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COMMITTEES:  
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ON INTELLIGENCE

## United States Senate

WASHINGTON, DC 20510-1401

February 23, 2000

Mr. John Angell  
Asst. Sec. Cong. Affairs  
U.S. Department of Energy  
1000 Independence Ave., S.W. Room 7B138  
Washington, D.C. 20555

Dear Mr. Angell:

1 [ Because of the desire of this office to be responsive to all inquiries and communications, your consideration of the attached is requested.

Your findings and views, in duplicate form, along with the return of the enclosure, will be greatly appreciated. Please direct your reply to the attention of Darlee McCollum of my Washington office.

Thank you for your thoughtful attention.

Sincerely,



Richard G. Lugar  
United States Senator

RGL/dwl  
enclosure

CJ 12

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**ANALYSIS OF YUCCA MOUNTAIN DRAFT ENVIRONMENTAL IMPACT STATEMENT**

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**DATE:** 2/6/2000

**TO:** PRESIDENT CLINTON  
SENATOR RICHARD LUGAR  
SENATOR EVAN BAYH  
REPRESENTATIVE TIM ROEMER  
W.R. DIXON, US DOE

**FROM:** ANNE COLLEEN COOPER  
UNIVERSITY OF NOTRE DAME  
730 PASQUERILLA EAST  
NOTRE DAME, IN 46556

**RE:** YUCCA MOUNTAIN DRAFT ENVIRONMENTAL IMPACT STATEMENT

*OB*  
*2/14*

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Enclosed is my analysis of the Draft Environmental Impact Statement (DEIS) for the United States Department of Energy's proposed geological repository for nuclear waste at Yucca Mountain, Nevada. The Yucca Mountain DEIS is incomplete, ethically unsound, and misleading for many reasons. It makes a mockery of the legal right of the U.S. public and scientific community to informed consent and commentary in purporting to be a comprehensive scientific analysis of the Yucca Mountain Project.

Even a single reading through one section of the DEIS presents numerous examples of the insufficiency of this report. However, it is not only the DEIS which is flawed, but the entire project. The Yucca Mountain site itself is proven to be unsafe and inappropriate for the long-term storage of nuclear waste. The conclusion of the Department of Energy to support the construction of the proposed facility is highly questionable and blatantly contrary to public health and environmental concerns.

Please receive with comments my deep concern over the future implications of this issue. I ask you to prevent the construction of this dangerous, scientifically and ethically unsound repository. The welfare of our nation demands it.

**Comments on the  
DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR A  
GEOLOGICAL REPOSITORY FOR THE DISPOSAL OF SPENT NUCLEAR  
FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN,  
NYE COUNTY, NEVADA.**

**By**

**Anne Colleen Cooper  
University of Notre Dame du Lac  
730 Pasquerilla East  
Notre Dame, IN 46556**

**Email: [Anne.C.Cooper.39@nd.edu](mailto:Anne.C.Cooper.39@nd.edu)**

**Submitted to:**

**Wendy R. Dixon, EIS Project Manager  
Yucca Mountain Site Characterization Office  
Office of Civilian Radioactive Waste Management  
US Department of Energy  
PO Box 30307, M/S 010  
North Las Vegas, NV 89036-0307**

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**Comments on the Yucca Mountain DEIS**

The US Department of Energy (DOE) was authorized by the Nuclear Waste Policy Act of 1982 to evaluate the potential for a geological repository site for nuclear waste, pursuant with the responsibility of the federal government for safe, effective storage of spent nuclear fuel and high-level radioactive waste. The Draft Environmental Impact Statement for the proposed repository at Yucca Mountain is intended to offer the public and the scientific community an opportunity to become informed about and comment regarding the Action Proposals set forth in the DEIS. However, the DEIS is not adequate to achieving this goal. In reference to only a few examples, this commentary reveals that the DEIS contains numerous inconsistencies and fallacies which demand attention in the final EIS. However, regardless of the improvements made in the final impact statement, the Yucca Mountain site is inappropriate and dangerous choice for the proposed repository.

1. The DEIS proposal is arguably incorrect about providing a "consistent analytical basis for comparing the No-Action Alternative and the Proposed Action." (DEIS, 7.7) One requirement of the National Environmental Policy Act is that proposed alternatives must be reasonable; however, neither of the two scenarios of the No-Action alternative is reasonable (thus creating a situation of Fallacy of Bifurcation).

Scenario 1 of the No-Action alternative assumes that DOE and commercial utilities would maintain control over the waste at the current 77 sites for 10,000 years. Scenario 2 assumes that the waste would remain at the current 77 sites under monitoring for 100 years, after which time the waste would be abandoned, such that the storage facilities "would begin to deteriorate and the radioactive materials... would eventually be released to the environment." (DEIS 7.7) Thus, the DEIS does not satisfy the requirement of the National Environmental Policy Act that alternatives be reasonable, nor can it logically justify the Proposed Action plan as the preferred alternative, because the No-Action alternative is unreasonable.

2. The DEIS is arguably incorrect about effectiveness of proposed long-term deterrents to public entrance of the Yucca Mountain vicinity (passive institutional controls including markers and engineered barriers [DEIS S-37]) because it does not take into account the risks of human-initiated threats of sabotage or terrorism in the next 10,000 years to the Yucca mountain site.
3. The DEIS is arguably incorrect about estimated health, socioeconomic, and environmental risks associated with transportation because it does not consider specific transportation routes for rail and highway shipments. (DEIS 8.4)
4. The DEIS is arguably incorrect in its presentation of predicted environmental and public health threats posed by the construction, monitoring and eventual closure of a geological repository at Yucca Mountain, because it does not offer a specific preferred repository design. (DEIS 8.1, 8.2)
5. The predicted long-term health consequences of the construction, operation, monitoring and closure of the geological repository are arguably incorrect about yearly predicted cancer fatalities because the figures are based upon data for male subjects, and the more sensitive parts of the population, such as children and pregnant women, are not taken into account. (DEIS F.2.1)
6. The DOE is arguably incorrect about its justification to shorten time for public commentary on the DEIS from the proposed 180 period to 90 days because 1) suspension of EIS activities due to budget cuts and resulting "compression" of EIS schedule are irrelevant to the public's right to full review time, and 2) increased availability of DEIS documentation over the internet is likewise irrelevant to the right to the public's right to comment. (Farrett)

Sources:

Ballard, James David. "The Impacts of Sabotage and Terrorism on Nuclear Waste Shipments: A Critique of the U.S. Department of Energy's Draft Environmental Impact Statement (DOE/EIS-0250D) for the Proposed Yucca Mountain, Nevada, Geological Repository." (26 January 2000).

Farrett, Jake H. Acting Director, Office of Civilian Radioactive Waste Management. Letter to Robert Loux, Executive Director of Nevada Agency for Nuclear Projects. 25 May 1999.

EIS002177

"Draft Environmental Impact Statement for a Geological Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada." (DOE/EIS-0250D) <http://www.vmp.gov/deis.htm> (24 January 2000).

February 3, 2000

To: Senator Richard Lugar

[ ] 02:17

From: Nicole Marie Wilson  
Undergraduate  
University of Notre Dame  
Notre Dame, IN 46556

JB  
2/11/00

Enclosed is my analysis of the US Department of Energy Draft Environmental Impact Statement (DEIS) of the proposed Yucca Mountain Nuclear Waste facility. As an undergraduate student pursuing a career in medicine, I feel that this document poses serious health risks to everyone involved. The Yucca Mountain Nuclear Waste facility should not be built when the DEIS blatantly ignores addressing the public safety threats this facility would impose if it were built.

The conclusion that the US Department of Energy (DOE) reached that supports the construction of the facility lacks substantial rationale. Surely it is preposterous to take the Draft Environmental Impact Statement (DEIS) seriously when it avoided confronting the public safety issues at hand.

As a concerned citizen of the United States of America, I see the construction of such a facility as a massive accident waiting to happen with profound health-related repercussions. I hope that you think not only about the problems that will be incurred a few years down the line, but take into account the threat a facility of this magnitude would impose on America a million years down the line. Thank you for your time.

**Profound Problems with the Yucca Mountain Environmental Impact Statement:**

**Comments on the  
*Draft Environmental Impact Statement for a Geological Repository for the Disposal of  
Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County,  
Nevada***

**By**

**Nicole Wilson  
Undergraduate  
University of Notre Dame  
Notre Dame, IN 46556**

**Email: [Nicole.M.Wilson.109@nd.edu](mailto:Nicole.M.Wilson.109@nd.edu)**

**Submitted to:  
Office of Senator Richard Lugar  
United States Senate  
Washington, D.C. 20510**

To Whom It May Concern:

After reviewing information pertaining to the Yucca Mountain Nuclear Waste Dump proposal, I am strongly opposed to the proposal for the following reasons:

- A. The decision to proceed with the Yucca Mountain Waste Dump is arguably incorrect because the individuals who live in Nevada were consulted on the matter, but ignored. The federal government has essentially disregarded the state's right to determine its economic and environmental destiny.
- B. It is arguably wrong for the government to spend thirty thousand taxpayer dollars on advertising to convince Nevadans that the Yucca Mountain project is safe since most Nevadans strongly oppose the proposal. According to the Nuclear Waste Project Office in the State of Nevada, nearly eight out of ten Nevadans oppose the construction of a Nuclear Waste Dump in Yucca Mountain (Nuclear Waste Project Office, State of Nevada. 4).
- C. Building a nuclear waste dump in Yucca Mountain is arguably incorrect because this proposed site has a history of earthquakes with 32 known earthquake faults and young volcanoes in the area (Nuclear Waste Project Office, State of Nevada. 4). Furthermore, the government has yet to propose casing devices for the deposit of nuclear waste in the mountain to ensure, if it is even possible, that the nuclear waste will not contaminate the surrounding area should an earthquake or volcano occur (DEIS, 1999. 2-88). Obviously Yucca Mountain's geological landscape is far from ideal for erecting a nuclear waste dump on.
- D. On account of the rising and falling of the groundwater under the mountain, it is arguably erroneous to build a nuclear waste dump in that area because the facility could flood, which would lead to contamination of the groundwater (DEIS, 1999, 8-33).
- E. The government is arguably incorrect about building Yucca Mountain Nuclear Waste Repository because it has failed to consider the severity of transporting thousands of shipments of highly radioactive material across the United States for the next thirty years. Not only would Nevadans be at risk, but every individual traveling the highways and interstates along with citizens living in areas near where vehicles would be transporting these hazardous materials would also be in danger of potentially unavoidable accidents.

