Grassroots Efforts to Clarify the High-level Waste (HLW) Definition – 16433

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ABSTRACT

Some defense High-Level Waste (HLW) at Hanford, and the Savannah River Site (SRS), and the Idaho National Laboratory, as well as similar waste in West Valley, NY also meet the definition of transuranic (TRU) waste. While this waste is currently defined under the Nuclear Waste Policy Act (NWPA) as HLW, managing and disposing of this waste as TRU has significant advantages. If a legislative clarification was drafted to resolve this ambiguity, significant progress could be made on the cleanup and disposal at Department of Energy (DOE) sites leading to lower taxpayer costs and less risk to human health and the environment.

INTRODUCTION

Grassroots advocacy is all about banding together like-minded people for a single purpose or cause. The same collaboration can happen between communities. Communities who learn to work together can bring about potential policy changes that would have otherwise been impossible to impact separately and alone. Grassroots efforts are associated with bottom-up, rather than top-down decision making, and are sometimes considered more natural or spontaneous than more traditional power structures.

In simplest terms, grassroots efforts raise the level of awareness regarding certain causes and issues at either the local, state, or federal levels. The purpose of these efforts is to influence public perception, regulations, or public policy such as legislation.

Such a community-to-community grassroots effort was started in June 2013, when the Savannah River Community Reuse Organization (SRSCRO) in cooperation with the Mayor of Carlsbad, New Mexico arranged to have local leaders from each community meet to discuss a potential path forward for the deposition of some of the SRS vitrified in the Waste Isolation Pilot Plant (WIPP). Seven community leaders from the SRSCRO region visited Carlsbad and toured the WIPP facility. While there, leaders from both communities met with WIPP facility experts to discuss the benefits of using WIPP for this potential disposition option. There was general agreement that WIPP technically could dispose of such material. However, such waste is currently excluded from using WIPP because of its classification as HLW.

Therefore, it was determined that a change in the way such waste is classified had to be made before the objective of the grassroots effort could be met – base the waste classification on its constituents, and risk from one of process or origin.

This grassroots effort is dedicated to revising the classification system for radioactive waste in the U.S. The current radioactive waste classification system relies primarily on “point of

origin" rather than composition and the specific hazards posed by a waste's radioactive properties. This approach has many shortcomings. For example, it is inconsistent: low-level waste (LLW) is defined by exclusion whereas HLW is defined by its source. It is also vague: the current definition states that HLW must "contain fission products in sufficient concentrations," but that does not adequately describe the radioactive characteristics of the waste, which should drive disposal decisions.

We believe that changing the legislative waste definitions would provide additional, safe, publicly acceptable disposal paths for HLW, leading to lower federal and taxpayer costs for storage and disposal, and less risk to human health and the environment. With the SRSCRO as the lead, initial outreach efforts were made to both South Carolina and New Mexico Congressional delegations, as well as, meetings and discussions with Regulators from both States. However, just as the initiative began to move forward the interruption of waste disposal activities at WIPP occurred and the grassroots efforts were temporally placed on hold.

Currently, with the WIPP operations pending and the possibility of other disposal options (i.e. Waste Control Specialists) for this type of waste being available, efforts to rejuvenate the initial objective are under way. Grassroots collaboration involves alliances among groups that share risks, resources, and responsibilities to achieve their common interests. Therefore, outreach to other potentially affected communities has begun through collaboration with the Energy Communities Alliance (ECA).

The ECA is an organization of local communities that have major DOE installations as neighbors. Established in 1992, ECA brings together local government officials in energy communities to share information, establish policy positions, and advocate community interests in the DOE arena. ECA is the only organization dedicated solely to meeting the broad-ranging needs of energy communities. Through ECA representation, member communities have learned that with a common purpose they can make gains that would not be possible by working alone.

