC000013779], p. 32), or why aquifer-test data were apparently ignored in formulating the Site-scale Model.
- The statement on page 2.3.9-21 that "Inflow from the east is generally the result of regional underflow in the Paleozoic carbonate aquifers that were recharged in the Specter Range" is unsupported.
- "Significant" differences between target and site-scale boundary fluxes are attributed in part to the "permeability distribution" on page 2.3.9-21, but no mention is made as to how permeability *data* (from aquifer tests) bears on those differences or was incorporated in either model.
- On page 2.3.9-22 reference is made to "the specific discharge estimate", referencing SNL, 2007 [LSN # DN2002478808], Sections 6.7.1 and 6.7.2, and to Darcy's Law, yet section 6.5.2.4 of SNL (2007 [LSN # DN2002478808]) defines specific discharge as pathlength divided by travel time, neither of which appears in Darcy's Law in standard formulations (Freeze and Cherry, 1979, p. 16). In the present context *Darcy velocity* is preferable to "specific discharge", allowing "travel time" to be reserved for interstitial velocity.
- Automatic (Table 6-9) and manual (Table 6-10) calibrations of the Site-scale Model (SNL, 2007, pp. 6-65 to 6-68) resulted in permeability estimates that differ by orders of magnitude from site data reported by Luckey et al. (1996 [LSN# NRC000013779]) and Geldon (1996 [LSN # DEN000682402]). Undoubtedly, as stated on page 6-69 in the first sentence of Section 6.5.2 of SNL (2007), "A model of this complexity proved challenging to calibrate". We contend that the model is *not* calibrated, as it matches hydraulic conductivity data very poorly.
- DOE's use of expert elicitation (CRWMS M&O, 1998 [LSN # DEN000672365], cited in SAR Section 2.3.9.2.2.6, page 2.3.9-26) addressed, in part, the impacts of climate change and water table rise. There is no mention in the citation or implementation in the

modeling program of the opinions of the two experts (Gelhar and Neuman) who addressed flow directions: both believed that directions of the hydraulic gradient under a pluvial climate could differ from the present one.

- The LA makes no reference to any comprehensive summary of the extent to which the recommendations of the expert elicitation panel (CRWMS M&O, 1998 [LSN # DEN000672365]) have been incorporated into the site saturated zone model and supporting analyses as of the date of the Application.

- According to DOE (SAR Sec 2.3.9.2.3.4, p. 2.3.9-40), the ratio of "average saturated zone groundwater flow under the future climatic conditions to the flow under present conditions" defines a scaling factor used by TSPA to accommodate climate change in radionuclide transport simulations. The site-scale saturated zone flow model cannot explicitly simulate water table rise because the saturated zone is represented as a confined system; "simple linear increases in the elevation of the water table" were applied *subjectively* (SAR Sec 2.3.9.2.3.4, p. 2.3.9-41), forcing the direction of the hydraulic gradient to conform to the present hydraulic gradient.

Discussion and Analysis

We first consider the broad aspects of DOE's modeling effort for a reality check of the embedded assumptions against physical evidence from the region. As indicated on Page 2.3.21 of the SAR, present-day volumetric flow rates along the lateral boundaries of the site-scale saturated zone flow model domain were extracted from the Death Valley regional groundwater flow system model (Belcher, 2004 [LSN # DN2002140364], pp. 118 and 132). These are referred to as "target" volumetric flow rates in the Site-Scale Model documentation (SNL, 2007 [LSN # DN2002478808], Table 6-11) and were adjusted to different values in the site-scale model calibration effort. At the southern boundary of the Site-Scale Model (UTM 533,000 to 563000 m E at 4,046,500 m N), for example, the target outflow rate was 2.2×10^7 m^3/yr (60,233 m^3/day), while the site-scale outflow rate was $Q = 1.72 \times 10^7$ m^3/yr (46,543 m^3/day).

DOE does not present effective (composite) values for hydrologic properties at the primary outflow (southern) boundary for comparison with aquifer-test data, but since the hydraulic properties of aquifer materials in the Site area have been estimated (Luckey et al., 1996 [LSN# NRC000013779]; Geldon, 1996 [LSN # DEN000682402]) a basis for comparison does exist. Measured site potentiometric data (SNL, 2007 [LSN # DN2002478808], Table 6-8) indicate that potentiometric levels at the southern (outflow) boundary of the model domain are of the order of 700 m above mean sea level (AMSL), and planar regression of those data (with no weighting) indicates a hydraulic gradient of i = 0.003827. Because DOE chose to establish the base of the model domain at 4000 m below sea level, the cross-sectional area of the outflow boundary is approximately A = 30,000 m × 4700 m = 1.41×10^8 m^2. These data allow us to apply Darcy's Law to estimate the composite hydraulic conductivity of the Model aquifer, which is about 0.09 m/day via the familiar Q=KiA algebra. For comparison, pumping experiments have provided estimates of 1 m/day from the "upper volcanic aquifer" at well J-13, about 0.6 m/day from the "lower volcanic aquifer" (average of 7 test locations; Luckey et al., 1996 [LSN# NRC000013779], Table 4), and over 11 m/day at the C-well complex (Geldon, 1996 [LSN # DEN000682402], Table 9). There appears to be an overall discrepancy between model hydraulic conductivities and physical reality of one to two orders of magnitude.

The base of the Site-Scale Model domain is suspect due to its great depth; ground-water temperatures representative of such great circulation depths are unknown in the region, and Luckey et al. (1996 LSN# NRC000013779], p. 37) report that all of the boreholes they analyzed had little production (or acceptance) of water from their lower intervals. A hydraulic basement near sea level is more consistent with both geothermal and aquifer-test data than the -4000 m

hydraulic basement assumed by DOE, which guarantees sluggish flow velocities and minimal proportional effects from water-table rise, which we consider next.

Ground-water discharge deposits near Yucca Mountain (Paces et al., 1996) constrain the elevation of the potentiometric surface between approximately 60 and 15 ka. Packrat midden FMC-7 (Spaulding, 1992 [**LSN # DN2001520708]**, p. 198) provides indirect evidence of shallow water levels in Fortymile Canyon prior to 47.2 ± 3.0 ka. Using the National Elevation Data (NED) terrain model to obtain elevations for the deposits described by Paces et al. (1996 [LSN # DN2000007221]) allows a first-order surface to be constructed through those deposits and checked by comparison with observed elevations along the profile of Fortymile Wash:

	E (m)	N (m)	Z (m)
Crater Flat deposit	539575	4064269	836
LWD deposit	536733	4062596	803
CFW deposit	539155	4061059	798

Table 1. Locations and elevations of ground-water discharge deposits near Yucca Mountain, referenced to NAD 27.

	predicted	observed	difference
Spaulding site FMC-7	1201	1190	11
FortymileWash at H Road	1024	1005	19
FortymileWash at US95	800	806	-6

Table 2. Predicted elevations (m) along Fortymile Wash for first-order regression surface through ground-discharge deposits near Yucca Mountain (Table 1 data)

These results set the stage for a comparison of modern and expected maximum pluvial groundwater conditions in the site area, which can in turn be compared with DOE's licensing information. Figure 1 presents our independent abstraction of site information for modern conditions, showing 1000-year particle tracks from the repository.

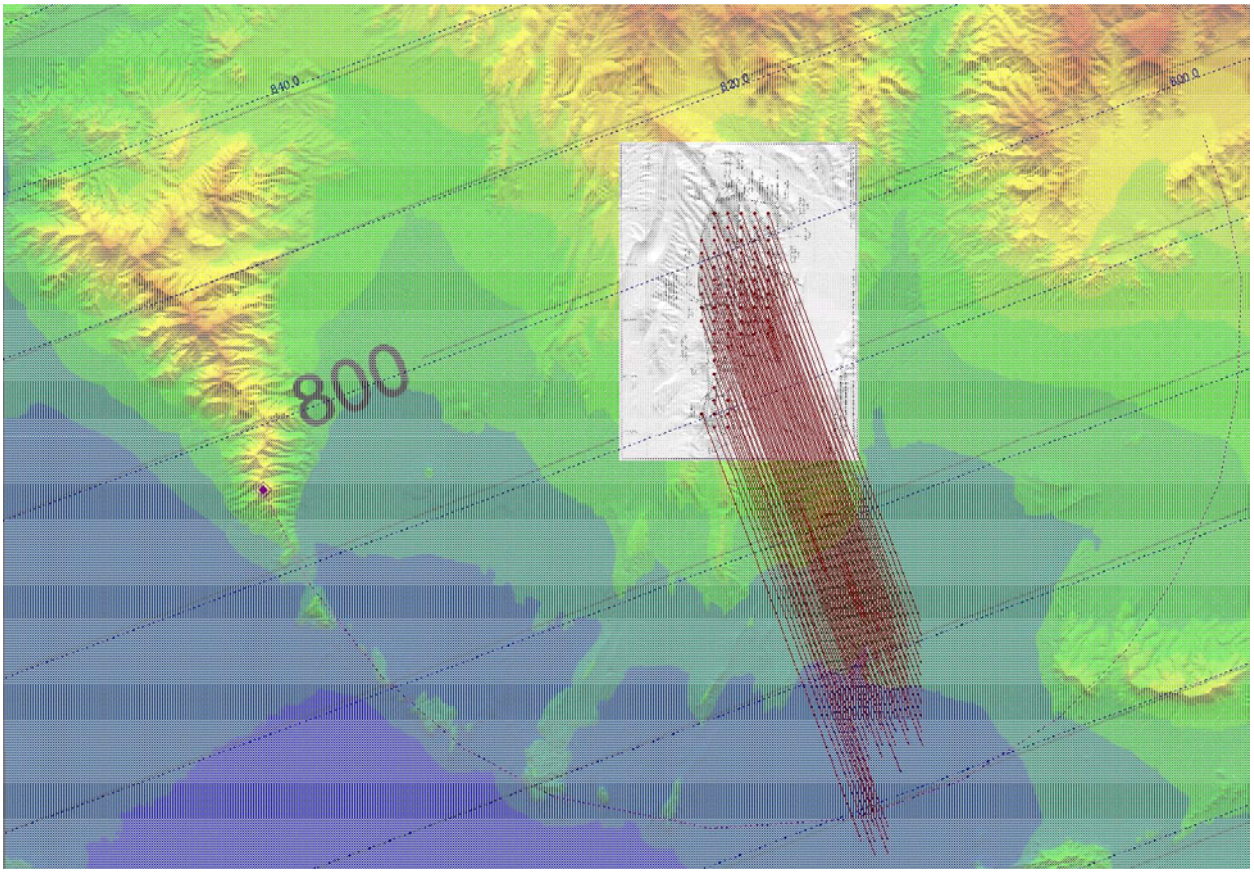

Figure 1. Simulated unconfined flow field for modern conditions, using hydraulic conductivity K=0.5611 m/day, porosity n=0.05, with base of aquifer at mean sea level elevation. Circular arc (flux inspection boundary) is 18 km from south-central portion of repository. Volumetric flow rate across inspection boundary is "target" value of 60,233 m^3/day.