- F. It is arguably impossible for the government to hypothesize about the safety of a Nuclear Waste Dump that will be around for the next million years when humans haven't even been around for a fraction of a million years.

All things considered, I believe that constructing the Yucca Mountain Nuclear Waste Dump would be a horrible mistake due to the above stated claims. We live in a democratic country and we as citizens of this country have an obligation to ourselves as well as our fellow Americans. We must watch out for the safety of our country. By constructing the Yucca Mountain Nuclear Waste Dump, not only will the welfare of individuals living in or near Nevada be threatened, but every American who travels the highways and interstates of these United States of America will be affected as well. The issue of nuclear waste deposit is very controversial because we lack sufficient knowledge about its affects thousands of years down the line. Therefore, I believe that it would be in America's best interests to leave nuclear waste in the cities where it originated until more is known about how to safely expose of it and it is sufficiently cooled. In conclusion, I hope that you will seriously consider the claims that I have providing in retaliation to the proposal of constructing the Yucca Mountain Nuclear Waste Dump.

Sincerely,

Nicole Wilson  
University of Notre Dame Undergraduate  
204 Lyons Hall  
Notre Dame, IN 46556

CJ

**To:** Indiana Senator  
Richard G. Lugar  
306 Hart Senate Office Building  
Washington, DC, 20510-1401

**From:** Kari F. Jerge  
Undergraduate Biological Sciences Major  
University of Notre Dame  
357 Badin Hall  
Notre Dame, In 46556-5604  
Email: [Kari.F.Jerge.1@nd.edu](mailto:Kari.F.Jerge.1@nd.edu)

**Date:** February 8, 2000

**Subject:** Draft Environmental Impact Statement for the Geologic Repository at Yucca Mountain

Thank you for taking the time to read the enclosed letter. My name is Kari Jerge and I am currently a sophomore at the University of Notre Dame. I have read the Draft Environmental Impact Statement (DEIS) for the proposed Nuclear Repository at Yucca Mountain, and to say the least I am concerned. I am certainly not against the creation of a repository for the storage of nuclear waste, however, based on the claims made by the US Department Of Energy in this document, I feel that the construction of a repository at Yucca Mountain at this time would be ill-judged. There are errors in the science and the conclusions reached based on that science in the DEIS. As a result, there are currently too many unknowns and too many risks involved in continuing with this project as it is proposed. I would request that this proposal be reconsidered, and I have included my criticism of the DEIS. Thank you for your consideration.

Problems with the U.S. Department of Energy Yucca Mountain Environmental Impact Statement  
Comments on the Draft Environmental Impact Statement for a Geological Repository for the  
Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye  
County, Nevada

By  
Kari F. Jerge  
Undergraduate Biological Sciences Major  
University of Notre Dame du Lac  
Notre Dame, IN 46556-5604  
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Submitted to:  
Indiana Senator  
Richard G. Lugar  
306 Hart Senate Office Building  
Washington, DC 20510-1401

The U.S. Department of Energy (DOE) asserts in their Draft Environmental Impact Statement (DEIS) for the Yucca Mountain Repository Project that, "The analyses in this EIS did not identify any potential environmental impacts that would be a basis for not proceeding with the Proposed Action." (DEIS, 1999, 2-87) Based on this conclusion the DOE proposes to proceed with the construction of the radioactive waste repository at Yucca Mountain. There is sufficient evidence available in the EIS, however, to conclude that the DOE did not find significant potential environmental impacts due to a high degree of uncertainty and error in the DEIS.

The DOE cites four key attributes of the repository safety strategy:

- Limited water contacting waste package
- Long waste package lifetime
- Slow release of radionuclides from the waste
- Reduction in the concentration of radionuclides and chemically toxic material during transport from the waste to a point of human exposure

All parts of the safety strategy are highly uncertain, if not impossible to estimate based on the data provided in the report.

First, the threat of human exposure through groundwater contamination was not accurately assessed because the scientists involved failed to include the possibility of a dramatic climate change raising the water table. In the climate models simulated, only three possible climates were analyzed (DEIS, 1999, 5-9). No mention was made of a dramatic climate shift which could possibly raise the water table level from its current depth of 600 m to near 300 m, the location of the waste packages. This possibility directly negates the EIS conclusion that limited water would contact the waste packages.

Second, the DEIS includes the statement that the "most important process controlling waste package lifetime is whether water would drip from the seeps onto a waste package." (DEIS, 1999, 5-11). On the previous page of the DEIS, the statement is made that, "After the water returned to the repository walls, it would drip into the repository but only in relatively few places. The number of seeps that could occur and the amount of water that would be available to drip would be restricted by the low rate at which water flows through Yucca Mountain." (DEIS, 1999, 5-10) As was previously mentioned, a climate shift could cause a dramatic increase in the water that flows through Yucca Mountain to the repository. In addition, the flow of water through this area is affected by the surrounding geologic conditions, which are uncertain, by the DOE's own admission. On page 5-10 (DEIS, 1999), the DOE admits that the effect of heat (which could arise 15-25 years after closure of the repository as a result of the decay of nuclear materials, or as a result of volcanic activity in the surrounding area) on the water flow and geologic conditions is unknown. The DOE is planning future studies to determine the effect of heat on repository conditions (DEIS, 1999, 5-18), but until that data is known, the DOE's claim that little water would seep into the repository and cause damage to the waste packages is weakened by inconsistency. Another uncertainty in the DEIS claim of waste package safety is the DOE's admission that the design for these waste packages is yet unknown (DEIS, 1999, 2-32). How, then, can the DOE assure long waste package lifetime when the design for these waste packages has yet to be determined. Essentially, the DEIS has made a statement implying the safety of the waste packages when in reality the variables affecting waste package lifetime are admittedly uncertain. Until the effect of heat on repository conditions can be estimated and the design of the waste packages known, no logical statement can be made about the lifetime of the waste packages.

Third, the rate of release of radionuclides from the waste packages would be determined by the design of the packages and the amount of water contact with the packages. As previously stated, both of these factors are admitted by the DOE to be unknown. If water contact with the packages were to increase beyond the DEIS estimation, the release of radionuclides would also increase. Therefore, the DEIS statement of slow release of radionuclides from the packages is unsupported.

The fourth aspect of the DEIS safety strategy is uncertain as well. The scientist involved insist that by the time a large portion of the radioactive material in the waste packages could reach groundwater supplies, their concentration would be non-toxic. The non-toxicity of these levels of groundwater contamination is not an assurance that they would not still be detrimental to humans. Furthermore, if the water table were to rise or if the water flow in the area surrounding the repository were to change as a result of heat, the concentrations of radioactive materials contaminating groundwater supplies could also increase. It is likely, if this were to occur, that the concentration of radioactive materials in groundwater would reach toxic levels.

Beyond the uncertainty of the above four DEIS claims, there is fundamental error in the modeling done by the DOE to assess the environmental consequences of volcanism, seismicity, and human intrusion. In modeling the possible consequences of these events, the DOE has assumed that only one of these will occur at a time. In other words, the simulations used to assess the environmental impact of these occurrences do not consider the possibility of an earthquake and a volcanic eruption at the same time. The DOE admits the likelihood of a thermal pulse 15-25 years after closure of the repository (DEIS, 1999, 5-10), along with high probability of seismic activity in the area (see 5-16, DEIS, 1999). Modeling the consequences of only one of these possibilities at a time, therefore, incompletely assesses possible environmental impacts.

Based on the above criticisms of the DEIS, the Yucca Mountain Repository should not be constructed until more information is available on the possible environmental impacts. The numerous unknown factors on page 5-18 (DEIS, 1999) need to be analyzed before the safety of the Yucca Mountain site can be judged. Moreover, following through with the Proposed Action in the face of such uncertainty would be ill-judged on the part of the DOE.

#### References

DEIS (1999), US Department of Energy, Draft Environmental Impact Statement for a Geological Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, Vol. I, Impact Analyses, DOE/EIS-0250D, Washington, DC, US Government Printing Office.

February 8, 2000

To: President Bill Clinton  
Senators and Representatives, US Congress  
W. R. Dixon, US DOE

From: Joseph V. Madia  
260 Alumni Hall  
University of Notre Dame  
Notre Dame, IN 46556

A major environmental issue has recently been brought to my attention, that of the Yucca Mountain Project for the disposal of nuclear waste. The proposal for the project blatantly ignores scientific data that indicates the location of the repository is a poor choice. In addition, methods for transporting the waste, and procedures for building the facility put civilians and workers in grave danger of receiving large amounts of radiation, not to mention the destruction it could cause to the environment and ecosystem.

I do not own Ph.D's in geology or chemistry, nor am I an expert of any kind on nuclear waste treatment. I am only an intelligent student with a love of science. It is this love of science that causes me to feel utter disgust to see it being performed so poorly in regards to the Yucca Mountain Project. Construction of this facility would be like setting an environmental time bomb that would very slowly tick away, and eventually wreak havoc on our descendents. In the name of science and ethics, I challenge anyone in a position of authority to take the initiative to stop this facility from being built. Thank you.

### Logical Problems with the Proposed Yucca Mountain Project

The Draft Environmental Impact Statement by the Department of Energy for the Yucca Mountain Project is filled with both logical and scientific fallacies. A review of the EIS will show that little concern for the validity of the conclusions was given. It uses poor science and dangerous assumptions to determine that the Yucca Mountain is an adequate location for a repository.

