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Subject: NRDC comments - PROJ0734, PROJ0735, PROJ0736 and POOM-32

Ms. Bradford,

please find attached NRDC's Comments on NRC's Draft Interim Concentration Averaging Guidance for Waste Determinations,

Docket Nos. PROJ0734, PROJ0735, PROJ0736 and POOM-32. Please contact me if you have any trouble downloading the attachment.

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January 31, 2006

**COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL
ON THE NUCLEAR REGULATORY COMMISSION'S
DRAFT INTERIM CONCENTRATION AVERAGING
GUIDANCE FOR WASTE DETERMINATIONS**

Introduction and summary

On December 16, 2005, the Nuclear Regulatory Commission (NRC) issued its Draft Interim Concentration Averaging Guidance for Waste Determinations. 70 Fed. Reg. 74846 (Dec. 16, 2005). While we appreciate the opportunity to comment on this draft guidance prior to the NRC instituting a Standard Review Plan (SRP) (that will provide guidance to NRC staff regarding the Department of Energy's (DOE) efforts to reclassify high-level radioactive waste (HLW) currently stored in hundreds of tanks at DOE sites), we find objectionable a number of aspects of the draft guidance and request that prior to implementation the NRC address these problems and, most important, withdraw the draft guidance until such time as the SRP is ready in draft form for public review.

In its draft guidance, the NRC is proposing to allow DOE to reclassify HLW as dispose of it as low-level radioactive waste (LLW) by allowing the agency to average materials that are not mixed. If adopted, this guidance will allow DOE to rely on dilution as a means of either staying below or near LLW concentration limits. Such guidance is not scientifically defensible, undercuts the regulatory structure for LLW disposal and should be withdrawn.

Comments

This draft guidance is yet more progeny of the long-running dispute over DOE's efforts to reclassify HLW resulting of the reprocessing of spent nuclear fuel. We need not repeat the long history of this dispute here. It should suffice to say that such reclassification of DOE's HLW would allow DOE to save costs and avoid disposing of this HLW in a geologic repository. DOE could refer to the newly classified HLW as "waste incidental to reprocessing" and dispose of the waste either in (1) shallow burial at the Savannah River Site's Saltstone Disposal Facility (SDF) after it has been removed from the HLW tanks or (2) simply not exhume that HLW from the tanks and leave it under a layer of "stabilizing" grout. The NRC, in carrying out its limited (non-regulatory) role under Section 3116 of the FY 2005 Defense Authorization Act, has offered draft guidance on how and to what extent DOE may rely on averaging HLW with materials with which it is not actually mixed.

NRC's proposal is clear on this point:

Credit can be taken for stabilizing materials added for the purpose of immobilizing the waste (not for stabilizing the contaminated structure) even if it can not be demonstrated that the waste and stabilizing materials are reasonably well-mixed, when the radionuclide concentrations are likely to approach uniformity in the context of applicable intruder scenarios.

70 Fed. Reg. at 74848.

NRC should not allow averaging of materials that are not mixed.

The NRC has drafted guidance that allows for DOE to add grout to HLW in a manner where there is no appreciable mixing, and thus, averaging is an inappropriate exercise in deciding what constitutes proper disposal. "Concentration" is defined as, "The amount of a substance in weight, moles, or equivalents contained in unit volume." *CRC, Handbook of Chemistry and Physics*, 68th Edition, at F-75. "Volume, unit of" is defined as "The cubic centimeter, the volume of a cube whose edges are one centimeter in length. Other units of volume are derived in a similar manner. Dimension. [13]." *Id.*, at F-108. The concentration of the waste that is the subject to NRC's draft guidance will not be changed in any appreciable manner by the addition of grout for whatever purpose, whether it be "stabilization" of HLW liquids and sludge or dilution to meet Class C requirements.

