National Nuclear Security Administration

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National Nuclear Security Administration
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RULES AND DIRECTIVES BRANCH

To Whom It May Concern:

On behalf of the U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA) Global Threat Reduction Initiative (GTRI), I would like to thank you and your colleagues and staff for inviting us to provide input as you move forward with your review of the Branch Technical Position on Concentration Averaging and Encapsulation (BTP, Docket ID: NRC–2011–0022). I would like to take this opportunity to expand on the comments I made as a panelist at the February 24, 2011 public meeting, and to offer suggestions on modification of the BTP as written in the draft revision[1] provided to this office for review.

The current BTP, as it is being interpreted and implemented, is having the unintended result of preventing a large number of non-GTCC radioactive sealed sources from being disposed of in existing commercial Low Level Waste disposal sites. These sources (which include some higher activity cesium 137 (Cs-137) and all higher-activity cobalt 60 (Co-60) sources) are some of the sources that are of greatest concern from a national security perspective. Below are some suggestions for your consideration as you reexamine the issues of balancing the immediate need for access to disposal of sources in storage versus long-term scenarios associated with intruder safety.

NNSA's understanding of critical considerations underlying the BTP are:

- 0.02 millirem per hour is the accepted surface dose rate for a waste package 500 years in the future and can be attained if a 30 Ci Cs-137 source is shielded with 15 inches of concrete
- There must be a limit to the size over which radioactive material can be averaged/diluted for practical purposes (i.e. a licensee cannot expect to bury a container the size of a house in order to meet 4600 Ci/m^3)

We believe that the BTP can be revised to allow for the disposal of significantly higher activity Cs-137 and Co-60 sources without undermining the intent of the BTP and would like the NRC to consider the following:

[1] Draft NRC Branch Technical Position on Concentration Averaging and Encapsulation, Version A, Rev B(2), undated

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- Allow for shielding other than concrete (including but not limited to lead, depleted uranium (DU) and tungsten)
- Emphasize that disposal configurations for sealed sources other than a 55 gallon drum are permissible
- Including more guidance on the intended use of "generally acceptable" in the Alternate Provisions section

To be clear, this is not a request to consider revising the Class C limit or adjusting the exposure-to-discrete-items level used in the intruder exposure scenario in the Part 61 EIS. Furthermore, the developed disposal limits and the guidance in the Alternate Provisions section should still meet the 10 CFR requirements for near-surface disposal facilities.

Flexibility with Regard to Shielding Materials:

The NRC should consider allowing for shielding with material other than concrete. If allowed to take credit for the shielding of a device containing the Cs-137 sources (lead, DU or tungsten) - the waste could still meet the performance objective outlined in the BTP. These shields are engineered to safely contain sources in a human environment (treatment room, laboratory). Considering that, as new devices, these source-containing devices are safely operated in a human environment - after 500 years there should be little risk to the inadvertent intruder if you take into account the shielding, concreted waste box, and isotopic decay. This same argument can be used for the protection of the workers and public during operation of the disposal facility. Furthermore, the weight of the shielding is usually greater than 1,000 lbs, which satisfies the following from the current BTP "The minimum solid volume or mass used to encapsulate should be sufficient to make handling the radioactive waste by an inadvertent intruder prohibitively difficult..." In addition, GTRI has or will install In-Device Delay kits on the majority of high activity Cs-137 devices making it extremely difficult to remove sources from the shielded portion of these devices.

We also request that the NRC consider other isotopes in a similar manner. If device shielding is allowed to be taken into consideration for Co-60 and other high activity gamma-emitting isotopes, we believe the performance objective outlined in the BTP would be met. We suggest that the NRC calculate (and include in a table in the BTP) the specific curie limit for all nuclides listed in Tables 1 and 2 of 10 CFR Part 61.55. It is understood that disposal sites must adhere to disposal limits as defined in 10 CFR Part 61.