1. Predictions and assumptions about the repository's effectiveness in safely storing the nuclear waste cannot be entirely accurate because the structural design of the repository is not finished. The EIS explicitly states that "... the current level of repository design is insufficient to meet informational needs for a License Application to the Nuclear Regulatory Commission . . . the design will continue to evolve"(DEIS, S-20). Therefore, the project should not and cannot be approved or begin construction until the final design of the structure is in place.
2. Statements about the unlikelihood of nuclear waste contaminating ground water because of the dry, dusty climate in the Yucca Mountain are incorrect when the effects of a climate change are taken into consideration. Since the 1970's the global temperature has continued to increase, and the 1990's has been the hottest decade ever. Should this increase continue, the possibility of polar ice melting also increases, which would raise the water level, possibly into the level of the repository where contamination would occur. In addition, a sudden, rapid climate change even within the next ten years could raise the water table within dangerous proximity of the repository.
3. The passive controls that would be initiated after the repository are insufficient to guarantee the safety of the surrounding population. No supervision of the activities around the repository creates a dangerous situation that fosters the possibility of homegrown and foreign terrorism.
4. It is impossible to guarantee the safety and functionality of the storage canisters over the long term in regards the construction of the canisters. Primarily, the actual canisters have not been built yet. Only blueprints exist from which the DOE has made predictions. In addition, seismic events or corrosion and destruction of the surrounding rock by the intense heat from the decaying fuel could subject the canisters to extreme pressures or weights that could cause them to rupture. Faulty canister construction would also present the possibility of waste fuel contaminating the area.
5. Transportation of the spent fuel is an extremely dangerous undertaking because of the cataclysmic destruction it would cause to the surrounding area of the crash site and the high probability of there being an accident. There were 382,030 accidents involving heavy load trucks in 1997, an average of about 1,047 per day. When

taken together with the fact that it would take over 23 years to move all the spent fuel to the repository, it is difficult to accept the idea that over that long time span, there will be no accidents involving a nuclear waste-carrying truck.

WORKS REFERENCED

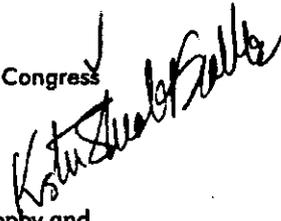
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01 11 11 11 36

January 31, 2000

To: President Clinton  
Senators and Representatives, US Congress  
W. R. Dixon, US DOE

From: Kristin Shrader-Frechette, Ph.D.  
O'Neill Family Professor of Philosophy and  
Concurrent Professor of Biological Sciences  
University of Notre Dame  
Notre Dame, IN 46556



Enclosed is my analysis of the US Department of Energy Draft Environmental Impact Statement (DEIS) of the proposed Yucca Mountain Nuclear Waste facility. As a scientist whose specialization is radiological and biological effects of nuclear waste disposal, I find this document to be nothing more than a scientific sham. Under no circumstances should the Yucca Mountain facility be built, if the basis is a DEIS as scientifically and ethically flawed as this one.

There are strong scientific, logical, and ethical grounds for disagreeing with the conclusion of the US Department of Energy (DOE), which supports building the proposed Yucca Mountain nuclear repository. The Draft Environmental Impact Statement (DEIS) used to argue for proceeding with the facility is little more than window dressing designed to make incomplete and invalid science, logical fallacies, and questionable ethics appear as if they were valid, reasonable, and ethical.

Can I count on your support to stop this dangerous, scientifically problematic facility from being built? I hope so. Best wishes.

Methodological Problems with the Yucca Mountain Environmental Impact Statement:

Comments on the  
Draft Environmental Impact Statement for a Geological Repository for the Disposal of  
Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain,  
Nye County, Nevada

by

Kristin Shrader-Frechette  
O'Neill Family Professor of Philosophy and  
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University of Notre Dame  
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email: [Kristin.Shrader-Frechette.1@nd.edu](mailto:Kristin.Shrader-Frechette.1@nd.edu)

submitted to:

Wendy R. Dixon, EIS Project Manager  
Yucca Mountain Site Characterization Office  
Office of Civilian Radioactive Waste Management  
US Department of Energy  
PO Box 30307, M/S 010  
North Las Vegas, NV 89036-0307

There are strong scientific, logical, and ethical grounds for disagreeing with the conclusion of the US Department of Energy (DOE), which supports building the proposed Yucca Mountain nuclear repository. The Draft Environmental Impact Statement (DEIS) used to argue for proceeding with the facility is little more than window dressing designed to make incomplete and invalid science, logical fallacies, and questionable ethics appear as if they were valid, reasonable, and ethical. The DOE asserts:

DOE's preferred alternative is to proceed with the Proposed Action to construct, operate and monitor, and eventually close a geological repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain. The analyses in this EIS did not identify any potential environmental impacts that would be a basis for not proceeding with the Proposed Action (DEIS, 1999, 2-87).

DOE's conclusion, above, is scientifically, logically, and ethically questionable for at least 9 main reasons:

- (1) DOE's Logically Fallacious Claim of Small Environmental Impacts over the Long Term
- (2) DOE's Ignoring Scientific Data on Problematic Groundwater Migration
- (3) DOE's Begging the Question of Site Suitability
- (4) DOE's Committing the Fallacy of Bifurcation regarding Alternatives
- (5) DOE's Practicing Theological Geology
- (6) DOE's Assuming That What You Ignore Can't Hurt You
- (7) DOE's Ignoring Environmental Justice and Committing the Fallacy of Composition
- (8) DOE's Jeopardizing Future Generations
- (9) DOE's Flawed Past Record

This analysis considers these 9 problems in order.

**(1) DOE's Logically Fallacious Claim of Small Environmental Impacts over the Long Term**

The DEIS is scientifically and empirically questionable because it repeatedly alleges that "in general the EIS analyses showed that the environmental impacts associated with the Proposed Action would be small" (DEIS, 1999, 2-74). This claim is questionable, in part, because it relies on a logical fallacy of composition. This fallacy consists of assuming that because something is true of the whole therefore it is true of the part, or assuming that a necessary condition for something to be true of a part is that it be true of the whole. Committing this fallacy, the DOE asserts that "no substantial impacts were identified; therefore, cumulative impacts...would not cause...concerns" (DEIS, 1999, 8-59). However, there could be no large impacts from radiological exposures over a given year, but the cumulative impact of these exposures could be great. For example, an annual chest x-ray might not be an important source of exposure, but having one every year for 30 years might have a substantial cumulative impact.

Another reason that the DOE errs in claiming that there will be no substantial impacts of the Yucca Mountain repository, over its life, is that the DOE's own peer reviewers unanimously concluded that it was impossible to show, scientifically and statistically, that the impacts would be small, because they could not be calculated; as the DOE peer reviewers noted, in a unanimous "Consensus Statement:

Many aspects of site suitability...predictions involving future geologic activity, future value of mineral deposits and mineral occurrence models...rates of tectonic activity and volcanism, as well as mineral resource occurrence and value, will be fraught with substantial uncertainties that cannot be quantified using standard statistical methods (Yunker, Albrecht, et al., 1992, B-2).

Moreover, the National Academy of Sciences committee on Yucca Mountain admitted that it was impossible to calculate the effects of repository intrusion, something that must be known in order to conclude that the environmental impacts will be small (NRC 1995). The same Academy Committee also noted that it was impossible to predict human/social factors, such as institutional control of radioactive waste, beyond one hundred years (NRC 1995). If the National Academy believes that one cannot predict human intrusion and meaningful human behavior after 100 years, then the DOE DEIS (1999, see 7-6) needs to explain how it can claim to predict what will happen 10,000 years into the future, and especially, that there will be no adverse environmental impacts as a result of the proposed Yucca Mountain facility. That is, it is scientifically impossible to conclude that the impacts of a repository, for thousands of years into the future, will be small, because it is impossible to know the future to the degree of precision necessary to draw this conclusion. There is no prior experience with permanent radioactive waste disposal on which to draw, and no nation has yet successfully employed permanent disposal.

Another reason that it is problematic for the DOE to assert that the environmental impacts of a permanent, high-level nuclear waste repository will be small is that the DOE admits that repository flooding would be catastrophic, and yet that Yucca Mountain experienced a wetter and cooler period 10,000 to 50,000 years ago (DEIS, 1999, 3-49); if the repository area was flooded 10,000 years ago, then it is reasonable to believe it could be flooded again, in the future, especially because the climate changes appear to be cyclic. Even the DOE admits that climate change at Yucca Mountain is uncertain, and that "the record shows continual variation, often with very rapid jumps, between cold glacial...and warm interglacial climates" (DEIS, 1999, 5-17).

DOE's alleging that the impacts of Yucca Mountain will be small also is inconsistent with its own statements when it reported the findings of Dublyansky (1998) that warm upwelling water has infiltrated the Yucca repository site (DEIS, 1999, 3-49). In response to these findings, the DOE notes that "both parties [the DOE, which supports the repository, and the state of Nevada, which opposes it] have agreed that additional

research is needed to resolve the issues [surrounding this upwelling finding](DEIS, 1999, 3-50). If the DOE thus admits that the upwelling data need to be resolved, and if such repository flooding would be catastrophic, then the DOE cannot consistently claim that effects of Yucca Mountain will be minor. In addition, the DOE admits that the data on Yucca Mountain are sparse and contradictory; for example, the DOE says that "there are a number of published estimates of perennial yield for many of the hydrographic areas in Nevada, and they often differ from one another by large amounts" (DEIS, 1999, 3-127). Given such discrepancies, it is inconsistent, controversial, and therefore premature to say that building a repository in such an area will cause few environmental impacts.

On the issue of repository flooding, it is interesting to note that the DOE itself claims that "The potential for flooding at the repository site is extremely small" (DEIS, 1999, 4-19), even though its own claims in the preceding paragraph cast doubt on this issue. In particular, if the claims are correct, then it is impossible to know whether the potential for flooding is small or great until the upwelling data are resolved.

