

Response to the Draft Environmental Impact Statement (DEIS)  
Yucca Mountain, Nevada

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January 20, 2000

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This speech is dedicated to my grandmother who was born in 1891 in Wells, Nevada. She was named--Maude-Nevada-Goble. She lived there in the Goble family home and for awhile in Utah until she came to Missouri to be near her husband's family. My grandparents, Maude & Fred Jacoby placed great value both on family and on historical fact and always supported the historical society in their community. My family's emphasis on history leads me to the perspective that the problems we are discussing tonight should be solved so there is a future for our children. The production of highly toxic radioactive material leaves a terrible legacy. People who try to solve their present day problems should not do so at the expense of future generations --as we have done--not just for 1000 years but for hundreds of thousands of years and longer.

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The Department of Energy's process of elaborate technical studies is complex and involves much scientific work but it also involves predictions. In fact, geological estimates or predictions are based on what has happened in the past. But a prediction that earthquakes occur 1000 to 10,000 years apart is hard to relate to human experience. A 21 year study tells us much about the structure of Yucca Mountain but does not tell us when earthquakes will happen there, exactly where they will happen or how they will change the rocks & fissures that exist. Since 1910 there have been over 600 earthquakes of greater than magnitude-2.5 within a 50-mile radius of Yucca Mountain.<sup>i</sup> How many earthquakes will happen within 50 miles of Yucca Mountain before 1000 years is over? This Basin area is a dynamic area.<sup>ii</sup>

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Science reported in March, 1998 that a team of 9 scientists using GSP data found that within 9 miles of Yucca Mountain the earth is expanding 10 times faster than was believed.<sup>iii</sup> Brian Wernicke was quoted in the *Las Vegas Review-Journal*, "I think the main message is if the rates we've seen is reflecting some long-term process, then the hazards at Yucca Mountain--volcanic eruption and frequency of earthquakes--would have been underestimated"

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This could change an earthquake prediction from every 10,000 years to every 1000 years. |

In January, 1999 there were at least 7 earthquakes at Frenchman's Lake.<sup>iv</sup> One of the earthquakes of magnitude-4.7 with epicenter at Frenchman's Lake knocked pictures off walls and left file drawers ajar at 2 facilities in the Nevada Test Site buildings at Frenchman's Flat. The magnitude-4.7 tremor in January was at the east end of the 40 mile Rock Valley Fault which according to Tim Sullivan, a Dept of Energy Geologist, is capable of magnitudes as large as 7.

| In the January 28 *Las Vegas Review-Journal* Nevada Senator Richard Bryan was quoted "This is an earthquake zone. It's a bad idea to place high-level nuclear waste on a place with earthquake activity."

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Nevada Rep. Jim Gibbons who has a master's degree in geology said, "This is something the Department of Energy cannot ignore.

"Yucca Mountain did not become Yucca Mountain through some placid event. This is a strong warning signal that (it) is unsuitable for nuclear storage." |

Greg de Polo, research geologist with the Nevada Bureau of Mines & Geology mentioned 2 faults in Death Valley capable of magnitude-7. He was discussing ways the Las Vegas valley could suffer earthquake damage in an April, 1999 article in the *Las Vegas Review-Journal*. He said that geologists estimate such strong earthquakes as magnitude-7 occur in Death Valley west of Yucca Mountain every 500 to 1000 years.<sup>v</sup>

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In fact, a magnitude-5.6 earthquake did occur on Aug. 1, 1999 at Scotty's Junction centered 50 miles west of Yucca Mt. It rattled residents of the Las Vegas valley but left no injuries or damage. There were also 13 aftershocks of magnitude 3 or greater. | Steve Frishman, consulting geologist with the State Nuclear Projects Agency referring to the amount of earthquake activity said, "It poses a real danger to an operating surface facility where they plan to have spent pools" of nuclear waste.<sup>vi</sup> |

From the Questions & Answers section of the web page for the seismology lab for UN, Reno run by Associate Professor John Louie, Ph.D., I quote "There is an active fault at the base of nearly every mountain range in the state."