Figure 2 shows our abstraction for pluvial conditions as constrained by field data, which illustrates the sharp contrast with DOE's finding that flow directions are not significantly changed by a water-table rise.

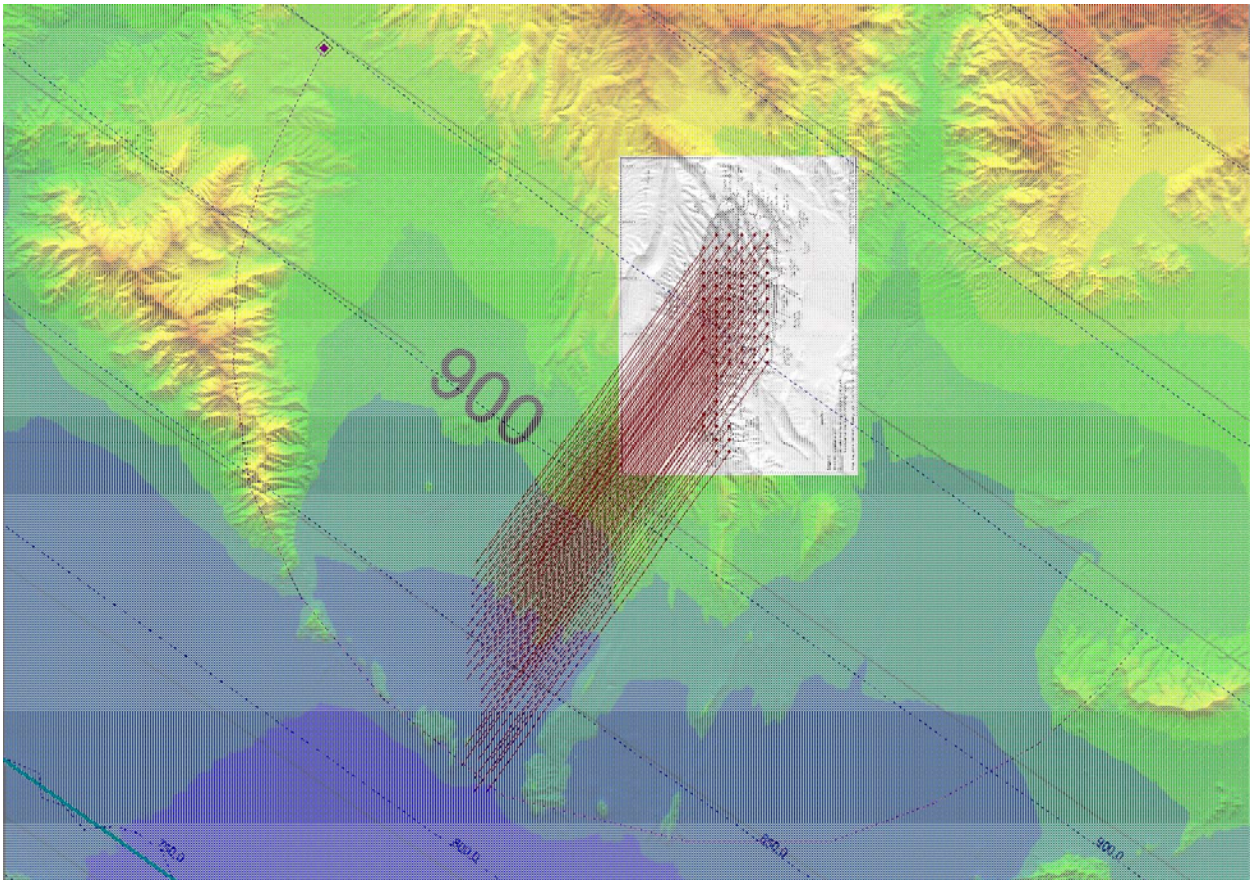

Figure 2. Simulated unconfined flow field and 500-year pathlines for full-pluvial conditions, using hydraulic conductivity K=0.5611 m/day, porosity n=0.05, with base of aquifer at mean sea level elevation. Circular arc (flux inspection boundary) is 18 km from south-central portion of repository. Volumetric flow rate across inspection boundary is 129,852 m^3/day, an increase of over 100% above modern conditions and directed to the southwest.

In summary, these simple and relatively transparent scoping analyses illustrate the extent to which DOE has failed to capture conceptual uncertainty related to the saturated-zone groundwater system in modeling analyses that directly support their License Application, which invalidates the Model in the context of the Application, as well as Performance Assessment calculations derived from it.

Because of significant deficiencies in the saturated zone flow model described above, the impact analysis of the FEIS and FSEIS are invalid and the FEIS and FSEIS can not be adopted by the NRC.

Readily available references are excluded from the requirement to provide electronic access. 10 C.F.R. § 2.1005.

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TIM-NEPA-05: INFILTRATION FLUX

1. A one-sentence statement of the contention itself

DOE's infiltration model has not been validated using available site and analogue information, and does not represent the range of probable infiltration fluxes, rendering the consequence estimates presented in FEIS Section 5.4 and SEIS Section 5.5 non-conservative and therefore invalid; had these deficiencies been remedied the disclosure of impacts would have been materially different, therefore the FEIS and FSEIS can not be adopted by the NRC.

2. A brief one-sentence summary of the basis of the contention

Neither moisture profiles (Flint and Flint, 1995 [LSN # MOL.19980429]) and implied minimum fluxes, nor observations from the Rainier Mesa analogue site (Russell et al., 1987 [LSN # DN2002163950]; Gauthier, 1997 [LSN # MOL.19980504.0153]) have been incorporated in the validation process described by SNL (2007 [LSN # DOC.20070530.0014)]; the model is therefore non-conservative with respect to infiltration estimates and cannot be accepted as evidentiary material by NRC.

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

Because this contention raises an issue whether DOE has complied with NEPA, the CEQ regulations, and the NRC NEPA regulations; pursuant to 10 C.F.R. section 51.109(a)(2), 10 C.F.R. section 63.31(c) and section II, paragraph 1 of the Notice of Hearing, this contention is within the scope of the hearing.

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

Before it may adopt the NEPA documents for the Yucca Mountain repository, the NRC must find that all requirements of NEPA have been satisfied. (*NEI v EPA*, 373 F.3d at 1314). Pursuant to 10 C.F.R. §§ 51.67(a) and 63.21(a) DOE is required to include an environmental impact statement (EIS) with its licensing application. Doe is required to supplement this EIS pursuant to 10 C.F.R. § 63.24(c) to consider the environmental impacts of any substantial changes in its proposed actions or any significant new circumstances or information relevant to environmental concerns related to the proposed action or its impacts. An attack on DOE's NEPA documents based on substantial and significant new information is a new consideration under 10 C.F.R. section 51.109(c), therefore the NEPA documents are not practicable for adoption. (Notice of Hearing Section III.B, 73 Fed. Reg. 63031 (October 22, 2008).) The NEPA documents fail to assess the environmental impacts of the proposed Yucca Mountain Repository. This contention alleges non-compliance with the relevant case law and regulatory provisions and therefore raises material issues relevant to the proceedings.

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

Moisture profiles in 99 shallow boreholes where site-specific data exist (Flint and Flint, 1995 [LSN # MOL.19980429.0126]) were not used as calibration targets in the validation effort summarized in SNL 2007 [LSN # DOC.20070530.0014]. Russell and co-workers (Russell et al., 1987 [LSN # DN2002163950]) have shown rapid responses to precipitation events at Rainier

Mesa, on the Nevada Test Site, an excellent natural analogue that was not considered in the validation process though well-known to Project management and the Nuclear Waste Technical Review Board (NWTRB). Recognizing that moisture profiles correspond to *minimum* fluxes through the wetted zones and that the Rainier Mesa tunnels provide empirical bases for comparison with Yucca Mountain, it must be concluded that DOE has not incorporated a reasonable measure of conservatism in its estimates of unsaturated-zone flux for the current climate. Analogue terrain provides somewhat greater effective moisture and infiltration due to a lower mean annual temperature (MAT) and higher mean annual precipitation (MAP) that may simulate a future transitional climate at Yucca Mountain.

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

DOE's representations of unsaturated flow in fractured tuffs are not demonstrably consistent with observations in the "neutron holes" at Yucca Mountain and the near vicinity. With respect to natural analogues, the source document (BSC, 2004m [LSN # DOC.20040524.0008], cited in SAR Sec. 2.3.2.5.1.6 at page 2.3.2-89) makes no reference to seepage into the tunnel complex at Rainier Mesa, the subject of analyses by Russell et al. (1987) and co-workers. In N-Tunnel at Rainier mesa, there is a well-documented zone with sustained inflows and proven seasonal pulses and recession behavior from seasonal infiltration (deep percolation) events. Given that key data from surface-based tests and analogue environments have been ignored in the process of estimating infiltration flux at Yucca Mountain, the analyses cannot be considered to be credible.

