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FROM: (MS.) ADRIAN ZOLKOVER, 17150 WEST GABLE END LANE, SURPRISE, ARIZONA 85387, EMAIL adv.zol@cov.net.

SUBJECT: PUBLIC WRITTEN COMMENTS REGARDING U.S. DEPARTMENT OF ENERGY OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT OCTOBER 2007

1] DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR A GEOLOGIC REPOSITORY FOR THE DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA; SUMMARY AND VOLUMES I AND II

2] DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT DISPOSAL OF SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA - NEVADA RAIL TRANSPORTATION CORRIDOR ... AND CONSTRUCTION AND OPERATION OF A RAILROAD IN NEVADA TO A GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NYE COUNTY, NEVADA; SUMMARY AND VOLUMES I-IV

DATE: NOVEMBER 17, 2007

Thank you for sending me for my review and comments the extensive studies contained in the above-mentioned 8 books, approximately 3,700 pages. After studying these books regarding the subjects I am interested in commenting on, I have the following observations and suggestion:

1 [1. BOOKS INDEX: For the group of 5 books of information regarding rail transportation and construction and operation of a railroad in Nevada to the proposed Yucca Repository, the Index of 7 pages not crowded with print found only at the end of Volume IV was barely functional. I found no entry for the subject of terrorism in the Table of Contents or the Index or any of the titles. For the group of 3 books about the Yucca Repository even in Volume I Section 7 Environmental Impacts Of the No-Action Alternative there is no mention of terrorism.]

2 start [2. SCIENTIFIC FEASIBILITY MOST IMPORTANT. I think the primary judgment regarding nuclear power and waste should be scientific. MIT'S Magazine of Innovation TECHNOLOGY REVIEW "Whose Nuclear Waste? By Gary Taubes Jan.-Feb. 2002 observes:

"The more geologists have learned about Yucca Mountain, however, the less viable that model has become. If there is an easy way out of the impasse, say experts, it isn't obvious. However, in the past year both the national Research Council [this is the National Academy of Sciences research arm] and the Harvard/University of Tokyo collaboration advanced an idea that seems to be gathering support among experts in the nuclear-waste debate. The gist of it is to slow down, rethink and do it right. The current repository plans were motivated in the early 1980's by the specter of reactor shutdowns and blackouts as spent-fuel storage pools around the country filled to the brim. Since then, the industry has learned to store spent nuclear fuel on-site in dry-storage casks. These concrete or steel casks are easy to use, easy to license and, according to the Nuclear Regulatory Commission, will keep the spent fuel safe for a century. Indeed, says the DOE's Williams, everyone agrees that dry-cask storage, known technically as monitored surface storage, is an adequate temporary solution to the problem of spent fuel, at least from the safety and security points of view."

Director of the State of Nevada Commission for Nuclear Waste, Robert Loux lists the litany of Yucca Mountain's potential failings, all of which the DOE acknowledges. The immediate region has over 30 fault lines running through it, an extraordinary number for an area of some 250 square kilometers. And the mountain is riddled with tiny fractures, and what water does get in moves relatively quickly, in geologic time, on down. There are also three or four relatively young volcanic structures within a few miles of Yucca. That if you're trying to find a good stable geologic foundation for a repository it's not available at Yucca Mountain.

3. DANGERS OF RADIOACTIVITY AT THE PROPOSED YUCCA MOUNTAIN NUCLEAR REPOSITORY. An article discussing the dangers of nuclear power plant waste fuel rods appears in *BULLETIN OF THE ATOMIC SCIENTISTS* "Energy in Decay" Jan.-Feb. 2002 by Robert Alvarez.

"On the average, spent fuel ponds hold five to 10 times more long-lived radioactivity than a reactor core. Particularly worrisome is the large amount of cesium 137 in fuel ponds, which contain anywhere from 20 to 50 million curies of this dangerous isotope. With a half-life of 30 years cesium 137 gives off highly penetrating radiation and is absorbed in the food chain as if it were potassium. According to the NRC, as much as 100 percent of a pool's cesium 137 would be released into the environment in a fire. In comparison, the 1986 Chernobyl accident released about 70 percent of the reactor core's 6 million curies of cesium 137 into the atmosphere, resulting in massive off-site radiation exposures. A single spent fuel pond holds more cesium 137 than was deposited by all atmospheric nuclear weapons tests in the Northern Hemisphere combined."

