PSR®

PHYSICIANS FOR SOCIAL RESPONSIBILITY®
1875 Connecticut Avenue Northwest Suite 1012 Washington DC 20009

1985 NOBEL PEACE PRIZE

telephone (202) 667-4260
facsimile (202) 667-4201
email: psrnatl@psr.org

December 11, 2006

010091

Dr. Jane Summerson
Regulatory Authority Office
Office of Civilian Radioactive Waste Management
U.S. Department of Energy
1551 Hillshire Drive, M/S 010
Las Vegas, NV 89134

Re: Supplemental Yucca Mountain Repository EIS Scoping

Dr. Summerson:

The Physicians for Social Responsibility (PSR) appreciates the opportunity to comment on the supplemental Yucca Mountain repository EIS scoping (FR Doc.06-8676). PSR is committed to protecting human life from the gravest threats to health and survival, a challenge that includes the safe storage of radioactive waste.

PSR is opposed to the selection of Yucca Mountain as the site for a permanent repository. After reviewing the announcement about the supplemental EIS we would like to reiterate that opposition and detail some of the public health threats posed by the plans to transport spent fuel from civilian reactors and high level waste from Department of Energy (DOE) sites. We fully support the storage at sites where the waste was generated and the development and licensing of hardened on-site storage capacity.

While the supplemental seeks transportation methods and canisters (TADs) that will limit human exposure to spent fuel and irradiated waste, the additional steps in packing, transporting and depositing wastes greatly enhance the chances of exposure or accidents that would harm human health and the environment.

As your office acknowledges, the Nuclear Waste Policy Act stipulates that the federal government has the "responsibility to provide for the permanent disposal of high-level radioactive waste and such spent nuclear fuel as may be disposed of in order to protect the public health and safety and the environment." Based on this charge, it would be logical to reduce the amount of transportation and handling necessary, an option that points to on-site storage. Unfortunately the final EIS for Yucca Mountain dismissed this no-action alternative and muddled the issue by referencing the outcomes of on-site storage with no institutional controls.

PSR encourages the DOE to reconsider the no action alternative with institutional controls as a better alternative that will reduce the risks of impacting human health.

Proposed Action

The proposed action in the supplemental would have more than 10 percent of the commercial spent fuel shipped in canisters suitable for transport or uncanistered. This option creates exposure risks on-site, during transport and for workers handling the wastes at the Yucca facility, creating three opportunities for radiation exposure, with countless hours and miles on roads and rail included in the proposed action. This does not account for the unacceptable risk associated with a transportation accident that causes a radiation leak.

Attached please find an analysis of the transportation concerns. PSR does not believe the supplemental scoping document adequately addresses these potential problems.

This also brings into question the assessment of radiological health impacts to workers. It is not clear that the DOE has considered all phases and all human interaction with the waste during storage, transportation and deposition, especially relative to the category of management of a wet handling facility.

The supplemental notes changes in canister design intended to reduce the incidence of radiation exposure to humans and the environment. Certainly this is a worthwhile and necessary effort, and the need for limited exposure reinforces our position that spent fuel and wastes should be isolated and stored on-site where generated. This decision, or no action alternative, would greatly reduce opportunities for exposure and totally eliminate the threats posed during transportation.

PSR appreciates the opportunity to comment on the supplemental EIS and encourages the department to assess long-term on site storage options.

Sincerely,

Michael McCally, MD

Enclosure: Three (3) pages

An Analysis of Transportation Issues Associated With Permanent Storage of Commercial Irradiated Waste at Yucca Mountain, Nevada

Erin Blankenship, Scoville Fellow
Physicians for Social Responsibility

TRANSPORT

U.S. nuclear power plants already have produced more than 40,000 tons of high-level waste, adding 2,000 tons annually. Presently most of the radioactive waste is stored on site at the power plant where it was generated, but the supplemental EIS' intention and mode of transport poses significant health risks to the American public. Under current DOE models, tens of thousands of tons of highly hazardous nuclear waste from 77 sites will have to cross through 45 states, the District of Columbia, and through or near virtually every major American city including the planned Las Vegas Beltway, putting tens of millions of Americans at risk of exposure to nuclear radiation.[1] While a National Academy of Sciences (NAS) report on the transport of spent nuclear fuel and high-level radioactive waste in the U.S. concluded that transport is technically possible, it made it clear that a safe transportation program is extremely difficult to create. Beyond the technology, it must also be well planned, managed, with stringent regulations carefully enforced, over the entire period of the transportation program.