DOE states in their primary supporting document for unsaturated-zone infiltration estimates (SNL, 2007 [LSN # DOC.20070530.0014], Section 7.2.1.1 at page 7-71):

> *…in this report, data collected from depths greater than a few meters into the UZ were considered to be invalid for comparison to MASSIF predictions of net infiltration. The reason for this is that the validity of comparing point measurements from boreholes with model predictions with 30-m × 30-m grid cells are questionable for surface measurements due to extreme scale differences between borehole data and grid cell size.*

> *Consider the comparison of model soil depth versus actual soil depth for 95 neutron logging boreholes located within the infiltration model domain…poor correlation between measured and modeled soil depth within each soil depth class region.*

> *…MASSIF was compared to measurements of net infiltration at Pagany Wash and to net infiltration calculated from neutron logging data. These comparisons do not generally provide conclusive validation of the infiltration model…*

Clearly, the chosen model (MASSIF) was unable to incorporate site information for validation purposes, and rather than select a more appropriate model DOE chose to ignore the relevant field data. This is an unprecedented dismissal of site-specific information, and of even greater concern is the complete lack of reference to surficial responses during the winter of 2004-05, when a multi-year drought in the region ended and ground-water levels elsewhere in the region recovered within months to pre-2001 levels in response to renewed recharge. No record of responses to this regional recharge event from the neutron logging boreholes is cited in DOE's discussion of unsaturated-zone infiltration in the FEIS, SEIS, or LA.

DOE did, however, attempt to model underground seepage that occurred in the winter of 2004-05. From pages 7-72 through 7-75 of SNL (2007 [LSN # DOC.20070530.0014]), DOE describes attempts to model observed seepage in a 5.1-m drift section in the South Ramp of the Exploratory Studies Facility (ESF):

> *…it was estimated that seepage would occur along about 37% of the ESF South Ramp, compared with the observation that about 13% of the length exhibited wet spots. Therefore, these simulations confirm that the seepage observations in 2005 were not an unexpected condition…Although MASSIF results cannot be directly compared with quantitative field measurements of seepage…*

> *…simulations confirm that the seepage observations in 2005 were not an unexpected condition*

> *..results of this MASSIF calculation beg the question of why wasn't more seepage observed in the south ramp if the seepage model predicted seepage along 37% of south ramp when about seepage along 13% of the south ramp was observed…*

What is puzzling about this discussion of seepage into the ESF is that DOE had apparently not expected the seepage (no such expectation is documented), calls upon a model that fails to replicate borehole data to address an issue of similar scale in the ESF, then claims that the *model* has shown the seepage was not unexpected! The natural analogue at Rainier Mesa, referenced above, is ample basis for the expectation of seepage into the ESF from occasional wet periods of the current climate and all future climates that simulate the slightly wetter and cooler climate of Rainier Mesa. These considerations have apparently not entered the

EIS or licensing dialogue. If one wet season in the modern climate can induce seepage to the repository, expectations for site suitability have not been met. For the reasons stated above, the FEIS and SEIS are incomplete and can not be adopted by the NRC.

Readily available references are excluded from the requirement to provide electronic access. 10 C.F.R. § 2.1005.

References

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TIM-NEPA-06: ECONOMIC ANALYSIS

1. A one sentence description of the contention itself

The FSEIS, Subsections 3.1.7 and Table 3-1 define the Region of Influence for socioeconomic effects as "The two-county (Clark and Nye) area in which repository activities could most influence local economies and populations (Section 3.1.7)." This definition is a value jugedment that is not supported by the analysis contained in the FSEIS.

2. A brief one-sentence summary of the basis for the contention

The FSEIS, Sec. 3.1.7, define the regions of influence for socioeconimc impacts but overlooks the substantial impacts the proposed action will have on the Timbisha Shoshone village in Death Valley National Park; the FSEIS fails to address any impacts that might occur outside the State of Nevada.

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

This contention challenges whether or not the Department of Energy has complied with the Nuclear Regulatory Commission requirements applicable to Yucca Mountain. This contention falls within the scope of the hearing specified in section II, paragraph 1 of the Notice of Hearing.

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

The Nuclear Regulatory Commission must consider the environmental impacts of proposed action in order to meet the requirements of the National Environmental Policy Act.

Transportation impacts are a subset of the environmental impacts. The NRC Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain determined that "DOE has considered the transportation impacts of the proposed action in its EISs in a manner that is consistent with NRC guidance and applicable regulations." (p. 3-13)

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

The Final Supplemental EIS describes the region of influence for socioeconomics as "The two-county (Clark and Nye) area in which repository activities could most influence local economies and populations (Section 3.1.7)." The FSEIS uses the computer model named REMI to attempt to demonstrate that any employment effect from the proposed Yucca Mountain repository is dwarfed by the size of Clark County's economy. The DOE's choice of this method establishes artificial boundaries on impacts as was done in the FSEIS. The DOE's analysis ignores effects on the local economy such as those that occurred following 9/11 when visitor attendance at the Death Valley National Park declined. The FSEIs fails to acknowledge effects outside Nevada, despite the proximity and historic connection that Timbisha have had in the region. The Tribe has commented on this at previous hearings. Interestingly, the proximity of the tribe to the Mountain was the basis for the Bureau of Indian Affair's decision to award the Tribe affected status. Yet, the FSEIS does not acknowledge that there will be economic effects from the use of the road network in the area or the increase in traffic caused by the construction of the repository.

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

There is a genuine dispute between Timbisha Shoshone tribe and DOE regarding the analysis

regarding economic effects. DOE has imposed articifical boundaries around the area assessed for economic effects and studied effects in a way that obscures impacts to small populations, such as the tribe. This is not a trivial disagreement because there is no adequate disclosure of the environmental impact of the routes. The impact of the proposed action is not assessed, thus the FEIS and FSEIS cannot be adopted by the NRC.

TIM-NEPA-07: MITIGATION

1. A one sentence description of the contention itself

The FSEIS' discussion of mitigation is contradictory and suggests that the DOE has failed to consider its responsibilities to mitigate the hazards of these shipments in a meaningful way.

2. A brief one-sentence summary of the basis for the contention

Chapter 9 of the FSEIS discusses mitigation in the vicinity of Yucca Mountain, but it fails to describe how it will implement a mitigation program or what impacts it intends to mitigate. Nor does it describe who will be eligible to participate in mitigation.

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

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

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

NRC must consider the impacts of the proposed action in order to meet the requirements of NEPA. The NRC Staff's Adoption Determination Report for the U.S. Department of Energy's Environmental Impact Statements for the Proposed Geologic Repository at Yucca Mountain determined that "DOE has considered the transportation impacts of the proposed action in its EISs in a manner that is consistent with NRC guidance and applicable regulations." (p. 3-13)

5. A concise statement of the facts or expert opinions supporting the contention, along with

appropriate citations to supporting scientific or factual materials

The FSEIS, Chapter 9 contains information about the mitigation measures necessary to reduce or avoid impacts in the vicinity of the Yucca Mountain site. The FSEIS also indicates that the DOE might form a mitigation advisory board to assist with mitigation activity. However, this ignores the problem of mitigating impacts that will occur outside the State of Nevada. The FSEIS does not assess the need to mitigate impacts on local tribes. It does not define how eligibility for mitigation will be determined and it does not describe what kind of program DOE will create to handle mitigation during each of the phases of construction. DOE has carried out a tribal interaction program (section 3.1.6.2) for years and has soliticied tribal input on the project. The DOE also has staff dedicated to tribal interactions. However, the FSEIS does not describe the tribe's role in mitigating these impacts.

The Timbisha Shoshone Tribe has a long-standing presence in the region and expects to participate in discussions of mitigation. However, the FSEIS fails to study impacts outside Nevada. Nor does the FSEIS establish a basis for mitigating the effects of the repository. While the Congress established a requirement for funding training for first responders (section 180c of the Nuclear Waste Policy Act Amendments) this does not obviate the DOE's responsibility for mitigating the hazards of transporting these materials. There will a substantial need for pre-shipping mitigation in areas where incident-free radiation doses will occur.

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

There is a significant dispute between the Timbisha Shoshone tribe and the DOE about the sufficiency of FSEIS analysis of its planning for the transportation of these materials. The DOE

has failed to provide a framework for mitigating the impacts of this program; it has failed to describe how the mitigation will take place. The FSEIS does not describe how the DOE will comply with NRC requirements for protection of the public. As a result of these deficiencies the FSEIS cannot be adopted by the NRC.

TIM-NEPA-08: FUTURE CLIMATE

1. A one-sentence statement of the contention itself

DOE has failed to conservatively incorporate the full range of likely future climates in their analyses of system response to climate change, on that basis their FEIS (Section 5.4) and SEIS (Section 5.5) are deficient, and had these deficiencies been remedied the disclosure of impacts would have been materially different; therefore the FEIS and FSEIS can not be adopted by the NRC.

2. A brief one-sentence summary of the basis of the contention

Antarctic ice core-derived long records of average global temperatures and atmospheric greenhouse gas concentrations, documentation of ocean circulation changes which correlate with global climate change, and the current global warming combine to indicate the DOE Milankovich-based characterization of global climates for the next 10,000 years is not conservative.

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

Because this contention raises an issue whether DOE has complied with NEPA, the CEQ regulations, and the NRC NEPA regulations; pursuant to 10 C.F.R. section 51.109(a)(2), 10 C.F.R. section 63.31(c) and section II, paragraph 1 of the Notice of Hearing, this contention is within the scope of the hearing.