The above article is not discussing what a crude nuclear bomb exploded at a nuclear plant waste storage facility would do as the result of vaporizing this cesium 137 and spreading it in a mushroom cloud. This might multiply and spread the disastrous damage many times – damage that lasts for generations.

Another potential danger is radiation on fire. The above *BULLETIN* article also states "If that fuel were exposed to air and steam, the zirconium cladding would react exothermically, catching fire at about 1,000 degrees Celsius. A fuel pond building would probably not survive, and the fire would likely spread to nearby pools. The Nuclear Regulatory Commission concedes that such a fire cannot be extinguished: it could rage for days." Radioactivity including plutonium is scheduled to be stored at Yucca Mountain. This is also discussed in *BULLETIN OF THE ATOMIC SCIENTISTS* "The Day They Almost Lost Denver" July-August 1999 by Len Ackland.

"Plutonium, a lethal substance that always required careful handling, could, and sometimes did, spontaneously ignite... [Seven millionths of one twenty-eighth of an ounce of plutonium ash or dust inhaled can give you lung cancer as mentioned in *SCIENTIFIC AMERICAN* article "Hanford's Nuclear Wasteland" by Glenn Zorpette May 1996.] The unpredictable nature of plutonium metal is well recognized but not completely understood... It is difficult to assign an ignition temperature to the many physical forms and crystalline phases of plutonium metal. For example, small plutonium filings ignited easily." Regarding a plutonium fire at Rocky Flats, Denver May 1969 "Fire Captain ... and 3 firemen arrived... within minutes... and found heavy smoke and fire, with flames shooting... ordered one fireman to attack the fire with a hand-held carbon dioxide extinguisher, while he moved... with a 50-pound carbon dioxide carrier mounted on a cart... The carbon dioxide had no effect... Firefighters had been ordered repeatedly never to use water on a plutonium fire because of the dangers of criticality, an explosion, or both... If the water caused a hydrogen explosion, the whole building might be destroyed and the Denver area contaminated... The facility held 7,641 pounds of

plutonium... Leading credence to the conclusion that heat and moisture would ignite plutonium, workers discovered a fire Monday morning in a plutonium storage glovebox on the south foundry line far away from the big fire... A few months later... a local group of independent scientists discovered plutonium in soil near the plant."

Radioactive material is not made like we are. I think of it as a lot of terribly strongly charged energy getting overcrowded, as we would in a building or theatre when too many people are there. Have you ever observed a bunch of birds all perch on a tree simultaneously? Somehow they are aware of the whereabouts of all the other birds because they don't bump into each other. Possibly radioactivity needs its space, a tremendous amount of space, or it will react in time by fires and or explosions to give it the space it needs. And these fires may be impossible for firefighters to extinguish.

3. MILITARY JUDGMENT. If possibly 50,000 or more tons of waste nuclear fuel rods were in an above-ground or near ground level area to cool for 50 years it appears to me they would be the prime target, and extremely vulnerable to terrorists. I have heard that crude nuclear bombs at multiple nuclear plant waste storage sites could turn the many tons of nuclear waste into mushroom clouds, and spread this long-lived radioactivity all over the U.S. Or as we hear of, in Iraq they launch bomb missiles at airplanes and tanks from portable missile launching equipment. With all our scientific and military expertise, this vulnerability seems like grammar school folly - to say the least. Last I heard, the DOE required the nuclear plants to prepare to defend against one group outside, or 3 people outside (4 people would be 2 groups of 2), and one person inside the nuclear power plant with conventional weapons. The DOE is excluding terrorists with this lack of defense capability.] 2 end