#### (2) DOE's Ignoring Scientific Data on Problematic Groundwater Migration

The DEIS likewise is scientifically questionable because it substitutes scientific judgment or opinion in areas, like groundwater migration, in which there already is confirmed scientific evidence to the contrary. In the case of groundwater migration, the primary means whereby radionuclides would migrate offsite, the DEIS alleges that, given the groundwater at Yucca Mountain, there would be "minimal potential to involve substantial contaminant releases" (DEIS, 1999, 8-33). This opinion, however, is doubtful because even the DEIS (1999, 3-42) admits that the perched groundwater at Yucca Mountain is very young (and therefore that rapid groundwater migration has occurred): "The apparent age of the perched water based on carbon-14 dating indicates this recharge occurred during the past 6,000 years." If the Yucca Mountain groundwater was recharged during the last 6,000 years, and if the waste is above the groundwater, then it is reasonable to assert that groundwater, migrating through the waste, may recharge the groundwater in the next several thousand years, just as it did in the past. On a related point, the DEIS also admits that

Chlorine-36 analyses at Yucca Mountain have identified locations where water has moved fairly rapidly (in several decades) from the surface to the depth of the proposed repository....About 13 percent of the samples (31 samples) had high enough chlorine-31-to-total-chlorine ratios to indicate the water originated from precipitation occurring in the past 50 years (that is, nuclear age precipitation) (DEIS, 1999, 3-47 and 3-48).

After thus noting that much of the groundwater, below the proposed repository, was 50 years old or less, the DEIS admitted that a continuous fracture path in the rock most

likely caused this fast transit time (DEIS, 1999, 3-47). The DOE also noted that, because of the mineral concentrations in the groundwater, there was "strong evidence that flow through faults and fractures is the primary source of the perched water [at Yucca Mountain]" (DEIS, 1999, 3-48). It is interesting to note that, a decade earlier, the DOE (1986, 6-32, 257,298,299) was maintaining, contrary to other geological reports, that the transit time from the surface to repository depths would be greater than 10,000 years and that fracture flow was virtually nonexistent. If a mere ten years of research have changed the DOE position on a crucial determinant of repository safety, one can only argue that more research is needed prior to building the repository and that, for now, no action is the best alternative.

It also is interesting to note that the DEIS concludes that, because of slow groundwater migration time, the radionuclides migrating from the Nevada test site would result in an individual's receiving only a maximum annual dose of about 0.2 rem, or less than .01 of normal annual background exposure. However, after drawing such a conclusion about minimal impact, the DEIS notes that "there is a high degree of uncertainty associated with this estimate" (DEIS, 1999, 8-76). If there is so much uncertainty, then one wonders why the DEIS bothered to give a number that was virtually meaningless. In the same discussion, the DEIS admitted that "the underground tests are based on one data set from one well over a very short time (fewer than 50 years) and then extrapolated to 10,000 years" (DEIS, 1999, 8-76). One wonders why the DOE bothered to use such a misleading number, based on one sample, and then extrapolated from less than 50 years to 10,000 years. Such one-well tests and extrapolations are contrary to all good practice in the science of geology (see Shrader-Frechette 1993, 42-50).

### (3) DOE's Begging the Question of Site Suitability

The DEIS allegation that environmental impacts of Yucca Mountain "in general ... would be small" (DEIS, 1999, 2-74) is not only inconsistent with existing empirical data and with the DOE's own claims about groundwater, perched water, and upwelling, but this DOE claim is also logically invalid because it begs the question. It begs the question because the DOE has not yet determined many scientific facts whose validity is essential to drawing this conclusion. For one thing, to allege that future impacts would be small, despite the million-year lifetime of the repository, seems incredible, because it is impossible to predict the specifics of what will happen over so long a time frame. Also, such DOE predictions are disguised as scientific when, in reality, they are no more than guesses.

Consider several examples of this logically-invalid, question-begging character of the DOE's analysis. When the DOE says, for instance, that "sixteen accident scenarios....bound the consequences of credible accidents at the repository" (DEIS, 1999, 4-61), this claim begs the question because it presupposes, ahead of time, what accidents are credible, and then, after this presupposition, concludes that the accidents

will be minor. DOE begs the whole question of the accidents that Yucca Mountain would be likely to cause because it sets up the problem in a question-begging way. It prescribes what accidents are "reasonably foreseeable" (DEIS, 1999, 6-41), despite the fact that it is impossible to predict human error, especially so far into the future, as the National Academy noted (NRC, 1995). After assessing only these question-begging accidents, the DOE then concludes that the risks are small. The "reasonably foreseeable" accidents that the DOE proposes, however, are quite different from those that the State of Nevada, where most such accidents would occur, alleges. Thus there are strong grounds for believing not only that DOE has "stacked the deck" in the material it considers, but also that its resultant conclusions are little more than begging the question.

Likewise, for example, when the DOE says that "sabotage...would be unlikely to contribute to impacts from the repository...sabotage events would be unlikely at the repository" (DEIS, 1999, 4-65), again it is merely begging the question. DOE concluded that sabotage events would be unlikely at the repository (DEIS, 1999, p. 4-65), even though the National Academy of Sciences (NRC 1995) committee noted that it would be impossible to predict any sabotage events. There are no data that show sabotage is unlikely, and US Office of Technology Assessment data show that human error and terrorism are well known to be responsible for 60 percent of all technology-related threats (Shrader-Frechette 1993, 69; see also 67ff.). Given the enormity of this statistic, the DOE ought not merely beg the question about the likelihood of terrorism or sabotage. Because the DOE assumes that the repository will be breached only by "inadvertent intrusion," (DEIS, 1999, 5-41) it is able, fallaciously, to dismiss sabotage and therefore conclude that the risks are smaller than might be thought.

Similarly, the DOE begs the question of the safety of the waste canisters. It says that "the waste packages would be the primary engineered barrier to inhibit the release of radioactive material to the environment" (DEIS, 1999, 2-31). Yet, the DOE is still "developing specific waste package designs" and has, so far, only a "preliminary conceptual design" for the canisters (DEIS, 1999, 2-32). In the absence of specific canisters that have been tested, the DEIS speaks instead of how "the design of a specific cask would be tailored to the type of material it would contain" (DEIS, 1999, 4-88). In short, the DOE provides no empirical analysis of what would happen to specific empirical casks, and instead it says what "would" happen, given the casks that it "would" make. Such claims ought to qualify, not as environmental impact analysis but as theological impact analysis, since the DOE prefers to analyze its promises and beliefs rather than the facts.

Just as DOE assumes that its canisters will be effective and safe, even though they are not yet designed, so also the DOE assumes that the transport routes, for shipping waste to Yucca Mountain, will be effective and safe, even though it has specified neither the routes to be taken, nor the mode of transport. Moreover, it is not even known "when

DOE would make any transportation-related decisions" (DEIS, 1999, 6-1). DOE goes on to say that the mode of transport used to ship waste "would depend on several factors that DOE does not control" (DEIS, 1999, 6-1). If DOE does not know the routes and the modes of transport, it is difficult to claim that it has assessed the environmental impacts from Yucca Mountain, particularly because most experts maintain that transport-related impacts will be the most serious, at least over the period when the repository is open. It is even more question-begging, and even more incredible, when DOE knows neither the canister that will eventually be designed, nor the routes, nor the modes of transport, to claim that "the overall radiological accident risk...from all accident scenarios over the 24 years of transportation activities...would be about 0.07 latent cancer fatalities" at most (DEIS, 1999, 6-7). Obviously such fatalities depend strongly on the mode and routes of transport, so these figures appear to be mere guesses, and surely they are not science. Besides, as the state of Nevada pointed out, the DOE simplified cask design and accident scenarios, "created" data to fill the gaps, ignored human error in transport, and so on (DEIS, 1999, 6-29). Given all these problems with the DOE's using subjective data, there is no way that a reliable probability about cancer fatalities, induced by transport, could be given by the DOE. And if not, then the DEIS is not an example of science but an example of mere opinion, rhetoric, and begging the question.

DOE also begs the question when it admits that "Isolated nuclear criticality events could occur if the engineered control measures in the waste packages failed and other conditions (such as the presence of water) occurred," but then concludes, "If a nuclear criticality even occurred (highly unlikely) it would not have a significant effect on long-term impacts from the repository" (DEIS, 1999, 5-46). Given that criticality is an uncontrolled nuclear chain reaction, the bland reassurance of the DOE is, again, subjective. DOE's claim appears, at best, to be based on a theoretical model built on a number of DOE's own conclusions. Hence, DOE uses opinions to support its models, then claims that its models show that "there is no chance" of criticality accident. Such examples of begging the question arise, in part, because the DOE uses its own subjective models, in the absence of empirical data and long-term studies, to provide opinions on problems like criticality and groundwater migration. Such models, however, produce conclusions that are merely a function of the original assumptions that DOE put into the model (see Shrader-Frechette 1993, 50-53). As such they are not science but logically invalid modes of rhetoric, examples of begging the question.

#### (4) DOE's Committing the Fallacy of Bifurcation regarding Alternatives

As should already be apparent, the DOE is guilty of numerous logical, scientific, and ethical fallacies -- such as inconsistency, begging the question, and the fallacy of composition -- in the reasoning used in the DEIS. Another flagrant logical fallacy in the DEIS is bifurcation. The fallacy of bifurcation occurs when someone argues for one of two positions in a situation in which there are only two options for choice and in which the other option (than the one preferred) is not really a viable option. Thus the fallacy

of bifurcation present itself as rational, but it is really invalid and illogical as a means of decisionmaking. The DOE bifurcation consists of its considers only two options, either to build the proposed Yucca Mountain facility or to take no action at all (DEIS, 1999, 7-1). Yet obviously the US cannot take no action. It has to do something with nuclear waste, as even the DOE admits: "The future course that Congress, DOE, and the commercial utilities would take if Yucca Mountain did not receive a recommendation as a repository site remains highly uncertain" (DEIS, 1999, 7-1) Hence, for the DOE to consider only two options, using Yucca Mountain or taking no action, is to use a thoroughly unjust and illogical method in the EIS. This method would be analogous to offering the people a ballot on which there was only one candidate. One could vote for or against the candidate, but since there was only one candidate, the voter would know that she were being railroaded. It is significant that the DOE DEIS thus uses the same fallacy of bifurcation that has been used, repeatedly, in fascist and dictatorial regimes that want to give the appearance of rationality and democracy, in their elections, even though there is little of either.