BACKGROUND

In 2013, representatives of the five counties surrounding the SRS and of the Carlsbad community began a discussion of using the WIPP to dispose of the HLW currently stored at SRS and meeting the technical definition of TRU waste. There was general agreement among these stakeholders that WIPP had the potential to be a disposal site for such waste and that this approach would benefit both the SRS region and the Carlsbad community.

In 2014, after the interruption of waste disposal activities at WIPP, DOE looked at a number of temporary TRU waste storage options. It identified temporary storage capacity at the Waste Control Specialists (WCS) facility in Andrews, TX. WCS is a waste management facility authorized by the Texas Commission on Environmental Quality (TCEQ) to accept hazardous, radioactive and mixed waste for treatment, storage and disposal. WCS routinely

accepts low-level mixed waste from various DOE locations, including TRU waste generator sites, for treatment and disposal. The facility's radioactive materials license authorizes storage of TRU waste from DOE.

More recently, the State of Texas sent a letter to the U.S. Nuclear Regulatory Commission (NRC) inquiring whether Texas can regulate the disposal of TRU waste along with Greater than Class C (GTCC) waste. In July 2015, the NRC staff provided the Commission with an analysis, along with options and a recommendation that NRC allow Texas to license and regulate the disposal of TRU waste at the WCS site. The Commission is currently considering the staff's analysis and recommendation. If WCS can dispose of TRU waste, this creates two potential options for the ultimate disposal of HLW if it is re-classified as TRU waste to more accurately reflect its radioactive characteristics.

The radioactive waste classification system in the U. S. relies primarily on a source-based framework (i.e.., U.S. wastes are categorized by their origin, not the specific hazards posed by their disposal). This approach is known to have many deficiencies [1]. For one, the basis of the classification within is inconsistent; for example, HLW is defined by its source, whereas LLW is defined by exclusion [2]. Rethinking our radioactive waste classification system has been explored in the past [3]. Internationally the International Atomic Energy Agency (IAEA) recommends a characteristics-based, risk-informed classification system to its member states [4]. Using a more risk-informed classification system results in waste classified by the "intrinsic qualities of the material" [5]

Only the U.S. classifies some of its nuclear waste by origin. In most major nuclear countries, wastes are categorized by their content, not their source, using waste classification systems similar to that recommended by the IAEA.

So, nuclear-capable countries use one of two waste classification systems: the U.S. bases their system on "where" the waste was generated (point of origin) and the rest of the world uses the "intrinsic qualities" of the material (risk-based)."

Revising our radioactive waste classification system has been explored in the past [6]. In this study, ORNL applied the results of previous investigations of radioactive waste classifications to the advanced fuel cycle systems model. Other papers have proposed or explored alternative systems of classification [7, 8]. Smith and Cohen [8] is of particular interest because it suggests that for current waste streams, the characteristics used to divide classes would not change the classification if care is taken in dividing the wastes.

PERFORMANCE ASSESSMENT AND EXISTING REGULATORY APPROACH

The Office of Environmental Management (EM) has primary responsibility, within DOE, for DOE Order 435.1, the self-regulation for all radioactive wastes, including LLW, HLW, and TRU waste. As part of this responsibility, EM conducted comprehensive complex-wide review of DOE's radioactive waste management in 2010 to gather feedback on the effectiveness of Order 435.1 (not to assess compliance with the requirements). EM is now is updating the

Order to incorporate changes to the regulatory process and to improve management of the wastes.

The NRC uses 10 CFR Part 61 to regulate near-surface LLW disposal technologies, including shallow-land burial and engineered land disposal methods such as below-ground vaults, earth-mounded concrete bunkers, and augured holes. Development of Part 61 in the early 1980s was based on several assumptions about the types of wastes likely to go into a commercial LLW disposal facility. Over the last several years recent developments regarding waste disposal have called into question some of those key assumptions and led NRC to consider revising Part 61.

Some cognizant parties believe that new legislative language is not necessary to use composition rather than source as a basis for waste disposal decisions. Both the NWPA and the Atomic Energy Act of 1954 contain this definition of HLW:

(A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products **in sufficient concentrations**; and
(B) other highly radioactive material that the [NRC] Commission, consistent with existing law, determines by rule requires permanent isolation.