3 [4. EARTHQUAKES. In the Draft Supplemental Environmental Impact Statement Volume I [not the
Start Volume I in the book regarding railroads] Section 3.1.3.3. Modern Seismic Activity, pages 3-22 to 3-23:

"The Yucca Mountain FEIS described the nature of seismic activity at the Nevada Test Site since 1978 and included a description of the largest recorded historic earthquake within 50 kilometers (30 miles) of Yucca Mountain, which was the little Skull Mountain earthquake in 1992 about 20 kilometers (12 miles) southeast of Yucca Mountain. This seismic event had a Richter scale magnitude of 5.6 and was apparently triggered by a 7.3-magnitude earthquake at Landers, California, 300 kilometers (190 miles) to the south of Yucca Mountain, which occurred 20 hours earlier... Some damage did occur at the Field Operations Center in Jackass Flats about 5 kilometers (3 miles) north of the epicenter."

However, there will be much worse in store for Yucca Mountain:

NEWSWEEK Special Report "A Whole Lot of Shakin' Goin' On" by Sharon Begley, Andrew Murr, Martha Brant Jan. 31, 1994 states

"Once again it was a fault they couldn't see that slammed Los Angelenos... Although the San Andreas Fault gets all the notoriety, geophysicists are now realizing that dozens of invisible, even unsuspected fractures in the rocks beneath the Los Angeles basin cause most of the earthquakes, large and small. And that has radically changed the seismic calculus. 'If a quake jumped from fault to fault and ripped the full 100-mile fault zone', says seismologist Tom Henyey of the Southern California Earthquake Center, 'there could be an earthquake that registers close to an 8 on the Richter scale - about 125 times more powerful than last week's jolt.'"

SCIENCE Vol. 369 Jan. 13, 1995 reports:

"Bigger Jolts Are on the Way For Southern California" by Richard A. Kerr

"The San Andreas passes Los Angeles at a distance of more than 40 kilometers, but the realization in the early 1980s that the next great quake there may be due at any time was sobering..."

"Prospects for Larger or More Frequent Earthquakes in the Los Angeles Metropolitan Region" by James F. Dolan, Kerry Sieh, Thomas K. Rockwell, Robert S. Yeats, John Shaw, John Suppe, Gary J. Huftile, Eldon M. Gath

"Data although not definitive, suggest that the superficial faults of the Hollywood-Santa Monica-Malibu Coast system rupture in conjunction either with each other or with other faults... Similarly... data from the Whittier fault suggest that this fault has ruptured in combination with other faults in the past... We conclude that faults within the Los Angeles region are capable of generating earthquakes in the range of M 7.2 to 7.6... It has been at least 210 years since the most recent large earthquake in the Los Angeles region a time interval that is longer than the average recurrence interval that we calculate for large earthquakes... Hough (54) for example, suggests a fractal distribution of earthquakes in which most seismic moment release is concentrated in infrequent large events... There is no evidence that any significant seismic fault creep occurs within the brittle, upper crust of the Los Angeles metropolitan region... If all strain release occurs during moderate M 6.7 earthquakes, then the historic period must represent a lull between clusters of such earthquakes. The average 11-year recurrence interval for M 6.7 earthquakes on the 51 [fault] sources we have defined predicts that 17 such events should have occurred during the past 195 years, but we have experienced only two such events... The effects of such a large earthquake would be substantially different from the recent moderate Northridge earthquake... We believe that Los Angeles must consider the potential for such an event in future planning scenarios."

In other words, the likely overdue tradeoff for the Los Angeles metropolitan region for not having a 6.7 earthquake every 11 years for the last 195 years is a series of almost simultaneous earthquakes in the magnitude 7s creating a domino effect on each other. This would mean multiple earthquakes on multiple faults erupting, back and forth, forth and back, fighting with each other. It appears to me this would not just add the damage that 17 6.7 earthquakes would cause, but greatly multiply the damage. In terms of magnitudes, I can't even think how they could estimate it and the damage that would occur. Footnote 10 of this article states "The overall affect of our source and slip rate characterization is to produce a probable underestimate of the rate of strain accumulation across the Los Angeles metropolitan region." Footnote 28 states that they didn't include the San Andreas in their scenario.