DOE and the state of Nevada analysis project approximately 108,500 truck shipments or more than 36,000 combined rail and truck shipments will be required to move the approved 77,000 tons of waste expected to be buried at Yucca Mountain nuclear waste dump.[2] To put this in perspective, if DOE uses its truck shipment model, a truck shipment of high-level radioactive waste would be required every 4 hours, around-the-clock, 365 days a year, for 38 years. Even DOE, which assumes human error will not affect the probability or severity of accidents, predicts 66 truck or ten rail accidents. Based on the actual record of past spent fuel shipments, other experts estimate there will be 130 truck accidents or 440 rail accidents during a 40 year period.[3]

According to the U.S. Department of Transportation, an accident could result in cask failure and the release of radioactivity, producing high human and financial costs.[4] Studies show that a train accident such as the Baltimore tunnel fire in the summer of 2001 would have resulted in cask failure and the release of radioactive materials. The contamination from that single incident would cause thousands of deaths and $10-$14 billion in cleanup costs.[5] The Baltimore train tunnel remains a DOE-approved eligible transportation route for nuclear waste.

DOE has stated that it prefers using rail shipments, but rail lines connecting all of the nuclear reactor sites do not yet exist, and most nuclear spent-waste casks are too heavy for road transport. Consequently, there are proposals for barge-shipments down the nation's coastlines and waterways. DOE's estimates from 2002 show a total of roughly 3,000 barge shipments on proposed routes past New York City and Staten Island, along the coast of Southern California, to the ports of Boston, New Haven and Baltimore, around Cape Cod, on Lake Michigan, down the Missouri, Mississippi and Tennessee rivers, and around the coasts of Florida.[6] Under such a scenario, the numbers of possible victims of radiation exposure will be in the tens of millions. Further, any accidents on barges run the risk of initiating an actual nuclear reaction between spent waste fuel from light water reactors and the water body used for transport, putting people at risk both by contamination of water sources and possible nuclear reaction dangers.[7]

posing a direct risk to transportation workers and [illegible] vicinity of the transportation routes. Considering that the primary road routes of transportation will be the U.S. Interstate Highway system, exposure to the public will be high, particularly through the more populated parts of the country. The NAS recently produced a report declaring that no dose of ionizing radiation, no matter how small, is safe, confirming what many physicians, health professionals and scientists have been saying for decades.[8] Damage from radiation increases with increasing exposure, even as the very lowest doses approach zero. Handling of the waste before and during transport puts workers at exceptional risk to such exposure, particularly the ten percent of irradiated spent fuel proposed to be moved uncanistered.[9] Furthermore, waste transported by rail to the Yucca Mountain site will have to undergo additional handling to move the waste to trucks because of the aforementioned lack of complete rail connections.

The EPA and other public health advocates have argued for many years that a dose greater than 15-25 millirem per year is "non-protective of human health" and that doses above 100 millirem per year produce unacceptable levels of risk. A recent NAS report on radiation risks states that an exposure of 350 millirem over one's lifetime will produce cancer in approximately one out of every 36 people exposed. According to the radiological health impacts to workers data presented in the February 2002 EIS, a non- involved worker will be exposed to between 430 and 830 millirem or radiation, while an involved worker will face 8,000 to 18,000 millirem. The collective dose for all workers is thus estimated to be between 540 and 1,200 rem. (FEIS, 15/15). Collective dose here is defined as the sum of individual doses in a defined exposed population expressed as person-rem. It is a useful index for quantifying dose in large populations and in comparing the magnitude of exposures from different radiation sources, though it may aggregate information excessively.

Low doses of radiation are considered less than 1 rem/yr, doses above that are considered high. In the case of a worst scenario accident, high doses of radiation produce the Acute Radiation Syndrome. According to medical studies, after an acute 50-100 rem whole body exposure patients may suffer gastrointestinal effects with nausea, vomiting and diarrhea. After an acute exposure beyond 100-200 rem, the hematopoietic syndrome begins to hemorrhage from the loss of blood clotting cells. At exposure levels such as those seen at Chernobyl and in a few other industrial accidents, roughly between 1,500 and 3,000 rem, patients develop problems affecting the central nervous system and show signs of brain damage, coma and death according to Dr. Michael McCally of the Physicians for Social Responsibility.