The question of which waste contains **sufficient quantities of fission products** to be "highly radioactive" … "to require permanent isolation" is exactly the type of question dealt with under the recently revised Part 61. Now, under Part 61, if the radioactive concentration of certain wastes regulated by the NRC can be demonstrated to meet the disposal performance objectives specified in the Part and the performance assessment of a specific land disposal site; then it is not sufficiently radioactive to require permanent isolation in a repository.

As, Dr. Anne White, President of Wolverine Nuclear [9] suggests in her approach to use the performance standards in 10 CFR Part 61 to emplace wastes at sites other than a deep geological repository. Specifically, new Part 61.7, states:

> "Waste acceptance - Demonstrating compliance with the performance objectives also requires a determination of criteria for the acceptance of waste. The criteria can be determined from the results of the technical analyses that demonstrate compliance with the performance objectives for any land disposal facility or, for a near-surface disposal facility, the waste classification requirements of subpart D of this part."

Her proposed course of action would compare the various waste forms at the DOE sites with the performance assessment of the designated disposal site to determine which waste streams could be safely dispositioned by land disposal. For example, some of the vitrified HLW waste at SRS is of sufficiently low activity to meet the definition of TRU waste. The specific waste characteristics of these canisters could be compared to the performance

objectives for a shallow land disposal site and a determination made as to whether the waste meets the performance objectives of that specific disposal facility and therefore can be disposed of at that disposal facility rather than a geologic repository.

Her initial calculations demonstrate that most of the current inventory of SRS vitrified HLW waste could safely be disposed under 10 CFR Part 61 requirements. It is projected that after treatment some wastes at Hanford and Idaho would meet the same performance objectives. It is important to note that these initial calculations do not take credit for the very robust form of vitrified waste.

Although DOE defines TRU waste, there is no such definition in NRC 10 CFR Part 61. In 10 CFR 61.55 NRC defines waste of 100 nCi/g, or less, of alpha emitting waste with a half –life of greater than 5 years as "Class C waste." Wastes in excess of this concentration are defined as "greater than Class C waste." Ergo, in NRC parlance, DOE "TRU waste" is "greater than Class C waste."

10 CFR 61.55 (2) (iv) states,

> Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. In the absence of specific requirements in this part, such waste must be disposed of in a geologic repository as defined in Part 60 or 63 of this chapter **unless proposals for disposal of such waste in a disposal site licensed pursuant to this part are approved by the Commission.** [Emphasis added].

Therefore Dr. White believes a licensing decision for wastes regulated by the NRC or DOE can be made based on waste and disposal performance assessments, without regard to any existing regulatory [TRU] waste definition, provided the waste is demonstrated to meet the performance objectives of 10 CFR Part 61 subpart C.

SIMPLE GRASSROOTS LEGISLATIVE APPROACH

It was noted [10] at the 7th Annual RadWaste Summit (on September 13, 2013) that disposing of some of the DOE's HLW (or "tank waste") at WIPP instead of Yucca Mountain or another high-level waste repository could be a game changer that could save DOE and the nation billions of dollars and have a positive impact on affected communities.

SRS and Hanford tank wastes are considered HLW because of their origin regardless of any radioactive characteristics. Classifying DOE waste by risk, rather than by source could ease EM budget constraints by allowing waste management decisions based on risk, not on a regulatory definition that imposes more stringent disposal decisions warranted by the waste characteristics.

At the conference noted above, Jay Rhoderick, Associate Deputy Assistant Secretary for Tank Waste and Nuclear Material in DOE's Office of Environmental Management at that time said, "Part of the conversation has to be what costs can you avoid and still be protected. For example, sending Hanford tank waste that meets WIPP criteria could reduce the operating time of the Waste Treatment Plant. Opening up WIPP would give us opportunities to have some cost avoidance within the EM system. Right now we have 2,300 canisters that have been produced down at Savannah River that when you put them through the criteria they meet the current WIPP [Waste Acceptance Criteria], but they can't go there because they are high-level waste."