I'm not an engineer or a scientist; however when I took a tour of the Yucca Mountain tunnel it looked like it was extremely well engineered and well built. However I don't think it could begin to withstand Mother Nature's earthquakes in store for the Yucca Mountain area. I lived in Los Angeles until May 1994 and Allstate Insurance would not insure for earthquakes any buildings that had subterranean structures, such as basements or beneath surface land level garages. Likely nothing built will withstand the brute tonnage of moving land masses surrounding it. And scientists later reported that part of the extensive damage to the Los Angeles area in the Northridge 1994 earthquake was due to a "complex configuration" where there was not just one earthquake, but 2 earthquakes that crossed each other and gave a double whammy emanating from its shaking to the land above and below the surface. In other words, it would not be like a whip that was deflected around Yucca tunnels. **There might be 2 or many more simultaneous movements of land colliding with and crushing the land housing the tunnels.** What the Yucca Mountain tunnels might have in store for them would be of an entirely different destructive impact than

Landers had if either the San Andreas experiences a "big one of 8's intensity" or if the horrific scenario of multiple earthquakes in the 7s magnitudes in the Los Angeles Basin and is more than 125 times as strong as the 1994 earthquake occurs. And it appears to me that the great likelihood is that one will cause the other in close succession, and that both will occur much within 30 years. Additionally, with global warming, possible major snow storms or even an ice age occurring in the Yucca Mountain area, there could be an abundance of water entering the area of the tunnels. This could create all kinds of deterioration, leakage and other problems. So I would not consider Yucca Mountain tunnels construction or a permanent Yucca Mountain structure closure feasible.] 3 end

4 [5. SABOTAGE AND TERRORISM. Draft Supplemental Impact Statement Volume II [not the Volume II about railroads] Appendix E. Potential Repository Accident Scenarios and Sabotage: Analytical Methods and Results, E.7 Representative Sabotage Scenario states there is "restricted airspace above the site". Yucca is so close to the boundary of Federally owned land I wonder if there could be an enforceable no-fly zone. Also its close proximity to the border of Federally owned land might allow crude nuclear missiles to be launched from the road or land nearby. Also in this section they state "The area must be monitored by random patrol." Terrorists' acts may be planned and not random. There should be guards present at all times, and some kind of land and air viewing monitoring system to detect movement of unauthorized people or vehicles. Draft Supplemental Environmental Impact Statement Summary page S10 states: "At the repository, some commercial spent nuclear fuel would be aged to reduce its thermal output, as part of a strategy to manage temperatures within and between emplacement drifts in order to divert water from them. [This might involve 50,000 tons or more of nuclear fuel rods at or near the land surface to cool for about 50 years.] Managing temperatures is important to DOE's strategy to always allow water to drain freely in the rock between the emplacement drifts. As part of this strategy, which would employ a 'thermal energy density concept', DOE would place some TAD canisters into aging overpacks and place the overpacks on aging pads near the surface facilities. When heat output had declined to an appropriate level, the canisters would be placed directly into waste packages for disposal. Those TAD canisters not placed on aging pads would be placed into waste packages for disposal, as would all disposable canisters containing spent nuclear fuel and high-level radioactive waste." In their earliest EISs they didn't consider cask temperature as significant to the safety of the tunnels. Including this variable appears to me to be an improvement in their design scenario. In their scenarios they consider only airplanes crashing into the above ground nuclear waste cask fuel storage buildings. **How can they not consider one or more airplanes piloted by suicide bombers dropping crude atomic bombs on this site; or land launched nuclear bomb rockets; creating mushroom clouds of cesium 137 [they don't even mention cesium 137] .** And what about future deep burrowing nuclear missiles that could penetrate the tunnels and generate tremendously radioactive mushroom clouds? They don't mention these either.]