The Nuclear Regulatory Commission (NRC) has developed a set of rules specifically aimed at protecting the public from harm that could result from the sabotage of spent nuclear fuel casks (10 CFR 73.37), that particularly deal with issues of safety affecting the environment and public health. Yet the transportation scenarios described in the EIS summary pose dangerous targets for terrorist attack. On June 25, 1998, the U.S. Army conducted a weapons test depicting the vulnerability of nuclear waste storage casks. The tested model, a GNB dual-purpose CASTOR, one used in both dry storage and transport, was successfully pierced during the tests by a TOW armor piercing anti-tank missile. Had there been spent fuel inside, a release of radioactivity would have occurred.[10] The TOW is the most widely distributed anti-tank guided missile in service around the world and weighs less than fifty pounds, certainly a size small enough for a mobile attack effort from terrorists. The CASTOR is among the most robust models of nuclear waste storage in use; it is 15 inches thick while many other models in use in the U.S. are only a few to several inches thick. The CASTOR can hold more than 200 times the long-lasting radioactivity comparable to that released by the Hiroshima bomb.[11] Moving enough waste for 200 Hiroshima type events per cask through most major US cities poses troubling possibilities for a terrorist attack.[12] DOE estimated the consequences of a potential saboteur using a device on a truck or rail cask, finding that the risk of a maximally exposed individual incurring a fatal cancer would be about 29 percent.[13]

When the accidents or attacks do occur it will be local emergency response teams that will have to deal with the initial hysteria and management of the potentially lethal crisis. However, emergency responders along transportation routes have yet to be created, trained, or equipped. DOE has not yet secured funding for state and local governments to do so.[14] Before any waste is transported, DOE must make sure that every community along the transportation routes is ready to respond to any sort of radiological accident that might occur. The public health consequences of not being prepared are too severe to dismiss.

The February 2006 NAS report on the transportation of spent fuel set out a long list of critical measures that must be taken in order to proceed safely. The committee expressed concerns about DOE's ability to plan and manage a safe program. It detailed these findings through a series of points about rail construction, routes, emergency responder preparedness responsibilities and timely access to information that does not require protection. It also insisted that other government bodies must be involved including: the Nuclear Regulatory Commission, the Department of Transportation, the Department of Homeland Security and state, local and tribal governments. All must play a central role in any waste transportation program's planning and implementation.[15] No pending crisis requires either the immediate transportation of or the opening of a faulty repository at Yucca for the nuclear waste at its present locations.

STORAGE

Since the 1970s the need for alternative storage has grown, as pools at many nuclear reactors began to approach their capacity with stored spent fuel. It is estimated that by the end of 2006, approximately 60 facilities will have no more storage space in their spent fuel pools.[16] Current regulations permit re-racking (placing fuel rod assemblies closer together in spent fuel pools) and fuel rod consolidation, subject to the U.S. NRC review and approval.[17] However, even with re-racking the spent fuel pools will not be capable of accommodating all spent fuel expected to be produced by currently operating power plants.

Although the final EIS for Yucca Mountain dismisses on-site storage, it is the best available option for the protection of public health and safety. While offering the best means to reduce the risks posed by additional transport and handling of high-level nuclear waste, it also provides for more time to work out safe alternatives. Hardened dry cask storage is the primary technology favored by public interest groups and scientists alike. Dry cask storage allows spent fuel that has already been cooled in the spent fuel pool to be surrounded by inert gas inside a container called a cask.[18] Casks typically consist of a sealed metal cylinder that provides a leak-tight containment of the spent fuel. Each cylinder is surrounded by additional steel, concrete, or other material to provide radiation shielding to workers and everyone else.[19] The casks used in the dry storage systems are designed to resist floods, tornadoes, projectiles, temperature extremes and other unusual scenarios. The safest available design for dry cask storage is what is called hardened dry-cask storage, where the cask is enclosed in a concrete bunker.

As ruled by Congress in the Nuclear Policy Act, all dry-cask designs and use must be approved by NRC.[20] Dry casks must also be continually monitored for radiation leakage and re-licensed by NRC every 20 years. The NRC periodically inspects the design, fabrication and use of dry casks, to ensure licensees and vendors are performing activities in accordance with radiation safety and security requirements, and licensing and quality assurance program commitments. As approved by the NRC, dry cask containers can store waste safely for at least one-hundred years and are already used at thirty-three nuclear power site throughout the country.

Dry spent fuel storage in casks is considered to be safe and environmentally sound. During the previous 20 years there have been no radiation releases which have affected the public, no radioactive contamination, and no known or suspected attempts to sabotage spent fuel casks.[21] Since dry casks do not contain water, which is necessary to enable a nuclear reaction in light water reactors, there is no chance of an accidental chain reaction, as there would be in water storage pools.[22] Because there is no water circulation and filtering, no "low-level" radioactive waste is produced by fuel storage, as is continually the case in the fuel pools. Dry-cask storage systems are, for the most part, self-contained, with no mechanical pumps or other active systems, while the maintenance of safety relies passively on the cask integrity.[23] As the 2005 National Academy of Sciences concluded, terrorist attack on spent fuel pools could lead to the release of large quantities of radioactive materials into the environment; dry cask storage offers inherent security advantages over pool storage.[24]

