

The Demise of Sound Science in Disposing of  
High-Level Radioactive Waste and Spent Nuclear Fuel

Statement

By

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## **Introduction**

The Natural Resources Defense Council (NRDC) is pleased to have this opportunity to speak to the National Academy's Board on Radioactive Waste Management (BRWM). Thank you very much for inviting us to participate.

There are no shortages of interesting scientific issues associated with the disposal of high-level radioactive waste (HLW) and spent nuclear fuel. The subject of waste disposal systems that must prove robust for thousands of years present questions in physics, chemistry, metallurgy, geology, anthropology, and a myriad of other disciplines. Indeed, the questions for disposal of HLW and spent nuclear fuel alone could occupy the full time of this board and its subcommittees for decades.

Unraveling the questions in a forthright manner and getting scientific details right is important. And such a progression can only occur if the regulatory process for judging the long-term health and safety issues is not corrupted. Unfortunately, the Natural Resources Defense Council (NRDC) believes that the regulatory process for disposal of HLW and spent nuclear fuel has been corrupted in several ways. However, we have hope that this situation can be rectified and we suggest some initial steps for the National Academy to take in this regard.

## **The Legal and Scientific Inadequacy of EPA's Radiation Protection Standards for Yucca Mountain**

The radiation protection standards for the proposed Yucca Mountain HLW and spent fuel repository have two major flaws. In the recently decided court case, the Environmental Protection Agency (EPA) acknowledged that in adopting section 801 of the Energy Policy Act of 1992 ("EnPA," Pub. L. No. 102-486, 106 Stat. 2776, 2921), the "unambiguously expressed intent" of Congress was "to have EPA promulgate standards that *protect public health* from releases from the Yucca Mountain Repository." Regrettably, EPA failed to fulfill that mandate as evidenced by part of the U.S. Court of Appeals for the D.C. Circuit's ruling.

Rather than giving any *scientific* basis for its refusal to follow the National Academy of Sciences' ("NAS") determination that the agency extend Yucca's period of performance to address massive peak doses of radiation, EPA attempted a dubious "policy" logic opposed to the protection of public health. The D.C. Circuit reversed EPA's action stating, "[O]nly in a world where 'based upon' means 'in disregard of' and 'consistent with' means 'inconsistent with' could EPA's adoption of a 10,000 year compliance period be considered a permissible construction of section 801 [the law]." *NEI v. EPA*, consolidated cases, July 9, 2004, D.C. Circuit, *slip op.* at 29.

Rather than justifying its gerrymandered "controlled area" that would allow dilution of radioactive contaminants to spread through an 18-kilometer area, EPA provided convoluted economic analysis flouting its statutory duties to protect public health and protect drinking water. The Court ruled for EPA that the gerrymandering of the control boundary was not illegal because, as a matter of law, where there are factual disputes, there is strong deference to the Government's analysis. However, as a matter of

science, the EPA's argument for gerrymandering the controlled area – the assertion that no one will ever drill for water within 18 kilometers of the repository because it is too expensive – is dubious at best. We have attached a visual depiction of EPA's gerrymandered control area boundary to this submission. *See* Attachment 1.

For the entirety of its three decade history, NRDC has supported the concept of geologic disposal for HLW and spent nuclear fuel. However, any such disposal must meet stringent, protective standards that will isolate the waste for the period of time in which it is dangerous. Rather than meet its statutory mandate to issue radiation protection standards that will protect public health and the environment for the necessary generations, EPA issued a flawed set of standards that could have potentially serious impact on a not too distant future. These two flaws – ignoring the NAS's recommendation to extend Yucca's period of performance and the gerrymandering the controlled area – were made to insure the site would be licensed. EPA failed to set scientifically valid standards appropriate for the Yucca Mountain *site*. Instead, EPA tailored its regulations to fit the *design* of the Yucca Mountain Project proposed by the Department of Energy (DOE). Such an approach is a corruption of sound science.

### **The Corruption of Law and Science that is “Waste Incidental to Reprocessing”**

Through an internal agency process termed the “waste incidental to reprocessing determination,” (“WIR determination”) the DOE unlawfully awarded itself unfettered discretion to redefine HLW so that it could be disposed of more cheaply on site (in aging and corroding tanks) rather than permanently isolating HLW in a robust, scientifically validated geologic repository.

In July of 2003, the Idaho Federal District Court ruled that DOE's WIR determination violated express directions of the Nuclear Waste Policy Act for the disposal of HLW. *See* 42 U.S. § 10101 *et seq.* Rather than comply with the express directions of Congress, the wishes of four affected states and the involved public, and fifty years of scientific consensus on how to properly dispose of HLW, DOE appealed the matter to the U.S. Court of Appeals for the Ninth Circuit and, simultaneously, scurried to Capitol Hill to obtain a legislative reversal of the District Court decision.