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An answer to another question "... There are faults in the region around Las Vegas that have the potential to produce strong earthquakes on rare occasions. Rare means that the average time between the large earthquakes on any one of the faults is at least 1000-10,000 years. We do not know when the next one will happen, of course."<sup>vii</sup>

We don't know when an earthquake is going to happen, no matter how many studies we do. Transportation and disposition of radioactive materials will take at least 30 years. What happens if an earthquake occurs before the wastes are completely buried underground? There may be aftershocks and other earthquakes following the first. Is there a contingency plan? Could one even work? How many systems such as communication, transportation, computers, must work properly? How many people must be involved? How much of the surface area would be damaged around Yucca Mountain? |

The largest earthquake this century close to Yucca Mountain was a magnitude-5.6 recorded in 1992 at Little Skull Mountain about 12 miles southeast. This one knocked out windows and cracked walls at the Energy Departments field center--an estimated 1 million dollars damage.

In a Las Vegas Review-Journal article written by Keith Rogers the earthquake at Little Skull Mountain occurred 24 hours after the Landers, Calif earthquake sequence with a magnitude-7.4, a Big Bear magnitude-6.5 quake and hundreds of aftershocks and may have been related to that sequence. The Little Skull Mountain earthquake occurred on a hidden subsurface fault about 3 miles from the closest trace of the Rock Valley Fault.<sup>viii</sup> I quote from the web page for the seismology lab for the Univ. of Nevada "now we know that the 1992 Landers earthquake caused minor events all the way up into southern and western Nevada. A magnitude 7 earthquake might be big enough to repeat that."<sup>ix</sup>

But note: the Little Skull Mountain earthquake was on a hidden subsurface fault.

Nuclear waste should not be stored in Yucca Mountain. A study in 1996 discovered traces of Chlorine 36 in rock samples 600 feet below the mountain surface which indicates rainwater seepage deep into the mountain in less than 50 years. Studies--that contradict

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earlier assumptions about the mountain--suggest that water seepage will result in corrosion and radioactive particles will be released into the region's ground water.<sup>x</sup> Yucca Mountain does not qualify under the Nuclear Waste Policy Act and should be disqualified. The 1000 year rule on water seepage must not be changed. |

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| Another point of contention for geologists is whether water has been forced up into the mountain by volcanic action and flooded the potential repository area. If this has happened in the past, there is a possibility earthquakes or volcanoes could trigger thermal heating from the water basin below. This is one more controversy that should not be settled by politics. |

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| Now there is talk that engineered barriers are necessary to protect the canisters of nuclear waste. In February, 1999 Nevada Governor Kenny Guinn said "The original notion of a geologic repository was that the natural features of the site, its geology and hydrology, would serve a significant role in assuring long-term isolation of the waste. Now the Yucca Mountain safety strategy relies nearly entirely on the predicted long lifetime of the metal waste containers."| Even the Draft Environmental Impact Statement<sup>xi</sup> of July, 1999 admits that earthquakes will happen in the area and could cause damage of the waste package at postclosure by falling rock from earthquakes which would then allow water intrusion into the nuclear waste. | We need many more years of study to understand the geology of Yucca Mountain so that the citizens of Nevada can be protected from the radioactivity that is already there. | But we know Yucca Mountain does not meet the suitability guidelines for long term storage of nuclear waste. These guidelines must not be changed. The federal government has a mandate to protect American citizens and that mandate includes protecting Nevada citizens. |

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| Under no condition should nuclear waste be stored at Yucca Mountain. This repository cannot contain radioactive material from escaping to the surface or the ground water for 10,000 years. | Spent fuel rods should be left at the nuclear power plants where they are generated. |

*Bacley Denny*

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<sup>i</sup> In the Aug Las Vegas Review-Journal Steve Frishman stated that more than 600 earthquakes of magnitude 2.5 or more, large enough to feel if one is near the epicenter, have been measured within 50 miles of Yucca Mountain since 1910.

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<sup>ii</sup> From a brochure *Earthquakes in Nevada & how to survive them* by Craig dePolo, Alan Ramelli, & Diane dePolo "Although earthquakes don't occur at regular intervals, the average frequency of earthquakes of magnitude 6 and greater in Nevada has been about one every ten years, while earthquakes of magnitude 7 and greater average once every 27 year."

<sup>iii</sup> Brian Wernicke, geologist at Cal Inst of Tech, James Davis, of Harvard-Smithsonian Center for Astrophysics (CfA) and 7 other members reported in *Science* that using GPS data they found the data indicated that within 9 miles of Yucca Mountain the Earth's crust is expanding 0.04 to 0.067 of an inch per year, at least 10 times greater using the satellite data than the U.S. Geological Survey had inferred based on slippage of faults (over hundreds of thousands of years.) Keith Rogers, *Las Vegas Review-Journal*, March 27, 1998.