The concept of a change in the method of radioactive waste classification is supported by communities eager to see waste removed from their site. The Savannah River's Citizens Advisory Board released several recommendations [11] urging DOE to take a look at disposing of the site's vitrified tank waste canisters at WIPP. As waste continues to be vitrified Savannah River, the option to send the canisters to WIPP (or WCS) could avoid the need to construct additional storage for the canisters of vitrified waste.

As stated earlier, the current definition of HLW in the US is vague and lacks specificity. For example, the phrase in the NWPA "***that contains fission products in sufficient concentrations***" is not precise and does not adequately address the actual characteristics of defense HLW. However, the definition of TRU waste in 40 CFR 191.02 is very precise and adequately allows DOE to segregate and identify other acceptable disposal paths for this waste.

A clarification in legislation (e.g., in the National Defense Authorization Act), as proposed below would capture radioactive wastes currently being inadequately defined.

> **"Regardless of origin or previous categorization, radioactive waste, other than spent nuclear fuel, containing more than 100 nCi/g of alpha-emitting transuranic isotopes with half-lives greater than 20 years is transuranic waste."**

With such an amendment, additional existing storage and disposal paths would become available for some of the waste currently stored as HLW at SRS, INL, and Hanford and similar waste at West Valley, NY. These include a number of HLW canisters at SRS and potentially some from West Valley. Some HLW at other DOE sites may not need to be vitrified as currently planned if disposed of as TRU waste. This would benefit the sites, save DOE and taxpayer money and more effectively utilize available cleanup funds.

CONCLUSION

As noted by James Conca his August 18, 2015 article [12] in Forbes magazine, "A funny thing happened on the way to our high-level nuclear dump. Most of America's high-level nuclear waste is no longer high-level." He points out that various processes have changed the nature of this waste over the last 50 years.

In the article, he goes on to point out that when human law and natural law collide it costs a lot of money and it takes too long to change the human law. But the various human laws only consider where it came from, which is our premise exactly. We agree with Mr. Conca; we have to start calling the waste what it is. As he points out, changing laws and agreements is very difficult but it is still a lot easier and cheaper for the taxpayer than ignoring reality and treating HLW that is no longer high-level.

Interest in clarifying the waste definition continues and is gaining strength as grassroots efforts are underway to improve the understanding of nuclear waste characteristics of Congressional staff. A multi-community task force focused on this grassroots effort to change the way the country thinks of nuclear waste was recently formed through the ECA and have drafted a “Fact Sheet” for dissemination to interested parties [13].

Some stakeholders believe NRC and DOE already have the existing authority to make this change. However, we at the grassroots level believe a legislative clarification appears easier and faster and looks to Congress to implement this change through legislation.

REFERENCES

[1] Micah Lowenthal, “Waste-acceptance criteria and risk-based thinking for radioactive-waste classification”, Waste Management 18 (1998) 249-256 WM2013 Conference, February 24 – 28, 2013, Phoenix, Arizona USA

[2] Nuclear Regulatory Commission, “Licensing Requirements for Land Disposal of Radioactive Waste – Waste Classification,” Title 10, Part 61.55 of the Code of Federal Regulations, revised as of 2002.

[3] Allen G. Croff, Michael J. Bell, Yoram Cohen, Leonard C. Keifer, David C. Kocher, Dennis J. Paustenbach, Vern C. Rogers, Andrew Wallo, III, E. Evan White, “Risk-Based Classification of Radioactive and Hazardous Chemical Wastes”, National Council on Radiation Protection and Measurements Report No. 139, December 2002

[4] International Atomic Energy Agency, General Safety Guide No. GSG-1, “Classification of Radioactive Waste”, Vienna, 2009

[5] Update of the MIT 2003 Future of Nuclear Power (2009), Massachusetts Institute of Technology.