This battle is ongoing and good science is one of the largest casualties. Through its allies on the Hill, the DOE has been circulating inaccurate and misleading data on the contents of the tanks. These misimpressions leave the appearance that it is leaving only small quantities of wastes in the tanks that present no significant risks to future generations. *See* Attachment 2 (misleading chart provided by DOE to congressional offices) and Attachment 3 (NRDC's response to the chart and request – which was granted – that Senate offices no longer circulate Attachment 2).

In addition to the radioactivity that may or may be not left in the tanks, DOE's Savannah River Site tank closure health risk estimates are derived from models which are unavailable for public scrutiny. The modeling contains hidden assumptions and no accompanying validation analysis. This analysis should be open to a transparent, scientific process.

The DOE, with acquiescence by the Nuclear Regulatory Commission (NRC) staff, adopted a strategy whereby it averaged the radioactivity concentration of HLW left in the tanks at Savannah River Site (SRS) with the negligible radioactivity concentration of grout poured on top of the waste. Note that there is no appreciable mixing of the two and nor has dilution been a recognized method of disposal for HLW for several decades. DOE (and NRC) may claim that this practice is permitted for containerized low-level waste (LLW), but in that instance the waste is mixed, although not uniformly with the contaminated materials in the container. DOE's suggested (and unlawful) treatment of HLW in the tanks where there is no mixing of the two is, simply, bad science. The procedure serves no purpose other than to avoid treating and disposing of HLW as HLW. The WIR approach is a corruption of sound science.

DOE's protestations aside, there is no legal bar to technical and scientific progress in the disposal of HLW and spent nuclear fuel. Currently, all the waste in the tanks is HLW.<sup>1</sup> However, not all that waste must ultimately be disposed of in a deep geologic repository as some of that HLW, removed from the tanks and treated to reduce its fission content, may be disposed of elsewhere if it meets applicable requirements. NRDC, along with the affected states, has held this position consistently throughout the litigation and throughout DOE's efforts to have the HLW court decision legislatively reversed. *See* Attachment 4, NRDC's August 19, 2003 letter to Speaker Hastert.

DOE alleges there is no legal framework on which to continue planned tank waste cleanup activity that is premised on treatment and disposal of alleged lower-activity fractions of high-level radioactive waste (HLW) as low-level waste. This assertion is inaccurate. The Federal District Court found that "... NWPA allows DOE to treat the solids to remove fission products, thereby permitting reclassification of the waste..." Four directly affected states – Idaho, Washington, South Carolina and Oregon – have addressed this matter specifically and they state:

The court's ruling allows DOE to proceed with retrieval and treatment of liquid waste from tanks ... If the wastes in question are not highly radioactive following treatment, DOE has the ability now to develop a classification strategy to qualify these wastes for management, including disposal, outside a high-level waste repository. What the court rejected was giving DOE free rein to override national policy as expressed in the Nuclear Waste Policy Act.

*See* Attachment 5, August 12, 2003 letter from the States to Representative Hastert, Speaker of the U.S. House of Representatives.

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<sup>1</sup> "It is undisputed that the waste stored at Hanford, INEEL, and Savannah River is highly radioactive and the result of reprocessing. No solids have yet been extracted from the liquid waste at those sites and treated to reduce fission products. Thus, the waste at issue in this case falls within NWPA's definition of HLW." *NRDC v. Abraham*, 271 F.Supp.2d 1260, 1265 (D.Idaho 2003) (emphasis added).

Ultimately, DOE assertions that the Federal District Court has stymied HLW cleanup are legally unfounded and ignore the obvious opportunities to proceed with a scientifically rigorous approach to the disposal of HLW.

**A Suggestion for the NAS BRWM on Addressing These Matters**

If the BRWM desires to have a meaningful impact on the scientific debates surrounding geologic disposal of HLW and spent nuclear fuel, it should first address the transcendent issue identified above. Efforts at ensuring Yucca Mountain is licensed or DOE saves money – all done at the expense of rigorous, sound science – must be stopped and must hear serious protest from the NAS.

Respectfully, the BRWM could provide Congress, the applicable agencies, and the public with answers to the following questions:

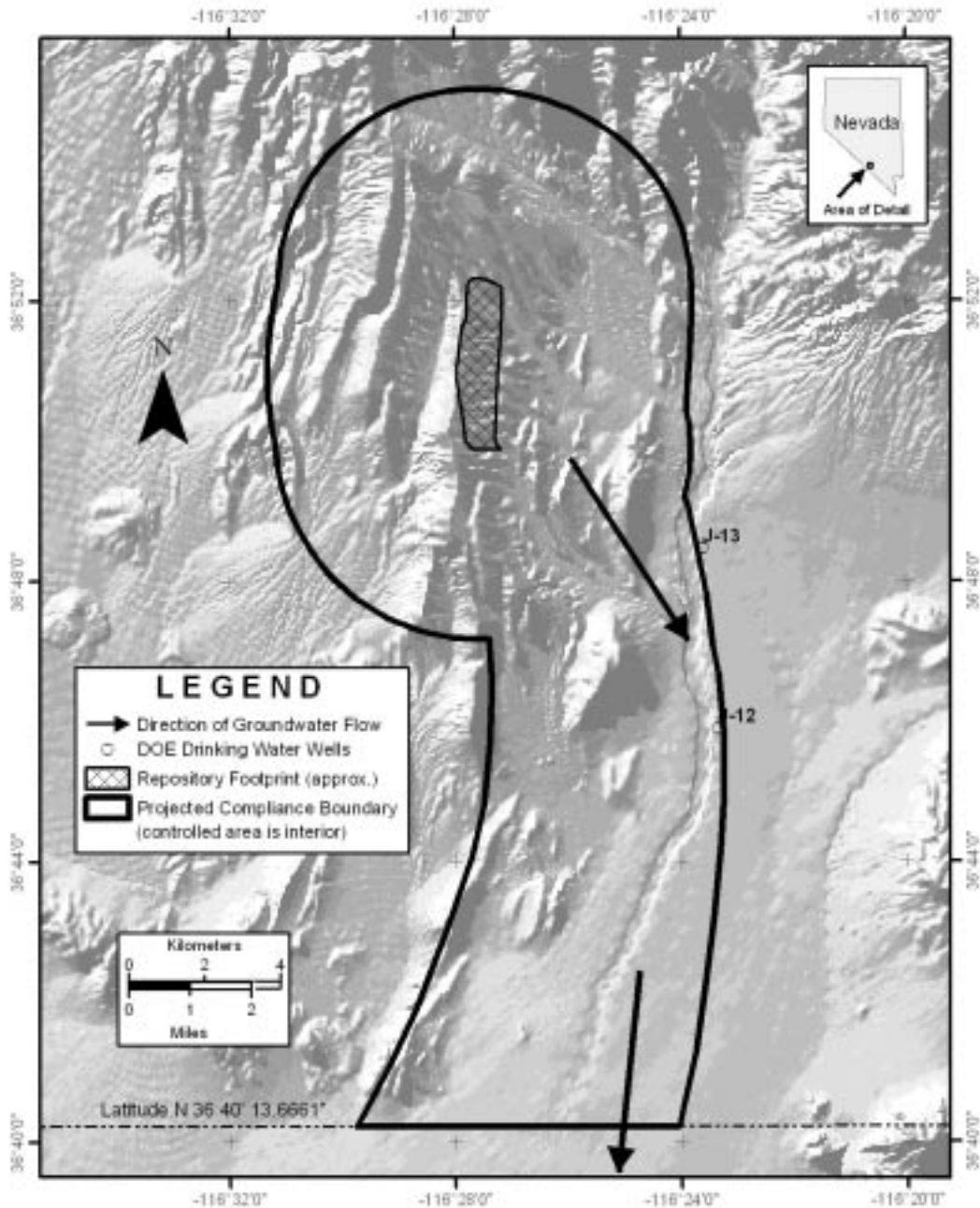
Is the Yucca Mountain site control boundary supportable by sound science; and is a boundary five kilometers in every direction, as was done for the Waste Isolation Pilot Project in New Mexico, more appropriate?

What is the best estimate of total radioactivity, and breakout by isotope, in SRS tanks, particularly Tanks 17-20 that are closed and Tanks 18 and 19 that are next in line to be closed?

Is it sound science to mathematically average the radioactivity of the HLW remaining in closed HLW tanks with the concentration of arbitrary amounts of grout poured on top of waste, but not physically mixed with it, to justify treating the HLW as LLW?

Have the models and assumptions used by DOE to calculate radiation dose to future generations at the SRS site been validated and do the results provide accurate or conservative estimates of dose?

**Projected Groundwater Standards Compliance Boundary for Spread of Radioactive Contamination at the Yucca Mountain Project**  
**Measurement of Radioactive Contamination Takes Place Outside of Controlled Area**



NRDC produced this visual representation from the following information:  
 "The controlled area may extend no more than 5 km in any direction from the repository footprint, except in the direction of groundwater flow. In the direction of groundwater flow, the controlled area may extend no farther south than latitude 36°40' 13.6651" North ... [T]he size of the controlled area may not exceed 300 square km." 68 Fed Reg. at 32117 (June 13, 2003). The direction of groundwater flow is from FBS (February 2002) at 5-21, Figure 5-3. The repository footprint is from the Yucca Mountain Science and Engineering Report, DOE/RW-0539, at 1-17, Figure 1-3, and the area is approximately 4.27 square km. The area within the projected compliance boundary, as shown in this map, is about 230 square km. The relief image was created from a 1 arc-second Digital Elevation Model from the USGS National Elevation Dataset, April 2002. This map is based on a Nevada State Plane Central projection, North American Datum 1927.