Allowing this averaging of unmixed materials next to important water supplies as a method of waste disposal is a matter of enormous public concern. The waste that DOE proposes to leave in the tanks and, under the DDA process in South Carolina, is "highly radioactive material."¹ In 2002 the States of Idaho, Washington, Oregon and South Carolina agreed with NRDC that the HLW in the tanks in question "directly result from reprocessing of spent fuel and are extremely radioactive." (*See* Amicus Brief submitted before the Idaho Federal District Court at 16). As an example of this significant level of radioactivity, it is estimated that "the solids in [SRS] Tank 19 are currently 39 times the upper limit for Class C waste." *See* P.D. d'Entremont and J.L. Thomas, "Characterization of Tank 19 Residual Waste," Westinghouse Savannah River Company, WSRC-TR-2002-00052, Revision 0, March 15, 2002 ("d'Entremont & Thomas, Tank 19 Report").²

The NRC guidance would allow DOE to take credit for mixing – by averaging – this highly radioactive waste with grout, which physically does not occur to any appreciable degree. In the papers before the Idaho Federal District Court, DOE claimed that the average concentration of radioactivity in SRS Tanks 17 and 20 after closure are 1.1 Ci/m³ [= 0.0042 Ci/gal] and 0.9

¹ On May 20, 2005, NRDC stated serious objections to DOE's Interim Phase Processing approach at SRS. In pertinent part, NRDC stated that while it "may have concerns with DOE's plans for the SWPF after the details of the project are more developed ... if the SWPF and DWPF operate as suggested, then NRDC is unlikely to have serious objections to the post-2009 plans as the project will (hopefully) separate the great portion of radioactive cesium-137 from the salt waste for processing through the DWPF and for appropriate disposal in a geologic repository." *NRDC Comments on DOE's Draft WIR Determination for Saltstone* at 3. However, we went on to state that "The Interim Phase Processing approach is another matter altogether. By contrast to the plans for the SWPF, the Interim Phase Processing approach would result in disposing of at least 3 to 5 million curies of radioactivity in the SDF, a facility originally designed to dispose of Class A low-level radioactive waste. This is primarily because the DDA technology, the first technology to be used, separates and decontaminates the HLW removed from the tanks at a factor that is approximately 1,000 times less effective than that of the SWPF. The potential for a significant radiation dose at or near the surface of the blocks of cesium-137 contaminated grout at SDF is excessive even after 100 years of radioactive decay. And the potential for groundwater contamination leaching from these blocks is too high. Moreover, abandoning 3 to 5 millions curies of cesium-137 contaminated waste in shallow land burial is unnecessary because it is feasible to wait for the construction and operation of the SWPF." *Id.* at 3-4.

² Found on the web at <http://www.srs.gov/general/pubs/fulltext/tr2002052/tr2002052.html>).

Ci/m³ [= 0.0034 Ci/gal], respectively, where these are the concentrations of radioactivity averaged over the sludge remaining in the tank and the "grout credited for binding up the wastes." See March 5, 2003 Affidavit submitted by DOE Assistant Secretary for Environmental Management at ¶ 9.

This mathematical averaging does not actually change the concentration of the abandoned HLW to any appreciable degree. This can be seen by examining the closure of Tank 17. When NRDC originally challenged DOE's numbers in the litigation before the Idaho District Court, NRDC relied on DOE-generated data from the "Industrial Wastewater Closure Module for the High-Level Waste Tank 17 System," Revision 1, Savannah River Site, April 2, 1997, p. A-18, Table A-4. According to later DOE documents, these numbers are no longer accurate reflections of the radioactive waste in the tanks. In 2004 DOE provided Congress two estimates of the residual total radioactivity in Tank 17: 478 Curies³ and 406 Curies.⁴ However, because the DOE selectively deleted certain isotopes from the inventory of Tank 17 the residual radioactivity may be one or two orders of magnitude greater.⁵

The residual radioactivity in Tank 17 was contained in approximately 2,200 gallons of sludge, so even using DOE's low figure of 406 Curies, the estimated concentration of radioactivity in the residual sludge is approximately 49 Ci/m³ (0.18 Ci/gal).⁶ Since interstitial liquid (liquid mixed in with solids) typically accounts for 70-85% of the volume of sludge, once the sludge dries following tank closure, the residual solids, or heels, represent only about 15-30% of the original sludge volume. Therefore, the estimated concentration of what was in the dry heel at the bottom of Tank 17 prior to closure is likely about 217 Ci/m³ (about 0.82 Ci/gal).