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

Before it may adopt the NEPA documents for the Yucca Mountain repository, the NRC must find that all requirements of NEPA have been satisfied. (*NEI v EPA*, 373 F.3d at 1314). Pursuant to 10 C.F.R. §§ 51.67(a) and 63.21(a) DOE is required to include an environmental impact statement (EIS) with its licensing application. Doe is required to supplement this EIS pursuant to 10 C.F.R. § 63.24(c) to consider the environmental impacts of any substantial changes in its proposed actions or any significant new circumstances or information relevant to environmental concerns related to the proposed action or its impacts. An attack on DOE's NEPA documents based on substantial and significant new information is a new consideration under 10 C.F.R. section 51.109(c), therefore the NEPA documents are not practicable for adoption. (Notice of Hearing Section III.B, 73 Fed. Reg. 63031 (October 22, 2008).) The NEPA documents fail to assess the environmental impacts of the proposed Yucca Mountain Repository. This contention alleges non-compliance with the relevant case law and regulatory provisions and therefore raises material issues relevant to the proceedings.

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

Average global temperatures and greenhouse-gas concentrations obtained from Vostok (Petit et al., 1999) and Dome C (Lüthi et al., 2008) in Antarctica demonstrate a cyclical behavior that does not support a direct cause-and-effect relationship to astronomical influences. There

appears, instead, to be terrestrial feedback mechanisms that limit global temperature rise and initiate cooling episodes sooner than would be predicted by the Milankovich theory.

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

DOE has considered modern, monsoonal, and glacial-transition climates in their analyses of the effects of climate change, but not full-glacial climates until 38,000 years in the future (Sharpe, 2003, [LSN # MOL.20030407.0055]). The ice-core data (Petit et al., 1999; Lüthi et al., 2008) can be interpreted to suggest that a return to full-glacial climate is imminent, and the need for conservatism dictates that DOE should consider the effects of more prevalent full-glacial climates on repository performance resulting from perturbation of global temperatures by greenhouse gases (IPCC, 2007). The evidence is building that global temperatures determine thermohaline-driven circulation patterns in the oceans (Broecker, 1997 [LSN # DN2001666881]; Clark et al., 2002) and establish new equilibrium states of ocean circulation and marked changes in global climates. The current rapid rise in average global temperatures is approaching a global average threshold temperature that has triggered the precipitous onset of glacial states in the past, based on ice core records. DOE has ignored the possibility of full-glacial climates for the first 38,000 years of the regulated time frame in their FEIS and SEIS assessments; these documents are non-conservative and therefore cannot be adopted by the NRC.

Readily available references are excluded from the requirement to provide electronic access. 10 C.F.R. § 2.1005.

<u>References</u>

Broecker, W.S., 1997. Thermohaline circulation, the Achilles heel of our climate system: Will man-made CO2 upset the current balance? Science, v. 278, p. 1582-1588. LSN #: DN2001666881.

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Sharpe, S. 2003. *Future Climate Analysis—10,000 Years to 1,000,000 Years After Present.* MOD-01-001 REV 01. Reno, Nevada: Desert Research Institute. ACC: MOL.20030407.0055.

II. JOINT CONTENTIONS

The Tribe reserves the right to join contentions with other parties.

SUPPORTING ATTACHMENTS

1. Affidavit of Fred C. Dilger

2. Affidavit of Cady Johnson

3. Affidavit of Martin D. Mifflin

Dated: December 22, 2008

Respectfully submitted,

[Signed electronically]

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SUPPORTING ATTACHMENT 1

Affidavit of Fred C. Dilger

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
U.S. DEPARTMENT OF ENERGY	)	Docket No. 63-001
License Application to Construct a Geologic Repository at Yucca Mountain	)	

AFFIDAVIT OF FRED C. DILGER

I, Fred C. Dilger, the undersigned affiant, do hereby make the following statements based upon my own knowledge, information, and belief.

1. My name is Fred C. Dilger, and my curriculum vitae is attached to this Affidavit as Attachment A. I am executing this Affidavit in support of the Timbisha Shoshone Tribe Petition to Intervene as a Party (Petition) in the above-captioned proceeding.

2. I have been retained by the Timbisha Shoshone Tribe as an expert in this proceeding to offer opinions on issues relating to the transportation of spent nuclear fuel and high-level radioactive waste from generator sites to the Yucca Mountain repository. In order to offer an expert opinion for the Timbisha Shoshone Tribe in the instant proceedings, I have reviewed the following documents: the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F)(2002); *Final Supplemental Environmental Impact Statement Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1) (2008); *Final Supplemental Environmental Impact Statement Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada Rail Transportation Corridor*(DOE/EIS-0250F-S2) (2008); *Final Environmental Impact Statement*

for a Rail Alignment for the Construction and Operation of a Railroad in Nevada to a Geologic Repository at Yucca Mountain, Nye County, Nevada (DOE/EIS-0369)(2008); the Petition to Intervene of the Timbisha Shoshone Tribe, including the accompanying Contentions, and all documents cited to or referred to in the Contentions.

3. Within the Petition are numerous Contentions, each comprised of several paragraphs. I hereby adopt as my own opinions the statements contained within Paragraph 5 of those specific contentions identified in Attachment B to this Affidavit. I understand that attorneys for the Timbisha Shoshone Tribe will assign unique numbers to each of those contentions just prior to the filing of the Petition and will include those unique numbers in Attachment B.

Further, the affiant sayeth not.

Fred C. Dilger

The above-named affiant personally appeared before me this ___ day of December, 2008, and executed this affidavit.

Notary Public

My Commission expires: March 8, 2011

R. TIFFANY
Notary Public, State of Nevada
Appointment No. 07-1845-1
My Appt. Expires Mar 8, 2011

ATTACHMENT A

CURRICULUM VITAE

FRED C. DILGER

Fred C. Dilger III

October 2007

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Education

PhD. Arizona State University, Tempe Arizona. Environmental Design and Planning (Planning concentration). Dissertation title: "The New Nuclear Imperative: A Hazards Planning Process for the Urban Transportation of Spent Nuclear Fuel." Chair Mary Kihl. August 2004.

M.A. University of Nevada, Las Vegas, Nevada. Ethics and Policy Studies: Concentrations included quantitative risk analysis and policy design.

M.A. University of London. Great Britain. Geography. Thesis on Quantitative Risk Analysis of Transportation Systems.

B.A. Pennsylvania State University, State College Pennsylvania. Major in economics.

Professional Experience

Principal, Black Mountain Research. Henderson, Nevada. June 2004 to present.

- Impact Assessment
- Use Planning Support Systems to quantitatively evaluate long-range plans
- Perform GIS-based transportation systems analysis.
- Develop customized travel demand models for transportation impact assessment.
- Quantitative risk assessment for transportation systems

Principal Planner, Clark County Comprehensive Planning. Las Vegas, Nevada. 1993-1994 and April 1998 to June 2004

- Assist in the preparation of regional transportation plans using computer-based transportation models
- Provide policy advice on transportation implications of transporting high-level radioactive waste through the community
- Provide policy advice on transportation planning issues relevant to the rapidly developing community

Graduate Research Assistantships, Planning. Arizona State University. (Fall 2000-Spring 2003)

- Prepared research report for faculty mentors.
- Engaged in professional conference presentations and scholarship development

Executive Consultant. Plangraphics, Muscat Sultanate of Oman 1994-1995.

- Prepared digital geodatabase design to support digital mapping for the Sultanate
- GIS instructor for National Survey Authority management and analyst staff

Transportation Analyst. Nevada State Department of Transportation 1991-1993 and 1996-1998.

- Prepare benefit/cost analysis of statewide transportation Improvement Plan projects
- Prepare GIS maps of Statewide transportation planning projects
- Analyze regional transportation planning reports and studies
- Managed University interns for multiple planning projects-trained interns in GIS.

Professional Affiliations

International Association for Impact Assessment

American Planning Association

National Association of Environmental Professionals

Articles in peer reviewed academic journals

The Next Species of Trouble: Spent Nuclear Fuel Transportation in the United States 2010-2048. American Behavioral Scientist. Winter 2002. (with Robert Halstead).

Using Social Scientific Methodological Approaches to Reducing Risk: How the Risk Reduction Approach Works with Oil and Gas Industries. International Journal of Social Inquiry. January 2008. (with James D. Ballard).

Articles in preparation for peer reviewed academic journals

Alternate Route: Mitigation Planning for Hazardous Materials Transportation. For submission to the Journal of the American Planning Association.