Practical Considerations with Regard to a 55 Gallon Drum:

The BTP states that "The amount of credit allowed for encapsulation should be limited so that extreme measures cannot be taken solely for the purposes of dilution" and we appreciate that a specific volume must be identified. We do not object to the use of 55 gallons for the purpose of concentration averaging. However, as a practical matter, encapsulation of sources in concrete in a 55 gallon drum seems arbitrary, as higher activity Cs-137 sources generally are not packaged or transported in this manner given that a majority of higher activity Cs-137 sources are contained within shields whose dimensions do not fit within a 55 gallon drum. The hospitals, universities and laboratories in possession of these devices do not have hot cells in which the sources could be safely removed from the shields and repackaged in appropriately shielded 55 gallon configurations.

A shielded 976 Ci Cs-137 in a 55 gallon drum (0.2 m3 or 23"x 23" x 23") would most likely meet the NRC surface exposure limit (A Cs-137 source would only need approximately 3.5" of lead to achieve the NRC surface expose limit of 0.02 mrem/hr after 500 years.) However, a lead waste package may not maintain its physical dimensions and form under the expected disposal conditions. Therefore, if NRC would increase the package size limit from 55 gallon drum (0.2 m3) to allow for material (e.g concrete) to be added for structural stability, and clarify that the shape that these disposal packages could take any form/shape and not just a cylinder (e.g. drum) then the NRC could greatly increase the number of sources that could be disposed of at commercial sites without impacting its long established safety parameters. In addition, NRC should use a similar logic to set an upper curie limit for Co-60 that can be stored safely in a similar volumetric space with maximum effective shielding (i.e. Lead).

In response to a question posed by NRC staff, we gathered the below data on voluntarily registered disused and unwanted sources from the GTRI Off-Site Source Recovery (OSRP) database (osrp.lanl.gov). These sources are effectively excluded from existing and planned commercial disposal facilities. While Co-60 sources cannot, by definition, be classified as Greater Than Class C, they have no commercial disposal pathway. This is a result of the fact that BTP guidance for Cs-137, as it is currently interpreted, is being applied to Co-60 sources.

Isotope	Activity Range	Number of Sources Currently Registered as Disused and Unwanted	Minimum Activity	Maximum Activity	Average Activity
Cs-137	30-976 Ci	100	34	960	349
Co-60	Greater Than 30 Ci	609	30	10,000	278

Alternate Provisions:

Finally, should the NRC decide not to incorporate the revisions suggested above, we recommend that the BTP include more guidance on the intended use of "generally acceptable" practices and bounding conditions, as well as additional guidance on the anticipated or expected content of a request for approval for alternate provisions of classification and disposal. This is based on the assumption that the disposal facilities would perform these studies and not individual waste brokers. We anticipate that proposals would require:

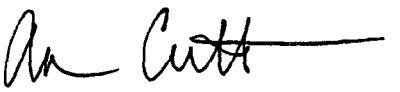
- Description of site and site characteristics pertinent to sealed source disposal
- Descriptions of sealed sources for which disposal action is requested, including concentration averaging and waste classification which results in the need for alternative approvals
- Description of source containing devices and additional packaging proposed for disposal
- Description and analysis of engineering and/or administrative controls to be employed to specified packaging configurations to assure compliance with 10 CFR 61 performance objectives
- Modeling to determine worst-case exposure pathways over specified performance periods for the material to be disposed

- Requirements/limitations on use of engineering controls specific to source packaging and site characteristics to meet performance objectives (examples – greater disposal depth, intruder barriers, tertiary containment such as vaults, etc.)
- Development of proposed limits for point-sources to be disposed, considering the worst-case exposure pathway
- Effects of degradation on packaging and engineered barriers
- Any additional information specified by the NRC.

If the BTP can be revised to allow for greater flexibility with regard to shielding materials and waste package configurations, the gap that has emerged from the implementation of the BTP as it is currently written will narrow significantly, if not disappear altogether, and there will be little or no need to invoke the Alternate Provisions.

Again, your consideration of our input is greatly appreciated. Please do not hesitate to contact me.

Sincerely,



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