Dry cask storage is a viable solution for handling the national nuclear waste problems. While complete safety may be unattainable when dealing with the extreme hazard represented by the intense radioactivity of irradiated fuel no matter what the storage technology, using a passive dry storage system is better than relying on active mechanical systems of spent fuel pools that can wear out, malfunction or break down. It also is better than rushing the country into false solutions like the faulty Yucca Mountain repository. The NRC's testing and quality control has shown that dry cask technology is completely safe for as long as 100 years. The DOE should utilize this time and opportunity to devise truly safe methods of disposal as well as to contemplate the consequences of the further use of nuclear energy. Using dry cask storage would ease the drive to push forward the approval of a permanent high level nuclear repository at a site that does not meet public health and safety standards. It would allow the time to find the safest possible site and to "develop a sensible national policy on nuclear energy."[25]

---

[1] *Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste and Yucca Mountain, Nye County, Nevada.* US Department of Energy. DOE/EIS 0250. February 2002.

[2] *Ibid.*

[3] *Ibid.*

[4] Lamb M Resnikoff, *Radiological Consequences of Severe Real Accident Involving Spent Nuclear Fuel Shipments to Yucca Mountain: Hypothetical Baltimore Rail Tunnel Fire Involving SNF*, Radioactive Waste Management Associates (September 2001) 13-16.

[5] *Ibid.*

[6] *Op.Cit. Final EIS for Geologic Repository*

[7] Makhijani, Arjun. *High-Level Dollars, Low-Level Sense: Chapter 3, Overview and Critique of the Current Approach to Radioactive Waste Management, Interim Management for Spent Fuel: MRS and Onsite Storage.* Institute for Energy and Environmental Research. 1996. http://www.ieer.org/pubs/highlv3d.html.

[8] National Academy of Sciences National Research Council, *Health Effects for Exposure to Low Levels of Ionizing Radiation: BEIR VII Phase 2,* (2005) National Academy Press, Washington D.C.

[9] *Op.Cit. High Level Dollars, Low Level Sense*

[10] Nuclear Information and Resource Service, *Armor Piercing Missile Perforates High-Level Radioactive Waste Storage/ Transport Cask In U.S. Army Aberdeen Proving Grounds Test.* http://www.nirs.org/factsheets/fctsht.htm/

[11] *Ibid.*

[12] Halstead, Robert and Ballard, David James. *The Risk of Terrorism and Sabotage Against Repository Shipments*. Prepared for the Nevada Agency for Nuclear Projects, October 1997.

[13] *Op.Cit. Final EIS for Geologic Repository*

[14] *Comments of the High-Level Radioactive Waste Committee of the Western Interstate Energy Board (WIEB) on DOE's April 30, 1998 Notice of Revised Proposed Policy and Procedures for Safe Transportation and Emergency Response Training; Technical Assistance and Funding*. July 31, 1998. http://www.westgov.org/weib/reports/180c1998.htm.

[15] National Academy of Sciences report, *Going the Distance? The Safe Transport of Spent Nuclear Fuel and High-Level Radioactive Waste in the United States* (2006). http://fermat.nap.edu/catalog/11538.html.

[16] Information Brief for the Minnesota House of Representatives from the Research Department, *Nuclear Waste Dry Cask Storage*. December 2001. http://www.house.leg.state.mn.us/hrd/pubs/nucwaste.pdf.

[17] U.S. Nuclear Regulatory Commission, Document Collections, *Backgrounder on Dry Cask Storage of Spent Nuclear Fuel*. December 2004. http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/dry-cask-storage.html.

[18] U.S. Nuclear Regulatory Commission, Radioactive Waste, *Dry Cask Storage*. June 2003. http://www.nrc.gov/waste/spent-fuel-storage/dry-cask-storage.html.

[19] *Ibid.*

[20] *Ibid*

[21] *Op.Cit. Backgrounder on Dry Cask Storage*

[22] Makhijani, Arjun. *High-Level Dollars, Low-Level Sense: Chapter 3, Overview and Critique of the Current Approach to Radioactive Waste Management, Interim Management for Spent Fuel: MRS and Onsite Storage*. Institute for Energy and Environmental Research. 1996. http://www.ieer.org/pubs/highlv3d.html.

[23] *Ibid.*

[24] Lyman, Dr. Ed. Union of Concerned Scientists. *Global Security, Nuclear Terrorism and Nuclear Reactors. Nuclear Waste Disposal*. November 2005. http://ucsusa.org/global_security/nuclear_terrorism/nuclear-waste-disposal-factsheet.html.

[25] *Reid, Ensign Introduce Nuclear Waste On-Site Storage Legislation*. December 2005. http://reid.senate.gov/record.cfm?id=249893