Conference proceedings (peer reviewed)

"State of Nevada Perspective on the U.S. DOE Yucca Mountain Transportation Program" (Paper presented at Waste Management 2008, Phoenix, AZ, with F.C. Dilger & J.D. Ballard)

"Assessing the Vulnerability of Yucca Mountain Shipments: A Threat Matrix for Human-Initiated Events" (Paper presented at Waste Management 2008, Phoenix, AZ, with J.D. Ballard and F.C. Dilger)

"Yucca Mountain Transportation Security Issues: Overview and Update." (Proceedings, Waste Management 2007, Tucson, AZ, with J.D. Ballard and F.C. Dilger)

"Full-Scale Cask Testing Revisited, Again." (Proceedings, Waste Management 2006, Tucson, AZ, with F.C. Dilger)

"Any Way to Run a Railroad: Implications of Dedicated Trains." (Proceedings, Waste Management 2006, Tucson, AZ, with F.C. Dilger)

"Great Expectations: An Examination of Section 180c Funding Allocations." (Proceedings, Waste Management 2006, Tucson, AZ, with F.C. Dilger)

"Railroading Nevada," Nuclear Engineering International Magazine, October 2005 (With F.C. Dilger)

"Hot Time in the City: Which Shipment Mode for High Level Nuclear Waste Affects Urban Areas Most?" (Revised Version of Paper presented at Waste Management 2005, NANP website, with F.C. Dilger)

"Measures of Community Impact for the Transportation of Hazardous Materials: The Case of Indian Tribes and High-Level Nuclear Waste." (Revised Version of Paper presented at Waste Management 2005, NANP website, with F.C. Dilger)

"Integrating Hazards Assessment and Risk Assessment: The Case of the Caliente Rail Corridor to Yucca Mountain." (Revised Version of Paper presented at Waste Management 2005, NANP website, with F.C. Dilger)

"Planning for An Unpredictable Event: Vulnerability and Consequence Reassessment of Attacks on Spent Fuel Shipments." (Revised Version of Paper presented at Waste Management 2005, NANP website, with J.D. Ballard & F.C. Dilger)

"Beyond the Mountains: Nuclear Waste Transportation and the Rediscovery of Nevada." (Proceedings, Waste Management 2004, Tucson, AZ, with F.C. Dilger & J.D. Ballard)

"Testing to Failure: Design of Full-Scale Fire and Impact Tests for Spent Fuel Shipping Casks." (Proceedings, Waste Management 2004, Tucson, AZ, with F.C. Dilger & J.D. Ballard)

"The Next Species of Trouble: Spent Nuclear Fuel Transportation in the United States, 2010-2048," in H.W. Kushner, ed., Nuclear and Radiological Terrorism, American Behavioral Scientist, Vol. 46, No. 6 (February 2003) (with F.C. Dilger)

"Many Roads to Travel: Alternative Approaches to Route Selection for Yucca Mountain Shipments." (Proceedings, Waste Management 2003, Tucson, AZ, with F.C. Dilger)

"Implications of the Baltimore Rail Tunnel Fire for Full-Scale Testing of Shipping Casks." (Proceedings, Waste Management 2003, Tucson, AZ, with F.C. Dilger)

"How Many Did You Say? Historical and Projected Spent Nuclear Fuel Shipments in the United States, 1964-2048." (Proceedings, Waste Management 2003, Tucson, AZ, with F.C. Dilger)

"Rail Access to Yucca Mountain: Critical Issues." (Proceedings, Waste Management 2003, Tucson, AZ, with F.C. Dilger & R.C. Moore)

"Radiological Impacts of Incident-Free Transportation to Yucca Mountain: Collective and Maximally Exposed Individual Doses." (Paper presented at Health Physics Society Annual Meeting, June 2002, NANP website, with H. Collins & R. Gathers)

"Radiological Impacts of Incident-Free Spent Nuclear Fuel Transportation to Yucca Mountain." (Proceedings, Waste Management 2002, Tucson, AZ, with H. Collins & R. Gathers)

"Meet the Maximally Exposed Member of the Public: The Service Station Attendant and SNF Trucks Going to Yucca Mountain." (Proceedings, Waste Management 2002, Tucson, AZ, with H. Collins & R. Gathers)

"Nuclear Waste Transportation Terrorism and Sabotage: Critical Issues," Proceedings of the International Symposium on Packaging and Transportation of Radioactive Materials (PATRAM), Chicago, IL, September 2001, with D. Ballard and F. Dilger)

"State of Nevada Studies of Potential Terrorism and Sabotage Against Spent Fuel Shipments," Proceedings of Waste Management '01, Tucson, AZ, February 2001, with D. Ballard and F. Dilger)

GIS in Regional Transportation Planning. Proceedings of the International Society of Civil and Electrical Engineers. July 1993. (With P. Lima).

A Geographic Information/Transportation Modeling System. Proceedings of the Institute of Transportation Engineers. July 1993. (With P. Lima and R. Souleyrette).

Recent government agency reports

"Terrorist Attacks on Nuclear Power Plants and Nuclear Material Transports." Various co-authors expert report for NATO project grant SST.CLG.978964. June 2004.

"Integrating Hazards Assessment and Environmental Impact Assessment in a GIS Framework" Nevada Agency for Nuclear Projects. August 2004.

"Impacts of Transporting Spent Nuclear Fuel and High-Level Radioactive Waste through Clark County, Nevada." Clark County, Nevada June 2001.

"Risk Assessment for the Transportation of Spent Nuclear Fuel through Inyo County, California." A report for the Inyo County Board of Supervisors. April 2006.

Expert Testimony

Risks Associated with the Transportation of Spent Nuclear Fuel. Minnesota Legislative Committee on Roads and Highways. July 2006.

Truck and Rail Shipments of High Level Radioactive Waste through Nevada. Nevada Legislative Committee on Roads and Highways. June 2000.

Implications of Alternative Rail Alignments on the Yucca Mountain Project. Nevada Legislative Committee on High Level Radioactive Waste. October 1999.

Nuclear Regulatory Commission, Package Performance Study. Spring 1999.

Selected Media Contacts

Interviews with 60 Minutes episode aired in November 2003. The Las Vegas Sun 1998-2004. Washington Post 2000.

Selected State/Local and community presentations

Mitigating Routine High Level Waste Transportation. Presentation to the Western Planning Experience Las Vegas. August 8th, 2003

"Route Selection for High-Level Radioactive Waste Shipments to Yucca Mountain." HAZMAT EXPLO 2003. Las Vegas. December 2003.

High Level Waste Transportation and Tribal Issues. Native American Forum on Nuclear Issues Las Vegas. August 26, 27, 28, 2003.

"Highway Alternatives for Shipping High-Level Radioactive Waste Shipments to Yucca Mountain." HAZMAT EXPLO 2002. Las Vegas. December 2002

ATTACHMENT B

Contentions Adopted By **Fred C. Dilger** In Accordance With Affidavit	Unique Identifier Assigned by Counsel per PAPO Order
Economic Analysis	TIM-NEPA-06
Mitigation	TIM-NEPA-07

SUPPORTING ATTACHMENT 2

Affidavit of Cady Johnson

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
U.S. DEPARTMENT OF ENERGY	)	Docket No. 63-001
License Application to Construct a Geologic Repository at Yucca Mountain	)	

AFFIDAVIT OF CADY JOHNSON

I, Cady Johnson, the undersigned affiant, do hereby make the following statements based upon my own knowledge, information, and belief.

1. My name is Cady Johnson, and my curriculum vitae is attached to this Affidavit as Attachment A. I am executing this Affidavit in support of the Timbisha Shoshone Tribe Petition to Intervene as a Party (Petition) in the above-captioned proceeding.

2. I have been retained by the Timbisha Shoshone Tribe as an expert in this proceeding to offer opinions on issues relating to the isolation of spent nuclear fuel and high-level radioactive waste from generator sites in a repository at Yucca Mountain. In order to offer an expert opinion for the Timbisha Shoshone Tribe in the instant proceedings, I have reviewed the following documents: the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F)(2002); *Final Supplemental Environmental Impact Statement Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1) (2008); the Petition to Intervene of the Timbisha Shoshone Tribe, including the accompanying Contentions, and all documents cited to or referred to in Contentions TIM-NEPA-01, -02, -03, -04, -05, and -08.

3. Within the Petition are numerous Contentions, each comprised of several paragraphs. I hereby adopt as my own opinions the statements contained within Paragraph 5 and 6 of Contentions TIM-NEPA-01, -02, -03, -04, -05, and -08.

Further, the affiant sayeth not.

Cady Johnson

The above-named affiant personally appeared before me this 20 day of December, 2008, and executed this affidavit.

Notary Public

My Commission expires: 2.9.10

NOTARY PUBLIC
STATE OF ARIZONA
Maricopa County
JESSICA LAURENCE
My Commission Expires 02/09/12

RESUME as of November, 2008

CADY L. JOHNSON
2113 W Rose Garden Ln
Phoenix, AZ 85027 USA
623-322-3096 (voice), 435-790-9528 (cel)
ircady@yahoo.com

hydrogeology
geochemistry
visualization models
infrared thermography
flight operations

EDUCATION

University of Nevada, Reno: Ph.D., Geology and Hydrology/Hydrogeology, 1982
Oregon State University: B.S., Geology, 1976

DOCTORAL DISSERTATION

"Correlation and Origin of Carnotite Occurrences in the Southern Nevada Region", 1982. Carnotite [$K_2(UO_2)_2(VO_4)_2 \cdot 3H_2O$] associated with a pre-Colorado River geomorphic surface was evaluated through a combination of geologic reconnaissance, geochemical modeling, and natural analogue studies. The preferred interpretation is that the carnotite formed by evaporation of shallow groundwater prior to incision of the Colorado River and lowering of the regional saturation level.

PROFESSIONAL CERTIFICATIONS

Licensed Professional Geologist, State of Utah, #6295290-2250
Certified Nuclear Testing Equipment Operator #11671
Certified Infrared Thermographer (Level III) #3156
Airline Transport Pilot, Rotorcraft/Helicopter
Certified Flight Instructor, Rotorcraft/Helicopter
Airframe and Powerplant Mechanic

EMPLOYMENT HISTORY

Wave Uranium Holding, President/CEO, 2007-present
GeoLogic VR, LLC, Principal, 2003-present
Petroleum Helicopters, Inc., Pilot, 1998-2003
Papillon Grand Canyon Helicopters, Pilot, 1997
Woodward-Clyde Federal Services, Senior Project Hydrogeologist, 1991-1997
Helicopter Services of Nevada, Pilot/Mechanic, 1990-1991
Mifflin & Associates, Inc., Associate/Hydrogeologist, 1986-1989
Desert Research Institute, Assistant Research Professor, 1985-1986
Coffey & Partners Pty. Ltd., Senior Hydrogeologist/Geochemist, 1984
Intera Environmental Consultants, Staff Consultant, 1983
Bendix Field Engineering Corp., Geologist & Research Geoscientist, 1979-1982

REPRESENTATIVE EXPERIENCE

Dr. Johnson has over 25 years of full-time professional experience as a hydrogeologist, 10 of which were conducted in parallel with flight operations as a commercial helicopter pilot.