#### (5) DOE's Practicing Theological Geology

Such examples of DOE's offering logical fallacies and opinions rather than science, promises rather than empirical data, continue throughout the DEIS, most notably in the area of assessing geological parameters relevant to environmental impacts at the site. For example, the DOE says that "volcanic activity in this area has been waning in the recent geologic past and...the probability of volcanic activity as a repository-disturbing event is low" (DEIS, 1999, p. 5-16). Likewise, with respect to earthquakes, the DOE admits that "earthquakes have occurred in the Yucca Mountain geologic region of influence, and are likely to occur in the future" (DEIS, 1999, 5-16). The DOE also admits that it has inadequate data regarding factors such as "drift seepage and percolation to depth," "dripping onto waste packages," integrity of the "waste package barrier," "integrity of the spent nuclear fuel cladding," and "transport in the unsaturated zone" (DEIS, 1999, 5-18).

In order to address each of these empirical problems -- volcanism, earthquakes, drift, drips, packaging, and transport -- the DOE says that it will update the models of each of these problems. Yet it concludes, correctly, that "because of the long periods simulated, the complexity and variability of the a natural system, and several other factors, the performance modeling must deal with a large degree of uncertainty" (DEIS, 1999, 5-19). However, when the basic difficulty is that one has little empirical data, as the DOE admits on the same page as the previous quotation, then modeling cannot resolve fundamental empirical problems, because the models themselves are based on subjective probabilities and alternative conceptual frameworks. As such, the models can be evaluated only for consistency, not for correctness or empirical fit; indeed if there were empirical data, the DOE would not be using models in the first place. The DOE, however, says that it will attack such empirical difficulties by using "alternative

conceptual models" (DEIS, 1999, 5-19). Yet, without empirical data, such models can only be tested via validation and verification—both of which bear no relationships whatsoever to the empirical world. They check merely consistency with other theoretical models (Shrader-Frechette 1993, 103-160). The DOE recognizes this fact, because it concludes, "the use of alternative conceptual models, while often necessary to characterize some types of uncertainty, is not always as exact as desired" (DEIS, 1999, 5-20). The DOE finally admits that, despite all its pretense of modeling, in the face of inadequate data, that it is relying on opinions. It says: "Based on expert judgment (and to some extent the finite time and resources that could be applied to the analysis effort), the analysis used a best estimate of the more likely ranges of model behavior and parameter ranges....Because of this narrowed range of models and parameters, the results are conditional, meaning that they depend on certain models and parameters being held constant or having their variance restricted. One such condition is the specific design of the repository and the waste packages in the reference design of this EIS (DEIS, 1999, 5-20).

In thus relying on opinions and models, rather than empirical data, the DEIS reveals very little about what is likely to happen, in the next million years, if the US uses Yucca Mountain as a repository. Instead of doing science, the DEIS is closer to doing theology, examining not facts but beliefs, hopes, and wishes. It is doing "theological geology," not real science.

#### (6) DOE's Assuming That What You Ignore Can't Hurt You

Throughout the Yucca Mountain DEIS, the DOE ignores factual events that are difficult, if not impossible to know, and then, despite these omissions, invalidly concludes that the impact from the proposed waste facility will be low. Consider some of these omissions: "The impact of such human intrusion was not included directly in the final presentation of results....the probability of human intrusion occurring was not modeled" (DEIS, 1999, 5-16). After ignoring crucial variables, such as human intrusion, that could cause massive environmental impacts, the DOE notes that it will use "insight based on the best information and scientific judgments available" in its analyses (DEIS, 1999, 5-17). Likewise the DOE says that, regarding radiological impacts on populations over long periods of time, "the DOE does not have the means to predict such changes quantitatively with great accuracy; therefore, the analysis does not attempt to quantify the resultant effects on overall impacts" (DEIS, 1999, 5-17).

DOE's ignoring key considerations, about which it is ignorant, is especially problematic because the very things about which it is most ignorant are those things to which conclusions about repository safety are most sensitive, and even the DOE admits this. For example, the DOE considers approximately 20 parameters and then assesses its confidence in its models' accuracy, as well as the sensitivity of the repository safety/performance, relative to each of these parameters. Interestingly, the DOE

admitted that its confidence in its models for water seepage into drifts, in its models for transport of radionuclides through the unsaturated zone, and in its models for transport of radionuclides through the saturated zone, all were "low," even though the significance of these parameters, for repository safety/performance, respectively, was "high," "high," and "medium" (DEIS, 1999, 5-22). If the crucial factors that affect repository safety are those about which DOE confidence is low, then how is it that the DOE can allege that the proposed repository will have no significant environmental impacts? Obviously, if the DOE claims about low confidence are to be believed, then they are not consistent with its claims about low impacts from the proposed repository.

Moreover, the DOE admitted that the peer review panel gave 145 pages of suggestions for improvement of its analyses, and then noted that "all of the suggestions are being addressed" (DEIS, 1999, 5-23). If even the peer review panel was critical of DOE efforts, then one wonders why the public should be railroaded into approval of the Yucca Mountain facility before all the concerns of the peer review committee have been dealt with. Indeed, these corrections should all have been completed before the DEIS was even submitted. To submit it prior to such correction is to show that DOE's decision -- about moving forward on Yucca Mountain -- is completely independent of what expert scientists say. Since when are projects submitted for approval on the basis of a promissory note, a promise to remedy poor science that should not even have occurred in the first place? The peer review committee noted that "the report of the DOE failed to provide a statement of the 'probable behavior of the repository' as requested by Congress" (DEIS, 1999, 5-23). If the peer review committee is correct, that DOE has not accomplished the Congressional mandate, then there is no reason, other than bias, that the DEIS should be presented for approval.

Similarly, one wonders why the DEIS should spend an entire chapter describing "management actions that the Department of Energy (DOE) would consider using to reduce or mitigate adverse impacts" at the site (DEIS, 1999, 9-1). What good is it to know that there are management actions that DOE "would consider"? To evaluate, adequately, the safety of a facility, presumably one would want to know what mitigating actions DOE would commit to performing under a variety of circumstances. For the DEIS to claim merely that certain actions will be "considered," when the government has a history of claiming sovereign immunity and of not compensating victims of government imposed radiation damage (Shrader-Frechette, 1994), is not reassuring. No one really cares about the "mitigation measures under consideration for inclusion in project plan and design" (DEIS, 1999, 9-2). The fact that the DEIS would state such measures as "under consideration" rather than as "guaranteed," also makes the reader, and any potential radiological victim, wary. Again, the DOE appears to have issued another promissory note, in the DEIS, when what the reader wants is some guarantees and some facts.

Apart from all these logical fallacies and scientific problems with the empirical quality

of the DEIS, there are a number of ethical shortcomings in the DEIS. Some of the most important of these shortcomings are that the DEIS violates considerations of environmental justice, ignores duties to future generations, and relies on the DOE to secure the safety of the proposed facility. Consider each of these ethical problems in turn.

(7) DOE's Ignoring Environmental Justice and Committing the Fallacy of Composition

Native Americans, especially the Shoshone and the Paiutes, would be treated unjustly, if the Yucca Mountain project continued, both because of factual reasons and because of the ethically invalid way that the DOE has defined "environmental injustice." Consider first the invalid definition. The DOE asserts that

The environmental justice analysis brings together the results of analyses from different technical disciplines that focus on consequences to certain resource, such as air, land use, socioeconomics, air quality, noise, and cultural resources, that, in turn, could affect human health or the environment. If any of these analyses were to predict high and adverse impacts to the human population in generation, then an environmental justice analysis would determine if those impact could occur in a disproportionately high and adverse manner to minority or low-income populations (DEIS, 1999, 4-81; see also, for example, 8-58).

DOE makes this same move throughout the DEIS. It argues that a particular impact will be low, based on the DOE's theoretical models and opinions, then says because the general impact is low, therefore the impact on native Americans will be low (see, for example, DEIS, 1999, 5-49). Or it says that, "because there would be no large cumulative impacts...there would be no disproportionately high and adverse impacts to minority and low-income populations" (DEIS, 1999, 8-91). This account of environmental injustice essentially claims that, if the DOE admits that any impacts on the general population are large, then (and only then) it will examine the impact on minorities and low-income groups. This strategy is both logically and ethically flawed, however, as well as scientifically flawed. It is logically flawed because it commits the fallacy of composition, a fallacy that consists of assuming that, if there are impacts of a certain type on a subset (part of a group) of people, therefore there are impacts on the whole set (the whole of a group) of people. Obviously, as any student of logic knows, such reasoning is false. There could be a massive impact on native Americans, for example, as a result of Yucca Mountain, without there being any obvious and massive effect on the population as a whole. Hence, if one waited for a whole-population impact, as DOE proposes, then DOE is likely to miss many adverse environmental-justice impacts, precisely because of the narrow way that DOE has defined "environmental justice" and then reasoned about it, in ways that use the fallacy of composition.

This fallacy of composition is also ethically flawed because, unless the DOE admits that certain impacts are large, it will investigate no environmental-justice issues at all. There is an ethical problem with this strategy because the magnitude of an impact is separate from the equity of its distribution. The first consideration is one of utilitarian ethics, whereas the latter consideration is one of egalitarian ethics (Shrader-Frechette, 1993, 90-94). By considering only the former, the DOE adopts a utilitarian ethics that fails to take account of equity (Shrader-Frechette 1993). Such a strategy is also ethically flawed because it relies on the DOE to define an impact as large before taking account of it ethically. In the case of an inequity, the potential perpetrators ought not be able to define what is and is not inequitable, while the alleged victims have no voice in what constitutes a an important impact.

From a factual and scientific point of view, DOE's questionable account of environmental justice is troubling because the DOE admits that, with respect to transportation, native Americans theoretically will bear much of the risk of the waste transport because "portions of some routes would cross or be adjacent to Native American tribal lands." (DEIS, 1999, 6-137). Given this admission, only the allegedly low radiation exposures claimed by the DOE would prevent native Americans from bearing a disproportionate impact from Yucca Mountain.