5 [6. U.S. WIND PATTERNS BLOW FROM THE WEST TO THE EAST. THEREFORE NUCLEAR WASTE WOULD BE MUCH LESS OF A MILITARY TARGET IF IT WERE LOCATED AS FAR U.S. EAST AS POSSIBLE. This means the waste rods would have to be stored in such a way that hurricanes, earthquakes, floods, ice ages, etc. would not strategically affect them. Again, I'm not a scientist. But what about all that barren empty land we fly over nearer the eastern coasts. Couldn't waste be brought to these areas, and each rod put in its own removable, monitor able 12 feet thick on all sides cement cask? There could be cement factories there where this could be done. Having it centralized like this in the center of an area with an empty boundary, if possible, of over 100 miles in any direction would make it an enforceable no-fly zone. Also physical structures and the military could enforce the boundaries so that no unauthorized person could enter the area. Then they might put these casks in open cage buildings spread over maybe 100 or more miles. These open buildings would be built to keep the casks from blowing away in hurricanes, etc. They predict some most severe earthquakes in the Tennessee area; but the casks and housing buildings might be built to withstand major earthquakes. I think the waste casks should be at least 200 miles from a potentially major river.]

- 6 [7. REGARDING NUCLEAR WASTE TRAIN TRANSPORT, FOR TRACK SAFETY I WOULD RECOMMEND THAT A TRAIN ACCOMPANY, IN FRONT BY A DISTANCE OF ABOUT A CITY BLOCK, EACH TRAIN PULLING CARS OF NUCLEAR WASTE. This would allow the train pulling the radioactive waste to stop before trying to pass over tracks that were faulty or tampered with.]
- 7 [8. SAFETY OF OPERATION AND SAFETY FROM TERRORISM ARE I THINK THE PRIMARY CONCERNS BEFORE NUCLEAR POWER CAN BE CONSIDERED TO BE FEASIBLE. A PROFIT MOTIVE IS FAR DOWN ON THE LIST OF IMPORTANT FACTORS. I therefore think The National Academy of Scientists should make the policy decisions, along with military input and administration. This means government would own the nuclear power plants and waste storage sites, under the scientific direction of The National Academy of Scientists. The military could administer this and complete some of the work. Government contracts with numerous private contractors might be made to carry out work. The contractors could submit competitive bids. Budgets should include ample finances for safety and security for workers and the community. Working around radioactivity can be most hazardous, and the workers should have adequate medical, disability and retirement benefits. Nuclear power plants are subjected to tremendous continuous physical pressures; and even the best constructed nuclear power plants wear out with time and must be permanently shut down. If there are existing power plants that are judged to be up to code for safety of operation and safety from terrorism, and are profitable, they might remain under their present ownership and management.]
- 8 [9. CONCLUSION. I think it is not in the interest of nuclear power to allow the extreme military vulnerability we are exposed to at our nuclear plant waste storage facilities. I DON'T THINK THE PLANS AT YUCCA MOUNTAIN WOULD SOLVE THE PROBLEM. I THINK THEY WOULD CREATE EVEN MORE PROBLEMS. ALSO UNTIL THIS NUCLEAR WASTE STORAGE PROBLEM IS DEALT WITH IN A PROPER EFFECTIVE FASHION, ANY INCIDENT WOULD LIKELY RUIN ANY FUTURE POTENTIAL NUCLEAR POWER MIGHT OFFER. Hastily spending money on new nuclear power is a huge error. Even when repeatedly requested by groups concerned with environmental safety to consider the threat of terrorism, THE DOE IS NOTED FOR ITS REPEATEDLY DENYING THE THREAT OF TERRORISM IN ITS PLANS. It looks only backwards for its models of how to deal with the future. Again, I think this is not in the interest of the DOE or nuclear power. I think some of the considerations I mention above would go far to improve the outlook for nuclear power, and make the United States a hugely significantly safer place. It is necessary for the public to know what has been, and is presently being done to correct these long standing most horrendous and mounting problems.]

Thank you for the opportunity to contribute to the DOE my observations about nuclear waste storage.


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