Dr. Johnson maintains an active consulting practice as Principal of GeoLogic VR, LLC, an Arizona company, and serves as President and Chief Executive Officer of Wave Uranium Holding, a Nevada corporation.

He was employed until August of 2003 as an emergency medical services (EMS) pilot with AirEvac Services (a subsidiary of Petroleum Helicopters, Inc.) in Phoenix. He relocated temporarily to Antarctica to fly for the National Science Foundation in 2001, after 2 ½ years of offshore operations in the Gulf of Mexico.

Dr. Johnson served for over five years as Senior Project Hydrogeologist in the Yucca Mountain Site Characterization group of Woodward-Clyde Federal Services in Las Vegas. In this position he was responsible for integration of field activities from numerous technical disciplines, including development of staff positions on fluid-flow modeling and issue resolution strategies. The Site Characterization Program is a ten year effort to assess the suitability of Yucca Mountain, Nevada, as the host environment for a high-level radioactive waste repository.

Previously, Dr. Johnson worked as a consultant to the Nevada Nuclear Waste Project Office while employed with Mifflin & Associates, Inc., a private consultancy, and with the Desert Research Institute (University of Nevada System). Additional duties at these positions included water quality and water resource evaluations for utility companies and the mining industry, and occasional graduate-level teaching assignments.

He was employed as Senior Hydrogeologist/Geochemist with Coffey & Partners Pty. Ltd. in Sydney, Austrailia, and contributed to a variety of mine dewatering, environmental, and corrosion-related evaluations. As a Staff Consultant with Intera Environmental Consultants in Houston, he contributed to performance assessment modeling of regional ground-water flow at candidate salt-repository sites in Texas and Louisiana, and to evaluations of the validity of ion-activity approximations at high ionic strengths.

At Bendix Field Engineering Corp., he contributed to three (3) quadrangle evaluations for the National Uranium Resource Evaluation (NURE) Program, and was Principal Investigator on the Las Vegas NTMS Quadrangle Evaluation. He designed the ground-water monitoring network for the Monticello Facility under the Uranium Mill Tailings Remedial Action (UMTRA) Program, and conducted interference tests and modeling analyses using production wells to evaluate aquifer parameters.

Dr. Johnson is an experienced professional pilot, rotary-wing flight instructor, and a licensed airframe and powerplant mechanic. As a Certified Infrared Thermographer, he has used modeling analyses to develop a thermal-barometric time constant for barometric pumping in the vadose zone near Yucca Mountain. The properties under study will govern the modes of heat and moisture redistribution in the partially-saturated rock above a nuclear waste repository.

PUBLICATIONS

Hurley, B. W., Johnson, C. L., Cupp, G. M., Mayerson, D. L., Dodd, P. A., and Berg, J. C., 1980, Uranium Resource Evaluation, Reno Quadrangle, Nevada and California: U. S. Dept. of Energy Open-File Report PGJ/037(81).

Johnson, C., and McKay, W. A., 1981, Influences of the Miocene Horse Spring Formation on Groundwater Quality in the Southern Nevada Region: Proceedings of the 10th Annual Rocky Mountain Ground-Water Conference, Laramie, Wyoming, p. 55 (Abs.).

Johnson, C., 1981, Structural History of the Great Basin: in Bender, Gordon L. (ed.), 1981, Research Handbook on the Deserts of North America; Greenwood Press, Westport, Conn. (a division of Congressional Information Service, Inc.).

Johnson, C. and Glynn, J., 1982, Uranium Resource Evaluation, Las Vegas Quadrangle, Nevada, Arizona and California: U. S. Dept. of Energy Open-File Report PGJ/F-1211(82).

Johnson, C. and Kearl, P., 1982, Hydrologic Measurements: in BFEC Technical Measurements Staff and Mary Gerry White, 1982, Review of Selected DOE Remedial Action Field Measurement Procedures for the Summer of 1982; U. S. Dept. of Energy.

Luning, R. H., Penley, H. M., Johnson, C. L., and Dotterrer, F. E., 1981, Uranium Resource Evaluation, Kingman Quadrangle, Arizona, Nevada and California: U. S. Dept. of Energy Open-File Report PGJ/137(81).

McKay, W. A. and Johnson, C., 1981, Hydrogeochemistry of Fault-Related Thermal Springs in the Black Canyon-Hoover Dam Area, Nevada and Arizona: Proceedings of the 10th Annual Rocky Mountain Ground-Water Conference, Laramie, Wyoming, p. 56 (Abs.).

Johnson, C., 1990, Infrared Imaging at Yucca Mountain: Evidence of a Potentially Disqualifying Condition (Abs.): in Minimizing Risk to the Hydrologic Environment, American Institute of Hydrology.

Johnson, Cady, and Mifflin, Martin, 2003, Evidence for a Sub-Regional Hydraulic Barrier in Southeastern Nevada (abs): Geological Society of America, Annual Meeting, Seattle, WA, Nov. 5, 2003.

Johnson, Cady, and Mifflin, Martin, 2006, The AEM and regional carbonate aquifer modeling: Ground Water 44(1), 24-34.

CONSULTING REPORTS (Author or Major Contributor)

Intera Environmental Consultants, 1983, Data Evaluation and Recommendation for Performance Assessments of the Preferred Site in the Palo Duro Basin; Regional/Local Geochemistry, Report TR-24, April 1983, pp. 35-42.

Intera Environmental Consultants, 1983 Second Status Report on Regional Groundwater Flow Modeling for the Palo Duro Basin, Texas; Report TR-31, October, 1983, 85 p.

Intera Environmental Consultants, 1983, Second Status Report on Regional Groundwater Flow Modeling for Vacherie Dome, Louisiana.

Coffey and Partners, 1984, Vickery Joint Venture-Vickery Coal Project-Interpretation of Vickery Hydrogeochemical Data; Report H131/1-AA, June, 1984, 35 p.

Coffey and Partners, 1984, Broken Hill Proprietary Co. Ltd. - Proposed Bloom Caster Development - Geotechnical Report; Hydrogeological Design Parameters, Report N1940, August, 1984, pp. 4-8.

Coffey and Partners, 1984, Feez Ruthning and Co./Alpair Pty. Ltd. - Proposed Cattle Feedcot - Felton East; Hydrogeological Assessment, Report B13374/1, September, 1984, 29 p.

Coffey and Partners, 1984, Denham Coal Management, Gordonstone - A to P 389C Hydrogeological Assessment, Report H138/1, September 1984.

Coffey and Partners, 1984, Morgan Talbot and Assoc. Pty. Ltd. - Hydrogeological Assessment Lot 3 DP556345 - Falconbridge, Report H141, 1-AA, November, 1984.

Coffey and Partners, 1985, Woodcutters Joint Venture - First Status Report on Trial Dewatering, Woodcutters Mine, N. T.; Report H122/5-AA, January, 1985.

Coffey and Partners, 1985, Woodcutters Joint Venture - Second Status Report on Trial Dewatering, Woodcutters Mine, N. T. (includes statement of monitoring strategy); Report H122/5-AB, February, 1985.

Coffey and Partners, 1985, Woodcutters Joint Venture - Permeability Testing at Tailings Impoundment Site, Woodcutters Mine, N. T.; Report H122/5-AC, February, 1985.

Coffey and Partners, 1985, Gordon Robilliard & Assoc./Baulkham Hills Shire Council, Hydrogeologic Assesment, Lot 1DP 550165 and Portion 379, Parish of Nelson; Report H146/1-AA, February, 1985.

Coffey and Partners, 1985, Radio Transmission Engineering Pty. Ltd., Corrosion of Buried copper at 2SM Antenna, Homebush, N. S. W.; Report S7549/1-AB, March, 1985.

Johnson, C., 1986, Nevada Power Company-Reid Gardner Pond Monitoring Study: Desert Research Inst. Water Resources Center, Unpubl. Rpt., July, 1986, 49 p.

Johnson, C., and Brick, C., 1986, Construction, Development and Testing of the NPC "Mesa Wells" EH-2 and EH-2A: Desert Research Inst. Water Resources Center, Interim Rpt. Dated July 31, 1986, 19 p.

Johnson, C., Mifflin, M., Johnson, R.J., and Haitjema, H., 2001, Hydrogeologic and Groundwater Modeling Analyses for the Moapa Paiute Energy Center, Nevada.: Mifflin & Assoc. Inc., January, 2001.

Mifflin, M. D., Johnson, C. L., and Johnson, R. J.,1989, Hydrogeologic Assessment - Upper Muddy River Valley, Nevada: Mifflin & Assoc., Inc., February, 1989.

SUPPORTING ATTACHMENT 3

Affidavit of Martin D. Mifflin

BEFORE THE U.S. NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
U.S. DEPARTMENT OF ENERGY	)	Docket No. 63-001
License Application to Construct a Geologic Repository at Yucca Mountain	)	

AFFIDAVIT OF MARTIN D. MIFFLIN

I, Martin D. Mifflin, the undersigned affiant, do hereby make the following statements based upon my own knowledge, information, and belief.

1. My name is Martin D. Mifflin, and my curriculum vitae is attached to this Affidavit as Attachment A. I am executing this Affidavit in support of the Timbisha Shoshone Tribe Petition to Intervene as a Party (Petition) in the above-captioned proceeding.

2. I have been retained by the Timbisha Shoshone Tribe as an expert in this proceeding to offer opinions on issues relating to the isolation of spent nuclear fuel and high-level radioactive waste from generator sites in a repository at Yucca Mountain. In order to offer an expert opinion for the Timbisha Shoshone Tribe in the instant proceedings, I have reviewed the following documents: the *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F)(2002); *Final Supplemental Environmental Impact Statement Repository for the Disposal of Spent Nuclear Fuel and High –Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250F-S1) (2008); the Petition to Intervene of the Timbisha Shoshone Tribe, including the accompanying Contentions, and all documents cited to or referred to in Contentions TIM-NEPA-01, -02, -03, -04, -05, and -08.