Not only does the DOE assume that a large general-population impact is a necessary condition for a disproportionate impact on Native Americans, but the DOE also commits the fallacy of the appeal to ignorance in its assessment of environmental justice and transport accidents relevant to Yucca Mountain. It notes, repeatedly, in chapter 6 of the DEIS, that it has not yet chosen the transport routes to be taken, the transport modes (rail or truck) to be used, and the transport casks to be employed. It also admits that "portions of some routes [of waste casks] would cross or be adjacent to Native American tribal lands" (DEIS, 1999, 6-137). Despite all these unknowns, the DOE claims that "DOE has identified no subsection of the population that would be disproportionately affected by transportation related to the Proposed Action" (DEIS, 1999, 6-34). Of course not. If the routes are not yet chosen, then one cannot tell the degree to which they would cross tribal land or the degree to which poor people and minorities would be living near the routes chosen. Hence, because of the unknowns in the DEIS, it would be impossible to determine a Native-American transport impact. Essentially, the DOE has argued that it does not know the transport routes, modes, and casks, and therefore "DOE has concluded that no disproportionately high and adverse impact would be likely on a minority or low-income populations from the national transportation of spent nuclear fuel and high-level radioactive waste to Yucca Mountain" (DEIS, 1999, 6-34,35). This is a classic instance of the logical fallacy of the appeal to ignorance: person A is ignorant of any X, therefore there are no X. From one's ignorance about something, one cannot logically draw any conclusions about it. To do so is to reason invalidly, and this is precisely what the DEIS has done.

Additional inequities associated with the proposed Yucca Mountain repository also present problems of environmental justice. The repository proposes to add to the environmental and social burdens that this society already has imposed on native Americans and on Nevadans and hence raises a number of issues of compensatory justice or reparation. Yet instead of reparation or compensation to Nevadans and to native Americans, the DOE proposes to add to their burdens in a variety of ways. Native Americans claim land rights, under US treaty, to the Yucca Mountain lands (DEIS, 1999, 3-9). Although they claim legal power to interpret treaties with Native Americans, the US courts have no ethical power over lands that the US took from Native Americans by force. As a consequence, the US government has no ethical right to impose Yucca Mountain on Native Americans who do not want it. Moreover, Yucca Mountain is part of the holy lands of the Paiute and Shoshone, and they do not want the repository on their holy lands (AIWS, 1998; DEIS, 1999, 3-70, 4-84). The DOE never addresses this argument of the Native Americans in the DEIS. Instead, the DOE merely begs the question of the acceptability of the Yucca Mountain site.

The Yucca Mountain Project also threatens environmental justice because the DOE has denied access and use to these important traditional lands of native Americans, and this denial threatens their cultural survival in a unique and irreversible way, a way experienced by no other Native Americans (AIWS, 1998; DEIS, 1999, 4-84, 85). Moreover, in taking away Native-American use of these holy lands, the DOE has given no rationale for why it believes that it need not take account of the National Historic Preservation Act, the American Indian Religious Freedom Act, Executive Order 13007 on "Indian Sacred Sites," and Executive Order 12898 on "Environmental Justice," all of which could be used to argue against building Yucca Mountain (DEIS, 1999, 11-12, 13, 14).

Although the US DOE invited the participation of the impacted Shoshone and Paiutes in the Yucca Mountain discussions, there is no evidence whatsoever in the DEIS that the US DOE considered the arguments of these peoples, and the US DOE has given no arguments that show why it believes that its ethical claims are superior to those of the Native Americans. In the DEIS, the DOE merely repeated the claims of the Native Americans (see, for example, DEIS, 1999, 4-84 and 85), but never addressed why it believed these arguments were not compelling. At a minimum, if the DOE is to reject the environmental-justice claims of native Americans, the DOE is obliged to explain both (a) what it thinks its rationale is and to detail (b) what considerations of the Shoshone and Paiute would be compelling grounds for abandoning the Yucca Mountain facility. The US DOE has done neither.

Additional environmental-justice issues arise because the Yucca Mountain facility is next to the Nevada Test Site. As a result, Native Americans have already borne more than their fair share of negative environmental impacts from Nevada and from the US because the tribes live directly downwind from the Nevada test site and have

experienced increased radiation-related cancers and ailments as a result of US weapons testing (Shrader-Frechette, 1994). The DEIS (1999, 8-76) does consider the radiological impact of weapons testing and, indeed, even makes the assumption that the migration of radionuclides from testing will be through the same pathways as migration from the proposed repository. Nevertheless, the DEIS never considers this particular environmental-justice aspect of the repository, namely that the same people are likely to bear the worst effects of testing and the worst effects of Yucca Mountain. Because both Nevadans and Native Americans would receive the most negative impacts from Yucca Mountain, if it were built, these minorities are receiving a disproportionate environmental impact from the site, as compared to other Americans. Moreover, they receive these negative impacts not only because of the radiological hazards that they face but also because of the nuclear-related liability they face. Under existing US law, it is not possible for a citizen to sue (the person or group that causes nuclear-related injuries or deaths) for more than approximately one percent of the costs of all nuclear-related consequences of some accidents. Because of the nuclear-exclusion clause in US law, those living near the proposed Yucca Mountain waste facility would face a massive financial risk, even if there is no accident. Knowing that one would not be fully covered, in the event of catastrophe, is both a financial, as well as a psychological and medical risk, apart from whether any severe accidents even take place (see Shrader-Frechette, 1993, especially pp. 96-99). Yet, the DEIS does not even consider this nuclear-liability exclusion, as part of its discussion of environmental justice.

DOE's problems with environmental-justice concerns show that it has great difficulty dealing with ethics, and especially, with equity issues. Not only does it repeatedly employ utilitarian ethical assumptions in its analyses, but it fails to consider the actual arguments of the Native American groups at all. Moreover, it admits that some of the repository impacts could have higher, skewed impacts for a few people. Yet it never analyzes the logical consequences of its remarks about skewing, such that it considers the environmental-justice ramifications of the skewing. DOE claims, for example:

The performance results reported in this EIS are highly skewed. In this context, skewed indicates that there are a few impact estimates that are much larger than the rest of the impacts. When a large value is added to a group of small values, it dominates the calculation of the mean. The simulations reported in this EIS have mean impacts that are often above the 90<sup>th</sup> percentile and occasionally above the 95<sup>th</sup> (DEIS, 1999, 8-63).

If DOE admits that the performance results are highly skewed, then it ought to consider these large impacts as potential problems of environmental justice. Yet it never does so. Nor does it provide alternatives to the misleading mean figures that it employs in its analyses. Hence the skewed data reveal not only scientific problems with the DEIS but also ethical difficulties.

#### (8) DOE's Jeopardizing Future Generations

The DEIS's presupposition, that it can adequately assess long-term repository effects by examining consequences "for as long as 10,000 years" into the future (DEIS, 1999, 2-74) also is ethically problematic. It jeopardizes duties to future generations, given that the repository impact continues in perpetuity and that the repository would contain radionuclides whose half lives are in the millions of years (Shrader-Frechette, 1993, 42-50). Indeed, as the National Academy of Sciences Committee on Yucca Mountain showed, the proposed site would have serious impacts on the order of a million years into the future (NRC, 1995). Even the DOE has admitted that the impacts from the repository, in terms of radiation doses, will continue to increase, after 10,000 years; its own dose curves, for all its scenarios, show that the radiation doses are continuing to increase up to, and after, 10,000 years (DEIS, 1999, see 5-29, 32, 35). In addition, the DOE explicitly states that "at times greater than 100,000 years after repository closure, damage from falling rocks would be more likely because the waste packages would be corroded" (DEIS, 1999, 5-45). If this is true, then the most massive impacts from the repository are certain to occur after the period for which DOE has done its analysis. And if so, it follows that the DEIS is systematically unfair to members of future generations, namely those who will live later than 10,000 years from now.

#### (9) DOE's Flawed Past Record

In addition to the flaws in logic and scientific method, as well as the ethical shortcomings of the DEIS, there are strong empirical grounds for challenging the claims that the DOE would engage in satisfactory "performance confirmation" to assure "that long-term performance objectives have been met" (DEIS, 1999, 2-37). In other words, given DOE's past behavior, it is doubtful that the "DOE would reduce or eliminate many such [environmental] impacts. [from the site] with mitigation measures or implementation of standard Best Management Practices" (DEIS, 1999, 2-74). Likewise it is doubtful that "DOE would minimize the potential for a contaminant spread by managing spills and leaks in the proper and required manner" (DEIS, 1999, 4-22). These empirical grounds for doubt, that DOE would manage the proposed Yucca Mountain site effectively, are DOE's past record of performance at other nuclear sites and DOE's coverup of relevant evidence in the Yucca Mountain case.

Consider first DOE's questionable record at other nuclear sites. According to a recent General Accounting Office (GAO) report, 90 percent of the 127 existing DOE facilities have groundwater contamination, some in excess of 1000 times the allowable limit (Shrader-Frechette 1993, 155). Both boards of the National Academy of Sciences, as well as the US Congress, repeatedly have criticized the US DOE for its bias and mismanagement, as well as for its repeated environmental violations (Shrader-Frechette, 1993, 152-157). Moreover, DOE withheld and covered up important scientific documents from its own peer reviewers and from the state of Nevada

regarding the Yucca Mountain site. The state of Nevada had to go to court to force the DOE to release these site studies, funded with taxpayer monies, to the state where the proposed repository was supposed to be located (Shrader-Frechette, 1993, 139-141). Given all this evidence of DOE bias, coverup, and violation of environmental standards, there is little evidence for the DOE claim that it will manage the proposed Yucca Mountain facility adequately. Indeed, if one goes on past DOE performance, the most reasonable prediction will be that DOE will withhold crucial safety data and that DOE has a 90-percent chance of contaminating the groundwater beneath Yucca Mountain, perhaps to 1000 times in excess of the allowable pollution limit. If DOE was forced to predict its own future behavior on the basis of its past behavior, it could not site Yucca Mountain. Yet DOE should predict its future behavior in precisely this way, because DOE uses past geological and hydrological data for future predictions. It should therefore use all past data, not just selectively ignore the data that show that DOE is likely to do a poor job at Yucca Mountain.