<sup>iv</sup> On January 27, 1999 an earthquake of magnitude 4.7 with epicenter at Frenchman's Lake knocked pictures off walls and left file drawers ajar at 2 facilities in the Nevada Test Site buildings at Frenchman's Flat. (A magnitude-4.7 quake is like detonating about 5,100 tons of TNT while a magnitude-6.7 earthquake is like detonating more than 5 million tons of TNT.) On January 25 there was a magnitude 4.3 earthquake. In fact there were at least 7 reported quakes at Frenchman's Lake in January, 1999. The 2.7 earthquake that rattled residents in northwest Las Vegas on Dec. 14 was called a background quake and not mentioned as related.

The magnitude 4.7 tremor in January was at the east end of the 40 mile Rock Valley Fault which according to Tim Sullivan, a Dept of Energy Geologist, is capable of magnitudes as large as 7. Keith Rogers, *Vas Vegas Review-Journal*, Jan. 28, 1999.

<sup>v</sup> Greg de Polo, research geologist with the Nevada Bureau of Mines & Geology described 4 types of seismic hazards to the Las Vegas Valley. He speculated that a magnitude-7.4 earthquake could occur along Furnace Creek Fault in Death Valley with enough ground shaking to cause damage some 90 miles (west & north) in Las Vegas Valley. "Another system there the Central Death Valley fault, is capable of a magnitude-7.2 temblor. He said geologists estimate such strong earthquakes occur in Death Valley every 500 to 1000 years.

In 1932 Cedar Mountain earthquake, a magnitude 7.2 shook the Las Vegas basin, but there weren't many structures built at the time, and little damage was reported.

According to Geologist Burt Slemmons, professor emeritus at UN, Reno there are 7 faults zones in the Las Vegas Valley including the Frenchman Mountain Fault. 6 of which pose an earthquake hazard to the Las Vegas area 100 miles south & east of Yucca Mountain.

I quote from a statement in the April 11, 1999 *Las Vegas Review-Journal* attributed to Greg dePolo, "He said the most prominent threat in the valley is Frenchman Mountain Fault, which could deliver a magnitude-6 to magnitude-7 earthquake based on its 20-mile length and the fact that the fault has shifted before leaving rock layers offset by as much as 6 feet. Based on preliminary examination of the fault, geologists believe an earthquake of that caliber happens every 10,000 to 50,000 years." Keith Rogers, *Las Vegas Review-Journal*, April 11, 1999.

<sup>vi</sup> Frishman commented on earlier earthquakes. "We've already had a wake-up call and the Department of Energy decided not to do anything." Frishman said, "adding that Nevada ranks third in the nation in frequency of strong earthquakes. Alaska ranks first & California ranks second." In the Aug *Las Vegas Review-Journal* Frishman also stated that more than 600 earthquakes of magnitude 2.5 or more, large enough to feel if one is near the epicenter, have been measured within 50 miles of Yucca Mountain since 1910. Michael Amon, *Las Vegas Review-Journal*, Aug.3, 1999.

<sup>vii</sup> Another question asked was: "How many earthquakes are there in Nevada?" The Answer was: "There are thousands each year that are too small for anyone to feel. There might be tens to over one hundred earthquakes over a year in Nevada and eastern California that

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are large enough to be felt. On average a damaging earthquake occurs about every three years in this region."

<sup>viii</sup> Attributed to Tim Sullivan in the Las Vegas Review-Journal, Jan. 28, 1999.

<sup>ix</sup> Q: Could a big earthquake in California cause earthquakes in Nevada?

A: We didn't use to think so, but "now we know that the 1992 Landers earthquake caused minor events all the way up into southern and western Nevada. A magnitude 7 earthquake might be big enough to repeat that." [http://www.seismo.unr.edu/Perminfo/question\\_answer.html](http://www.seismo.unr.edu/Perminfo/question_answer.html)

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<sup>x</sup> Estimates of the concentrations of radioactive materials entering the environment south of a Yucca Mountain repository will be highly uncertain," said Richard R. Parizek, a board member (Nuclear Waste Technical Review Board) Tony Batt, Donrey Washington Bureau ]

<sup>xi</sup> Draft Environmental Impact Statement July, 1999, Section 5-16

"In contrast, earthquakes have occurred in the Yucca Mountain geologic region of influence, and are likely to occur in the future. The effects of an earthquake that would be important to postclosure repository performance primarily would result from ground motions rather than from direct offset along a fault . . . . The primary effect of ground shaking would be to hasten rock fall into the drift. Such rock fall would have the potential to damage the waste package and hasten water intrusion into the waste form."