3. Within the Petition are numerous Contentions, each comprised of several paragraphs. I hereby adopt as my own opinions the statements contained within Paragraph 5 and 6 of Contentions TIM-NEPA-01, -02, -03, -04, -05, and -08.

Further, the affiant sayeth not.

Martin D. Mifflin

The above-named affiant personally appeared before me this 20 day of December, 2008, and executed this affidavit.

Notary Public

ANGELIQUE NGUYEN
NOTARY PUBLIC - STATE OF NEVADA
COUNTY OF CLARK
APPT. No. 07-4345-1
MY APPT. EXPIRES JUNE 19, 2011

My Commission expires: June 19, 2011

RESUMÉ
MARTIN DAVID MIFFLIN
Revised 10/07

PERSONAL:

Date of Birth:	29 March 1937
Place of Birth:	Olympia, Washington
Citizenship:	United States of America
Marital Status:	Widowed 1971, 4 children
Health	Excellent
Languages	English, working knowledge of Spanish

EDUCATION:

Ph.D., 1968, University of Nevada, in Hydrogeology
M.Sc., 1963, Montana State University, in Applied Science
B.Sc., 1960, University of Washington, in Geology
Washington State University, Eastern Washington

PROFESSIONAL EXPERIENCE:

7/86-present President and Senior Hydrogeologist of Mifflin and Associates, Inc., (MAI) a consulting firm which conducts hydrogeologic and geologic investigations. Contracts have included technical support for oversight of DOE proposed Yucca Mountain High-Level Nuclear Waste Repository for the following clients: State of Nevada (1986-1997), Nye county (1992-1994), and Inyo County (1993-1994). MAI provided ground-water monitoring and data analyses to Nevada Power Company (1987-1997) and conducts local and international ground-water development and management studies: Moapa Band of Paiutes (1998-present) Calpine Company (1999-2003), Chemical Lime (1998); Nevada Cogeneration Associates, 1989-1992; Las Vegas Paiute Tribe, 1992; United Nations—Paraguay, 1989-1991; and Kenya Wildlife Service, 1991. Specialized in providing technical support teams composed of experts, laboratories, and drilling contactors for hydrogeological and geological problems.

3/79-7/86 Research Professor, Water Resources Center, Desert Research Institute, University of Nevada System. Research in ground-water problems in arid zone hydrology. Specific areas of activity: carbonate rock hydrogeology, ground-water exploration and development, exploratory drilling techniques, vadose zone moisture conditions, and recharge in arid terrain. During this period of time, major ground-water exploration and development programs were established for the State of Nevada (Jean Prison water supply, Valley of Fire State Park), the United States Air Force (Tonopah Test Range, Tolicha Peak), and Nevada Power Company (Meadow Valley Wash Well Field development, monitoring, and

modeling; carbonate-rock ground-water exploration program near Moapa). Program Director of the Yucca Mountain Candidate High-Level Nuclear Waste Repository oversight technical support program for the State of Nevada (1983-1986). Helped the Nuclear Project Office, State of Nevada, design its technical oversight program (1982-1983).

3/78-3/79 Senior Hydrogeologist, and Resident Administrator UNDP, Chile. Leave of absence from Desert Research Institute for service in Region 4, Chile UNDP project. Water resource assessment project in semi-arid region of Chile, chief resident administrative responsibility for the UNDP project.

7/75-3/78 Associate Director and Research Professor (September 1977 to March 1978, Research Professor), Water Resources Center, Desert Research Institute, Las Vegas, Nevada. Acting as researcher and head administrator in the Water Resources Center of the Desert Research Institute in the Las Vegas branch office. General responsibilities included research funding, direction, and execution of programs of the Water Resource Center in Southern Nevada. Areas of research interest during this period included land subsidence caused by fluid withdrawals and associated earth fissures and faults in Las Vegas Valley and Mexico, deep carbonate-rock aquifers in Nevada as a potential water-supply alternative for Eastern and Southern Nevada, and waste-water treatment by natural marsh systems in Las Vegas Valley. Expert testimony on the Cross Florida Barge Canal ground-water hydrology was given to the State of Florida Bureau of Planning and Florida Cabinet in July 1976, as well as serving on the board of review for the Water Element of the State Plan of Florida from1976 to 1977. Periodic Consulting in 1975, 1976 and 1977 for the Comision del Plan Nacional Hidraulico in the area of ground-water policy and executed programs of resource evaluation and advanced training of personnel.

9/73-7/75 Leave of absence from the University of Florida in order to accept an 18-month position as World Bank Resident Consultor to the Plan Nacional Hidraulico (PNH), a newly-created planning organization within the Mexican government. Also concurrently held PNH position of Jefe de Aguas Subterraneous (chief in charge of ground-water planning and associated investigations within PNH). Responsibilities involved training and development of professional staff, development of procedures and policy, and direction of ground-water studies designed for both short and long term planning of ground-water exploitations and management. PNH was a joint effort by the United Nations Development Program (UNDP) and the Mexican Government. The UNDP effort was executed by the World Bank (International Bank for Reconstructions and Development), which provided five internationally selected resident consultors expert in

various disciplines in water resource planning and development to work with Mexican counterparts. The experimental program was judged successful by the UNDP, World Bank, and the Mexican Government. Mexico formalized the organization into the continuing national planning agency for water resource development in Mexico (Comision del Plan Nacional Hidraulico, ASRH).

9/69-7/75 Associate Professor of Geology, University of Florida. Teaching responsibilities in the following courses: Physical Geology, Introductory Geosciences, Geomorphology, Structural Geology, Ground-Water Geology, and Hydrogeology. Research was local problems of ground-water pollution and continued field work (summers of 1970 and 1972) on isostatic rebound in the Lahontan Basin of the Great Basin. Member of the UF Graduate Faculty and served on graduate committees (M.S. and Ph.D.) for Geology, Environmental Engineering, Coastal Engineering, and Civil Engineering graduate students. Considerable involvement in ground-water pollution aspects of the Cross Florida Barge Canal (controversy), with testimony given to Florida Legislative committees, the State of Florida Cabinet, and the U.S. Presidential Council on Environmental Quality. The Corp of Engineer project was terminated by U.S. Presidential Executive Order in 1970 due to Floridian Aquifer pollution hazard largely based on my testimony and analyses of fundamental design problems. Principal expert witness in hydrological groundwater issues for EDF and U.S. Department of Justice in court proceedings (U.S. Government vs. Florida Canal Authority) August, 1973.

7/63-9/69 Research Associate, Desert Research Institute and Nevada Center for Water Resources Research. Activities primarily research in ground water and hydrogeology. Principal Investigator or co-investigator in research dealing with the following: hydrologic safety, AEC underground nuclear detonation; investigation of land subsidence in Las Vegas Valley and the development of the theory of mechanics; investigation of the hydrogeology of Las Vegas Valley for feasibility of artificial recharge; delineation of ground-water flow systems using studies of fluid potential, water chemistry, isotopes, and other methods; paleohydrologic investigations in Nevada (surface water and ground water); stratigraphic studies of alluvial basins; documentation of mudlump formation and hydrologic relationships causing formation, and developing a theory for mechanics of formation; investigations of carbonate-terrain hydrology in Nevada using tritium and hydrogeochemical techniques; exploration and development of ground water in a number of arid areas for federal, state, and private agencies; investigation of techniques for delineation of ground-water flow systems. Other activities included guest and substitute lecturing in ground water, hydrogeology, and physical geology, and

direction of graduate student research in the Great Basin on hydrologic problems. Nevada State Legislative Committee testimony that began a process which resulted in a new Dept. of Interior diversion policy in the early 1970's. The new policy for TCID Newlands Project Truckee River diversion basically doubled Truckee River flows to Pyramid Lake.

9/62-6/63 Graduate Research Assistant, Montana State University. The Montana State University experience consisted of half-time teaching of geology laboratories and two winters of snow avalanche research.

5/62-9-62 Geologist. GS-7, U.S. Geological Survey. Field geologic mapping in the Lemhi Range, Idaho, and Beaverhead Range, Montana.

9/60-6/62 Graduate Teaching Assistant, Montana State University. Half time geology laboratory instructor.

3/59-8-59 Apprentice Geologist, Pan American Petroleum Corporation. Field reconnaissance mapping in Western Alaska.

PROFESSIONAL HONORS AND OTHER PROFESSIONAL ACTIVITIES

Recipient, with co-authors, of the Geological Society of America *Kirk Boyen Award,* 2007 for published paper of distinction advancing the Science of Quaternary Geology.

Committee Member, National Academy of Science, Committee of Review Specific Scientific and Technical Safety Issues Related to the Ward Valley, California, Low-Level Radioactive Waste Site, 1994-1995.

Editorial Board, Groundwater Journal, 1992-1995.

Geological society of American Meinzer Award Committee, term 1989-1992.

Co-Chairman of Hydrogeology Session, FOCUS 89, September 1989, Las Vegas Nevada.

Co-Leader (with Jay Quade) Geological Society of America Field Trip, Paleohydrology and Hydrogeology of the Carbonate Rock Province of the Great Basin (East-Central to Southern Nevada) Oct 28, 1988 –Oct 30, 1988

DRASTIC Advisory Board Member, National Water Well Association, 1986-1987.

Invited Speaker, International Workshop of Regional Aquifers, Sponsored by the Institute of Geophysics, UNAM, Mexico City, February 1985, "Hydrogeology of Regional Systems in the Great Basin".

Co-Leader, Field Trip, White River hydrological (Karst) system, Southeast Nevada, 6th conference on Karst Hydrogeology and Speleology (Friends of the Karst), September 1979.

Moderator, Water Supply Planning Session, AWRA Conference "Water Resource Management in a Changing Society", September 1979, Las Vegas, Nevada.