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[7] M. Zucchetti and P. Rocco, "Classification of ITER Waste: the Recycling Option for ITER Materials," Technical Note No. I.94.166, Joint Research Centre, Italy. (1994).

[8] C.F. Smith and J.J. Cohen, "Development of a Comprehensive Waste Classification System," in Waste Management '89, Proceedings of the Symposium on Waste Management, Vol. 2, ed. R.G. Post. University of Arizona, Tucson, Arizona February 26-March 2, 1989

[9] Dr. Anne White presentations at the Exchange Monitor *9th RadWaste Conference*, September 11, 2015 and the *27th DecisionMakers Conference*, October 22, 2015.

[10] *Weapons Complex Monitor -- Vol. 24 No. 36 (9-13-2013)*

[11] Savannah River Site Citizen’s Advisory Board - Recommendation #301 Adopted October 30, 2012 Recommendation # 304 Adopted May 21, 2013 Recommendation # 305 Adopted May 21, 2013

[12] J. Conca, *Where Has All the Nuke Waste Gone,* Forbes, August 18, 2015

[13] Energy Communities Alliance – Fact Sheet, Defining Waste Based on Composition Can Create Additional Disposal Paths, Expedite Cleanup – see attached

Energy Communities Alliance
Local Concerns. National Impact.

FACT SHEET

DEFINING WASTE BASED ON COMPOSITION CAN CREATE ADDITIONAL DISPOSAL PATHS, EXPEDITE CLEANUP

ECA supports clarifying the definition of transuranic waste (TRU) and high-level waste (HLW) to reflect the composition of the waste rather than the origin. ECA shares the Department of Energy's (DOE) goal to remove waste as quickly and safely as possible to an appropriate location for disposal. Some defense HLW at Hanford, Savannah River Site, Idaho National Laboratory, and West Valley, NY, meets the current specific definition of TRU waste and as such, are not truly HLW as currently defined under the Nuclear Waste Policy Act (NWPA). If a legislative clarification is drafted to resolve this ambiguity, significant progress could be made on the cleanup and waste removal at DOE sites and the adjacent communities leading to lower DOE costs for storage and less risk to human health and the environment.

Why the Need for Clarification:

The current definition applied to HLW is vague and lacks specificity. For example, in the current definition the statement "***that contains fission products in sufficient concentrations***" is not precise enough and does not adequately address the current state of defense HLW. However, TRU waste as defined in 40 CFR 191.02 is very precise and adequately allows DOE to segregate and identify acceptable disposal paths for this waste.

HLW is defined in the Nuclear Waste Policy Act (NWPA) as:
"(A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; andI (B) other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation."

TRU waste is defined in 40 CFR 191.02 as:
"waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes, with half-lives greater than twenty years, per gram of waste, except for: (1) High-level radioactive wastes; (2) wastes that the DOE has determined, with the concurrence of the Administrator, do not need the degree of isolation required by this part; or (3) wastes that the Commission has approved for disposal on a case - by-case basis in accordance with 10 CFR Part 61."

What Needs to Happen:

A clarification, proposed text below, needs to be placed in legislation (e.g., the National Defense Authorization Act). The result would capture and clearly define radioactive wastes currently being incorrectly defined.

"Regardless of origin or previous categorization, radioactive waste, other than spent nuclear fuel, containing more than 100 nCi/g of alpha-emitting transuranic isotopes with half-lives greater than 20 years is transuranic waste."

Potential Benefits of Waste Definition Clarification

- With such an amendment and proposed legislative clarification, additional existing storage and disposal paths would become available for some of the waste currently stored as HLW at SRS, INL, Hanford, and at West Valley, NY. These include a number of existing HLW canisters at SRS and West Valley.

- Some HLW may not need to be vitrified as currently planned if disposed of as TRU waste. This would benefit the sites, save DOE and taxpayers money by disposing of the waste more quickly in a safe manner, and allow available funds to be utilized more effectively for cleanup of the nuclear weapons complex.