Apart from the way that DOE has mismanaged its other sites and polluted the environment, DOE is not a credible agency to oversee radioactive waste storage or disposal because of its scientific biases and coverup in the Yucca Mountain case. Indeed, the DOE does not even go through the sham of putting scientific documents, contrary to its own positions, in the bibliography for the DEIS. Only one of the hundreds of scientific documents published by the Nevada Nuclear Waste Project Office (NWPO, 1997) appears in the DEIS (1999) bibliography, and this is short letter providing a list of citizens' concerns. The DOE admitted that the state of Nevada, which opposes the repository as unsafe, has a number of scientific findings that must be evaluated, if the project is to be scientifically grounded, concerns such as the groundwater upwelling in the recent past, as documented by Dublyansky (1999). Yet neither this scientific study, nor hundreds of others from the NWPO appears in the bibliography. This bibliographic bias shows not only that DOE cannot be trusted to evaluate Yucca Mountain credibly but also that it cannot be trusted even to report on Yucca Mountain credibly.

DOE bias in the Yucca Mountain study (DEIS 1999, 7-53) is apparent, for example, in its treatment of environmental-justice issues. On the one hand, throughout the document, whenever it discussed environmental-justice questions likely arising in the event of building the proposed Yucca Mountain facility, the DOE authors simply stated the Native-American point of view opposing Yucca Mountain, and then, without any evidence or discussion, asserted that there would be no disproportionate environmental impacts (see earlier section on environmental justice in this paper) and no significant impact from the repository at all (DEIS, 1999, 5-49). The DOE made both assertions, despite the fact that nuclear waste transport would cut across native American lands, and despite the fact that the site of the proposed repository is on land sacred to the Shoshone and Paiute, as well as contested in a land treaty between the US and the Native Americans. The DOE completely ignored the land claims, the sacredness of the land to the Native Americans, and the fact that many reservations are located near the

proposed Yucca Mountain facility. Instead the DOE proclaimed, by fiat, that there would be no environmental justice impacts as a result of the proposed repository. This denial is all the more amazing because there is no analysis, whatsoever, of the Native American claims in opposition to the Yucca Mountain facility. On the other hand, when the DOE treats proposed impacts of leaving the nuclear waste onsite, at reactors across the US, instead of moving forward on the Yucca Mountain Project, its bias is evident. Although this (no-action) alternative is more preferable to the Native American community and to potential victims of environmental injustice, the DOE claims that this no-action option could cause environmental-justice problems. It states:

the increased number of facilities required to store the...inventory could adversely affect the nearby public to a degree greater than that for the Proposed Action inventory [siting Yucca Mountain]. As with the Proposed Action inventory, nearby minority or economically disadvantaged communities could experience disproportionately high and adverse human health impacts. In addition financial considerations could make it ore difficult for members of minority or low-income populations to obtain uncontaminated resources or to move away from contaminated soils and water. Because subsistence patterns vary for minority or low-income populations, members of these populations could be exposed to greater than average doses. The result of differing potentials for exposure could result in disproportionately high and adverse impact on minority or low-income populations (DEIS, 1999, 7-53).

This DOE affirmation of environmental-justice problems associated with not building the Yucca Mountain Repository is amazing, given (1) that DOE did not analyze the environmental-justice arguments of the Native Americans who wrote opposing the Yucca Mountain facility (see, for example, DEIS, 1999, 4-8, 5-49, 8-58, 10-4), and given (2) that DOE claimed there were no environmental-justice impacts in the case of building the Yucca Mountain facility. This unargued DOE denial of environmental-justice problems, where native Americans say they exist (if the repository were built), together with the assertion of environmental justice problems, where native Americans say they do not exist (if the repository were not built), is puzzling. The DOE affirmation of environmental-justice problems that would arise if the waste remained where it is, throughout the country, is especially problematic because of three DOE omissions in its short, five-sentence "analysis" of environmental justice in the no-action case. In this analysis, DOE alleged that not building Yucca Mountain likely would cause environmental injustices, but it failed to note that, in this case, (1) the people receiving the benefits from the nuclear electricity would also bear the risks of the waste, which would not be the case if Yucca Mountain were built. The DOE also failed to take account of the fact that (2) the Nuclear Regulatory Commission affirmed that the waste could stay safely onsite, where it is, for at least 100 years, and that, (3) all things being equal, waste disposal is more equitable the more widely it is dispersed, as it would be in the no-action case. Given its failure to examine these three points, all of which

suggest that the no-action option is more environmentally just than the Yucca Mountain option, the DOE again appears to be begging the question and thus revealing its biases.

One of the more flagrant examples of DOE bias occurred in 1992. When the DOE issued its Early Site Suitability Evaluation in 1992 (Yunker, Andrews, et al., 1992), and concluded that Yucca Mountain was a suitable site for permanent nuclear waste disposal, the study received massive criticism, including criticism from the DOE's own peer reviewers (Yunker, Albrecht, et al, 1992). These DOE peer reviewers included Ph.D.s in geology and hydrology from the top institutions in the US. They unanimously warned, in their "Consensus Statement":

Many aspects of site suitability...predictions involving future geologic activity, future value of mineral deposits and mineral occurrence models...rates of tectonic activity and volcanism, as well as mineral resource occurrence and value, will be fraught with substantial uncertainties that cannot be quantified using standard statistical methods (Yunker, Albrecht, et al., 1992, B-2).

Confronted by the top geologists and hydrologists in the US, who said that Yucca Mountain safety could not be predicted in the long-term future, the DOE promptly covered up the massive volumes of the Early Site Suitability Evaluation when its peer reviewers said that what the DOE wanted to do (show safety) could not be done. This coverup continues to the present, and neither the ESSE nor the report of the 14 distinguished peer reviewers, on the ESSE, appears in the DEIS. This is not surprising, as the peer reviewers' consensus statement contradicts the findings of the DEIS.

Even more interestingly, after the distinguished Ph.D.s in geology and hydrology, the DOE peer reviewers, severely criticized the DOE Yucca Mountain efforts and said the studies could not be credibly done, the DOE appointed a 50-person team to write the DEIS (1999, 13-1 through 13-7). Of these 50 persons, although there were several geologists, not one had a geology degree higher than the bachelor's. Moreover, half of the 50 DOE DEIS authors were engineers, and presumably predisposed to say that the facility could be built. After all, that is what engineers do. They build things. There was not one medical doctor on the DEIS 50-person team, and not one public-health expert, and not one hydrologist, even with an undergraduate degree. Nevertheless, the main worries of the Yucca Mountain project are health-related radiological exposures and groundwater migration because of geological and hydrological conditions. It thus appears that the DOE could not handle Ph.D.s in hydrology or geology, the Ph.D. peer reviewers of the ESSE, and that the DOE also could not "handle" medical and public-health experts, so it simply excluded these people from the DEIS. In fact, of the DEIS authors, by far the largest specialty was engineering, which was represented by more than double the number of the next highest specialty (biology) of the DEIS project team. Because the DEIS authors do not include a single hydrologist, with even an undergraduate degree, because its geologists have only undergraduate degrees, and

because the DEIS authors include no medical doctors and no public-health experts, at all, this DEIS document is not scientifically credible. It illustrates well why a National Academy of Sciences panel warned, in a classic volume on risk assessment, that assessors must not only get the science right, but they must get the right scientists (NRC, 1996). The DEIS did not get the right scientists. And it looks as if it was no accident that the DEIS did not get the right scientists for the task.

As if the under-education and under-representation of geologists, hydrologists, medical doctors, and public-health experts were not bad enough, DOE also took steps to insure that no hydrological or geological experts interfered with its plan to build Yucca Mountain. The DEIS states very clearly that all reviewers of the DEIS came from various DOE offices, and that there were no external reviewers (DEIS, 1999, 13-7,8). Presumably DOE could not withstand the sort of review that happened when experts from places like MIT said its project could not be accomplished, as happened in its badly flawed ESSE. But if outside experts, including those at the National Academy of Sciences, have been critical of the Yucca Mountain Project (NRC, 1995; see Shrader-Frechette, 1993), and if the DEIS has had no genuine external review, then why should the American public be told that the document is a reasonable one? Why should this document even be offered for decisionmaking? It does not come even close to providing scientific, logical, or ethical grounds for pursuing the Yucca Mountain repository. The document is a scientific disgrace.

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February 3, 2000

**TO:** Wendy R. Dixon  
EIS Project Manager, M/S010  
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Yucca Mountain  
Site Characterization Office  
P.O. Box 30307  
No. Las Vegas, NV 89036-0307

**FROM:** Brian Clemency  
259 Zahn Hall  
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Notre Dame IN 46556  
Clemency.2@nd.edu

**CC:** President Clinton  
Senator Bayh  
Congressman King  
Senator Lugar  
Senator Moynihan  
Congressman Roemer  
Senator Schummer

Following careful consideration of DOE/EIS-020D: *The Draft Environmental Impact Statement for a Geological Repository of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County Nevada*, I have concluded that the DOE's plan for Yucca Mountain is not an prudent course of action. This plan puts not only the residents of Nevada, but all Americans at risk. Enclosed are my comments on the draft and the DOE's plan.

The Dangers of the Yucca Mountain Project:  
A Response to DOE/EIS-020D:  
*The Draft Environmental Impact Statement for a Geological Repository of Spent  
Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain,  
Nye County Nevada*

By  
Brian Clemency  
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The dangerous legacy of the arms race and the commercial generation of electricity is the nuclear material that has subsequently been produced. This represents the greatest challenge of our time: the safe storage and disposal of radioactive waste. Although a long term solution is required, the Yucca Mountain Project is not an advisable course of action. The "Draft Environmental Impact Statement for a Geologic Repository at Yucca Mountain" does not adequately provide for the safe transportation and storage of nuclear waste. The major flaws of the draft relate to transportation, construction, monitoring, safety and security. In addition this plan does not act in accordance with the individual rights of US citizens.

Before any waste can be stored at Yucca Mountain it must be shipped to Nevada. The government's belief that nuclear waste can be shipped with a low accident probability is based upon faulty assumptions. (Lamb & Resnikoff, 3) Most of the waste will be traveling from sites east of Nevada. This model fails to address changes in speed limits, traffic density, frequency of bridges along the routes and movement through different states. These oversights invalidate any conclusions stemming from this model, and raise doubts as to the actual safety of the proposition.

If all the nuclear waste reaches the site safely, the issue of long term storage remains. The government's construction plans are incomplete and unsafe. The government calls for nuclear waste disposal to begin prior to the completion of the site. However, Section 4.1.8.1 does not consider accidents that may occur during the construction phase, and cannot draw applicable conclusions because it uses conceptual models and "final facility design details are not available." The possibility of an incident due to a construction mishap must be taken in to account in any complete safety analysis.