To give the impression that the concentration of residual radioactivity has been diluted from 217 Ci/m³ to 1.1 Ci/m³, DOE presumably "takes credit" for approximately 96,000 gallons of grout out of the approximately 1,300,000 gallons of grout that were added to Tank 17. Att. 2, Table C.3.1-1 Worksheet Data. Thus, the approximately 96,000 gallons of grout that DOE "credits" as binding with the waste is 44 times the 2,200 gallons of sludge left in the bottom of the tank and 194 times the estimated volume of the heel. Since the "fill factor" for Tank 17 is approximately 3,540 gallons per inch, the 2,200 gallons of sludge has a height of about 0.6 inches and DOE is "taking credit" for about 27 inches of grout. It is obvious the approximately 96,000 gallons (27 inches) of grout is not thoroughly mixed with the 2,200 gallons (0.6 inches) of sludge. Rather, it is poured on top of the sludge.

³ In May of 2004 the DOE provided United States Senator Graham's (SC) office a one-page summary of the residual inventories of SRS Tanks 17-20. Please contact NRDC for copies of the documents cited in notes 3-5.

⁴ DOE "Due Out" List from August 4 meeting re SRS/WIR, dated September 7, 2004.

⁵ NRDC letter to Mr. Hugh P. Brady, Staff Member, Committee on Armed Services, September 10, 2004.

⁶ Here, it noted that the estimated concentration of radioactivity in the Tank 17 sludge was less than the estimated concentration of radioactivity in sludge in nearly all, if not all, other HLW tanks at SRS where data is available. Tank 23 is the only tank where the concentration is less than that of Tank 17. It is unclear whether Tank 23 has a lower concentration, or this single case reflect a lack of inventory data for specific radionuclides in Tank 23. This simply confirms that DOE chose the cleanest tank to suggest that averaging the concentration of radioactivity to be left in the tanks is small.

In yet another example, in Tank 19, it has been proposed to "take credit" for 20 .2 inches of grout poured over 15,000 gallons (4.2 inches) of sludge. d'Entremont and J.L. Thomas, Tank 19 Report. Here again, it is not credible to assume that the sludge is actually diluted by the grout. DOE does not even make this claim.

While one would expect some binding at the interface of the sludge and the grout poured on top of it. DOE claimed, "The initial grout addition added to the tanks, both stabilizes the waste and is formulated to promote some chemical binding of the waste constituents." DOE 2003 Declaration ¶ 12. "Promoting binding" is not synonymous with "uniformly mixing." Substantial mixing is not even contemplated. DOE has proposed, and now the NRC offers draft guidance to approve, taking credit for mixing whether significant mixing takes place or not, by an amount of "grout credit" that would be sufficient to reduce the "average concentration" to below Class C levels.

Average concentration," as DOE uses the term, is not the same as and should not be confused with "actual concentration." Mathematical "averaging," as performed by DOE, does not imply dilution through mixing, and therefore does not imply a reduction in the concentration. Under the NRC's draft guidance, the residual sludge at the bottom of the tank will contain radioisotopes in concentrations that dramatically exceed the Class C limits. The examples cited above for Tanks 17 through 20 contain comparatively the least amounts of radioactivity in the HLW tanks at SRS (*see* note 6). Literally dozens of tanks at the Savannah River Site or at the Hanford site in Washington contain millions of curies in minimal amounts of waste resting in the heels of the tanks. Allowing for mathematical averaging, "taking grout credit," renders meaningless the objective of establishing concentration limits for Class C and other waste categories in 10 CFR 61.55. DOE could just as well average the residual radioactivity in the tanks with arbitrary volumes (or mass) of earth under the tanks or the groundwater adjacent to the tanks. DOE cannot reduce the actual concentration of residual waste by averaging the radioactivity over arbitrary volumes (or masses) of materials with which the wastes are not thoroughly mixed and the NRC should not approve a process for doing so.

It is inappropriate to rely on dilution as a method of radioactive waste disposal.

We agree with the NRC that the Branch Technical Position on Averaging was an inappropriate vehicle to address DOE's WIR determinations. That noted, we find this draft guidance technically indefensible as any solution to final HLW disposal. The concept of disposal by dilution of the nation's most highly radioactive waste was discarded over 30 years ago, long before Congress first passed the Nuclear Waste Policy Act in 1982. If dilution were an acceptable option, Congress would not have directed HLW to be consolidated and disposed of in a geologic repository that does not rely on human monitoring and maintenance to keep the wastes from entering the biosphere.

Again, we urge you to withdraw this draft guidance as it technically inappropriate and will, over time, endanger important drinking water sources with significant amounts of highly radioactive waste. If you have any questions please do not hesitate to call me at the number listed below. Thank you very much for your consideration of these matters.

Sincerely,



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