Geological Society of America Meinzer Award Committee, term 1977-1980.

Elected to Desert Research Institute Faculty Senate, 1975-1978.

Moderator, Special Session on Ground-Water Quality, Las Vegas Valley, NWWA Technical Meeting, Las Vegas, 1976.

Selected as Resident International Consultant in the field of ground water to the Mexican Government by the World Bank and UNDP, 1973-1975.

Trustee: Florida Defenders of the Environment (1970-1977); FDE Scientific Committee Co-Chairman (1971-1974).

Appointed Chairman, Environment Impact Committee, City of Gainesville-Alachua County Joint Committee (January 1973, Resigned August 1973).

Elected Foundation Advisory Member, Environmental Information Center, Florida Conservation Foundation, Inc. 1972.

Elected Member UF Presidential Faculty Concerns Committee, 1971.

Designated Program Moderator (1970 National Geological Society of America Evening discussion of Hydrology Section).

Granted first sabbatical leave offered to Desert Research Institute Faculty, 1969.

Elected to Desert Research Institute Faculty Organization, 1968-1969.

Program Chairman, Sigma XI Luncheon Lecture Series at University of Nevada, 1965-1966.

Co-Author of scientific paper nominated for the Geological Society of America Meinzer Award, 1965.

NSF Basin and Range Field Conference Co-Leader, 1965.

INQUA Great Basin Field Conference Co-Leader, 1965.

Sigma XI, nominated at Montana State University for M.S. thesis.

CONSULTING EXPERIENCE

Consultant to Penner Propiadades, Design and Plan of a proposed regional water supply (well field and pipeline) for the Central Chaco Communities, Paraguayan Chaco, South America, 2006-2007

Consultant to the World Bank/Kenya Wildlife Service, Amboseli National Park Excess Water Assessment, Kenya. 1991.

Consultant to United Nations, DTCD, Senior Project Consultant, ground-water development in the Chaco Region of Paraguay, 1989-1991.

Consultant to United Nations, DTCD, for the UN representation of a tripartite (UN, World Bank, and Food and Agricultural Organization) project review in the Sudan, November-December 1988.

Consultant to the U.S. Nuclear Regulatory Commission on Yucca Mountain, Nevada, 1982-1984.

Consultant to the Government of Ecuador, ground-water development for irrigation, Rio Guayas Basin, 1982-1983.

Consultant to USAID, University of Wisconsin, Government of Tunisia, on design and feasibility of potable water development for dispersed populations in Central Tunisia, February-March, 1980.

Consultant in the organization of, and participant in, "Seminar on Development and Rational Management of Groundwater of the Yucatan Peninsula" sponsored by the Banco de Mexico, S.A., December 3-7 1979, Merida, Yucatan, Mexico.

Consultant to Mexico, reviewer of all ground-water studies by CPNH, 1973-1077, Comision del Plan Nacional Hidraulico, ASRH, July 1977.

State of Florida, Division of State Planning, Water Element of State Comprehensive Plan, Panel of Experts, review of water element, 1977

State of Florida, Division of Planning, testimony to the Florida Cabinet on hydrologic impacts of Cross Florida Barge Canal, June 1976.

Ground-water consultant to Arthur D. little, Inc. on bi-national water resource development project for Colombia and Venezuela, 1976.

Consultant to Mexico, organization of PHN-sponsored symposium, entitled "La Sobreexplotacion de Agua Subterranea en Algunas Partes del Mundo", Mexico City, December 1975.

Nevada and California (1969-1973): Runoff/erosion studies with respect to timbering activities in the Sierra Nevada (1972, major lumber company).

Florida (1969-1973: lake dewatering hydrogeological studies for Lake Apopka (1970) Citrus Growers. Numerous hydrogeological studies for land developers as senior hydrologic consultant for the firms Eco Impact, Inc. and Environmental Science Engineering, Inc. (1972-1973). Solid waste disposal and site suitability of Alachua County (1972); three landfill sites located, evaluated, and subsequently adopted by the County. Offshore Nuclear Power Plant site evaluation---aspects of tectonic history and seismic hazards (major engineering firm, 1973).

Nevada and California (1963-1969): Ground-water exploration and water supply development in arid terrain for the U.S. F`ish and Wildlife Service, Nevada State parks, and several development and mining firms. Ground-water supply and contamination studies, U.S. Gypsum.

PUBLICATIONS, REPORTS, AND PRESENTATIONS

Johnson, C. and Mifflin, M.D. 2006, The Order 1169 Pumping Experiment,. Hypothesis Tests and Noise Reduction Implications for Results, Mifflin and Association Inc. submitted to the Moapa Band of Paiutes, June 2006, 11p.

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Mifflin, M.D., Adenle O.A., and Johnson, R.J., 1991, Earth Fissures in Las Vegas Valley, 1990 Inventory, prepared for the Nevada Bureau of Mines and Geology, 42 p.

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Johnson, R.J., and Mifflin, M.D., 1990, Hydrogeology of the Alluvial Aquifer, Upper Muddy River Valley, Nevada, prepared for Nevada Power Company, Las Vegas, Nevada.

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Mifflin, M.D., 1989, Earth Fissures in Las Vegas Valley, in Geotechnical Investigations of Windsor Park, North Las Vegas, Nevada, prepared for Western Technologies, Inc.

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Johnson, R.J., Mifflin, M.D., and Adenle, O.A., (Mifflin and Associates, Inc.) 1989, Hydrogeologic Study of the Black Mountain Area: Death Valley Monument, California 101 p.

Mifflin, M.D., Johnson, C., and Johnson, R.J., 1989, Hydrogeologic Assessment, Upper Muddy River Valley, Nevada, 49 p.

Mifflin, M.D., and Quade, J., 1988, Hydrogeology and Paleohydrology of the Carbonate Rock Province of the Great Basin, *in* Holder, G.D. (ed), Geological Society of America Field trip Guidebook, 1988 Geological Society of America Centennial Annual Meeting, p. 305-335.

Mifflin, M.D., 1988, Region 5, Great Basin, *in* Back, W., Rosenshein, J.S. and Seaber, P.R. (Eds.), Hydrogeology, Geological Society of America, p.69-78, Plate.

Mifflin, M.D.,. and Quade, J., 1987, *Estimating Climate Change from Hydrologic Response,* Water Forum '86, ASCE Proceedings, August 4-6, 1986, Long Beach, California.

Mifflin, M.D., Johnson, C.L., and Johnson, R.J., Summary of Ground Water Exploration in Lanfair Valley, California, through 7 March 1987, for Viceroy Mining Corporation, 10 p.

Mifflin, M.D., and Johnson, R.J., 1987, Hydrology of the Eldorado Valley, Nevada, in Environmental Assessment of Eldorado Valley as a Hazardous Waste Transfer Facility, prepared for Western Technologies, Inc., 8 p.

Mifflin, M.D., Johnson, C.L., and Johnson, R.J., 1987, Appendices A&B, Location Map1, Well and Spring Inventory, Upper Muddy River Valley, Nevada, 349 p.

Mifflin, M. D., et al, (Mifflin and Associates, Inc), 1987, Technical Review Comments on the Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada, (May 1986, Volumes I, II, II (DOE/RW-0073), July, 187 p.

Mifflin, M.D., and Morgenstein, M.E., Eds., 1985, Technical Review Comments on the Draft Environmental Assessment, Yucca Mountain Site, Nevada Research and Development Area, Nevada, Water Resources Center, Desert Research Institute, March 1985, 169 p.

Mifflin, M.D., and Zimmerman, D.E., May 1984, Ground-Water Availability in the Lower Meadow Valley Wash Near Glendale, Nevada, Water Resources Center, Desert Research Institute, 1984, 52 p.

Glancy, P.A., Jacobsen, R.L., and Mifflin, M.D., 1984, The Hydrogeology of the Carson and Truckee River Basins, Nevada *in* Lintz, J. (ED.), Western Geological Excursions, 1984 Annual Meeting, Geological society of America, vol. 3, p. 52-146

Woessner, W.W., Mifflin, M.D., Zimmerman, D.E., and Sullivan, K.E., January 1983, Meadow Valley Wash Exploration Program, October and November, Water Resources Center, Desert Research Institute, 1983, 47 p.

Mifflin, M.D., Elzeftawy, A., Wheatcraft, S.W., and Hess, J.W., 1982, Henderson, Nevada, Rapid Infiltration Basin Siting and Monitoring Study, Water Resources Center, Desert Research Institute, Project Report, 100 p.

Mifflin, M.D., 1982, Preliminary Report on the Jean Correctional Facility Test/Production Well, Water Resources Center, Desert Research Institute, Memorandum Report to Nevada Legislature Interim Finance Committee, 5 p.

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Mifflin, M.D., and Elzeftawy, S., 1982, Lateral Hydraulic Conductivity of the Alluvial Sediments Near the RIB Site, Water Resources Center, Desert Research Institute, Letter Report to the City of Henderson, Nevada, 6 p.

Mifflin, M.D., 1982, Preliminary Additional Test Holes for the Determination of the Useful Life of the Test/Production Well, Jean Correctional Facility, Nevada, Water Resources Center, Desert Research Institute, Memorandum Report to the Nevada Legislature Interim Finance Committee, 4 p.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

In re: **U.S. Department of Energy's Application for Authorization to Construct a Geologic Repository at Yucca Mountain, Nevada** **(High-Level Waste Repository)**	**Docket No. 63-001**

CERTIFICATE OF SERVICE

I hereby certify that the foregoing "Timbisha Shoshone Tribe's Petition for Leave to Intervene in the Hearing" has been served via the Nuclear Regulatory Commission's Electronic Information Exchange ("EIE") upon those on the Service List maintained by the EIE for the above-captioned proceeding.

Dated: December 22, 2008

Respectfully submitted,

[Signed electronically]
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