The plans for closing the site lack a strategy for long term monitoring. The report does not call for continued vigilance but only for the site to be marked and for "continuing performance confirmation as necessary." (4.1) This ambiguous plan is not satisfactory in light of the lasting dangers nuclear storage imposes on future generations. A clear and comprehensive long-term safety plan should be adopted prior to storage, rather than a "wait and see" attitude. Nuclear waste is currently carefully monitored at the sites where it is produced. Until there is a guarantee that the same precautions will be taken at Yucca Mountain is seems imprudent to relocate the nuclear material.

Though wars were the greatest threat to the US of the 20<sup>th</sup> century, the greatest threat of the 21<sup>st</sup> century will likely be terrorism. The DOE believes that sabotage is "unlikely" (4.1.8.3). But, the Yucca Mountain Project presents opportunity for terrorism both at the facility and in transportation phase, the likes of which has never before been seen. This threat is much greater than the terrorist threats on the recent Y2K celebrations. Maintaining security protocols indefinitely which are suitable for this threat are not planned and are not economically feasible.

This project also creates a new the threat of a catastrophic nuclear disaster. Though any nuclear event would be harmful to our ecosystem, putting all our nuclear waste in one place creates an added danger that does not exist when nuclear waste deposits are spread though out the country. Such an event would have serous national and world health implications.

Perhaps most disturbing is the fact that the government's Yucca Mountain Project overlooks the concept of free informed consent on behalf of its citizens. Most apparent are the protests of the citizens of Nevada who are strongly against these plans, and who do not themselves utilize nuclear power. However, consideration must be granted to individuals whose homes are downwind of the mountain. And finally, at risk are the Americans who use our roadways and who live near transportation routes. In short, the Yucca Mountain program puts all of us at risk, a risk that many Americans are not willing to take.

Perhaps after an open dialogue and further improvement upon the Yucca Mountain Plans, a safe depository program could be created. . However, due to the restrictions imposed by the Nuclear Waste Policy Act of 1982, such a course of action is not an option. And as such I am compelled to recommend the "no-action alternative."

February 3, 2000

To: Richard G. Lugar  
United States Senator, State of Indiana  
306 Hart Senate Office Building  
Washington, D.C. 20510

From: Carrie E. Hedin  
18027 Bulla Road, Apt. *C. Hedin*  
South Bend, IN 46637

Enclosed are several of my objections to the US Department of Energy Draft Environmental Impact Statement (DEIS) of the proposed Yucca Mountain Nuclear Waste Repository. As a senior science major at the University of Notre Dame, I have been exposed to many scientific and technical reports and experiments. However, I have never seen a document filled with such "bad science" as this one. Based on this DEIS, the building of Yucca Mountain should not be allowed to proceed.

There are numerous inconsistent, incomplete, and incoherent claims made throughout this proposal for the Yucca Mountain Repository. These logical fallacies and flaws have severe ethical and moral consequences not only for today's world, but also for future generations. It is my hope that you will view these objections and concerns with utmost concern and decide to support the numerous scientists, researchers, and citizens in their goal to stop the building of this dangerous facility. Thank you.

Objections to the Draft Environmental Impact Statement (DEIS) for the Yucca Mountain Waste Repository

The Draft Environmental Impact Statement of the Yucca Mountain Waste Repository contains numerous problematic issues in regard to the way the study was performed. There are many incomplete, inconsistent, and incoherent claims made in this document, all of which lead one to disagree with the DOE's conclusion that the site is safe and suitable. In the following points, I address several of these claims and raise objections to what I believe is "bad science." I hope that these examples alone serve as a basis from which to further critique the Yucca Mountain study and object to the building of the waste repository.

1. The Draft Environmental Impact Statement is incomplete with regard to the definition of the "maximally exposed individual." The definition did not take into account differences in age, gender, and physical characteristics and also assumed that current lifestyles in the exposed area would remain consistent over the next 10,000 years. First of all, if the intent of the study is to determine protection for future generations, the maximally exposed individual should not be a person of mean or average lifestyle because it automatically results in some people (namely the old, young, sick, etc.) being less protected. In addition, while it is certainly not possible to know future lifestyle patterns, one cannot assume that characteristic conditions today will remain intact for thousands of years in the future. Therefore, the DEIS is wrong to rely on current averages to determine future levels of safety from the repository (DEIS, p. 5-26).
2. The DEIS is incomplete in various sections of the overall study when it discusses different radiation effects from the repository only over a 10,000 year time period. For example, in the analysis of the water-borne radiological consequences (Section 5.4), dose rates to individuals using groundwater were only estimated for the first 10,000 years after repository closure. When one considers that the serious effects of the waste could last for one million years (due to the extensive lifetime of many of the toxic materials in the repository), the DEIS is not fully reporting the radiation consequences of Yucca Mountain to the public (DEIS, p. 5-25).
3. The DEIS is inconsistent when it states that water flows at highly variable rates through the saturated zone of Yucca Mountain because it states earlier that the amount of water affected would be minimal due to the low rate of flow (Section 5.2.3.1). By assuming a low flow rate (despite mentioning later that rates were variable), the DEIS underestimated the potential amount of seepage that could occur into the repository (DEIS, p. 5-10).
4. The DEIS is incomplete in its discussion of human intrusion because it admitted the possibility of intrusion when it described a potential event, but then did not further discuss the impact of such an intrusion in its final results (Section 5.2.3.5). While it is difficult to predict future human activity, one cannot completely dismiss the discussion of possible consequences that could occur through human impact simply because exact scenarios are not known. By not including the possible consequences of human intrusion, the DEIS fails to fully consider the potential radiological impacts that could occur from the building of the repository (DEIS, p. 5-16).
5. The DEIS is incomplete in its analysis of the proposed casks for use at the waste repository because it did not include failure rates under extreme conditions (when there is actually the highest potential for failure). In section 5.2.3.4, it reports that package failures

would occur periodically over hundreds of thousands of years (a questionable prediction itself considering the fact that casks are still in the design phase and modern technology has not even existed for that long!). However, it then neglects to state what failure rates might be if disruptive events, such as an earthquake, were to occur. Since information regarding the low failure rates under normal conditions was provided, potential rates of failure from disruptive events should be included as well (DEIS, p. 5-15).

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February 6, 2000

To: The Honorable Richard Lugar  
U.S. Senate  
306 Hart Senate Office Building  
Washington, D.C. 20510

From: Annie Vogel *A.V.*  
433 Farley Hall  
Notre Dame, IN 46556

I have enclosed my analysis of the US Department of Energy Draft Environmental Impact Statement (DEIS) of the proposed Yucca Mountain Nuclear Waste facility. As a student majoring in premedical sciences combined with science, technology and values, I cannot support this proposal. This DEIS underestimates many of the potentially dangerous health and environmental impacts, which could result from the transportation of nuclear waste to the facility from 77 locations nationwide.

There are many ethical and scientific problems associated with building the repository. The US Department of Energy (DOE) has overlooked the severity of these problems in supporting the DEIS and the building of the site. There have not been enough accurate and thorough studies conducted to insure that the transportation of nuclear waste to this repository could be conducted safely and without detrimental impacts to the surrounding environment.

This is a serious issue and it needs to be treated as one. Please consider the possible dangers associated with transporting hazardous nuclear waste to this facility. Reconsider before the shipments can begin on our highways and through our cities and towns. Thank you.

**Analysis of the Nevada Transportation Components of the Yucca Mountain Draft  
Environmental Impact Statement:**

**Comments on the  
Draft Environmental Impact Statement for a Geological Repository for the Disposal of  
Spent Nuclear Fuel and High-level Radioactive Waste at Yucca Mountain,  
Nye County, Nevada**

by

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submitted to:  
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Yucca Mountain Site Characterization Office  
Office of Civilian Radioactive Waste Management  
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PO Box 30307, M/S 010  
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The Yucca Mountain Repository Site should not be approved since a safe method for transportation of nuclear waste materials to the site has not been determined. In the Environmental Impact Statement (EIS), the DOE has not accurately assessed the potential risk of the proposed transportation methods of either rail or highway. Several factors that must be reconsidered and reevaluated are the frequency and severity of accidents, proposed population growth in the areas near the transportation routes, and a recent increase in traffic speeds. The potential environmental impact resulting from the transportation of waste to the site have also been underestimated in this statement due to incomplete and outdated data. The DOE needs to conduct more accurate and complete studies in order to formulate a more complete assessment of the potential risks.

The EIS proposes either rail heavy-haul options for transportation of waste (Moore, 1). However, the DOE does not accurately assess the potential risk or probability of environmental damage or serious accidents resulting from either option. The EIS cited that the frequency of accidents on national interstate highways is not likely to change, despite a recent speed limit increase on these highways, and gives no supporting evidence for its conclusion (Resnikoff, 3). The probability of accidents was also incorrectly calculated to be less than what is actually likely. The DOE does not include the effects of increased highway use in the Las Vegas and surrounding areas as a result of projected population growth. In assessing the potential danger of rail accidents, the DOE uses incomplete data by only assessing the risk resulting from a nuclear fuel falling from a low bridge and does not consider the consequences, which could result from an accident from a tall bridge (Resnikoff, 5).

The potential environmental damage, which would result from transportation of the hazardous waste was also underestimated in the EIS. The DOE used incomplete and outdated data to reach an invalid conclusion that the environmental impacts would be minor. The effects on ground and surface water, loss of land use near the site, and the disruption of wild game habitat were underestimated by the DOE (Moore, 22, 20, and 5, respectively). They have not adequately studied the potential impacts either transportation method would have on each of these variables since they did not consider the different measures of impact in a broad enough area (Moore, 22). In order to

adequately assess the potential damages, the DOE must study the entire area, not only the "area within the right-of-way" (Moore, 20.) The information necessary to make an accurate transportation assessment is missing from the EIS and should be included before any decisions regarding the Yucca Mountain site can be made. Based upon the information from the current EIS, the transportation of hazardous waste to the proposed Yucca Mountain Site should not be conducted.

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