HEALTH PHYSICS SOCIETY

Specialists in Radiation Safety

Edward F. Maher, Sc.D., CHP
President
Health Physics Society
42 Tuttle Drive
Acton, MA 01720
(978) 929-9133 x111

Cindy Bladey, Chief
Rules, Announcements and Directives Branch
Division of Administrative Services
Office of Administration
Mail Stop: TWB-05-BOIM
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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(3)

Re: Comments on Potential Revisions to NRC's Branch Technical Position on Concentration Averaging and Encapsulation

Dear Ms. Bladey:

The Health Physics Society (HPS) is pleased to submit the attached comments and suggestions on the proposed revisions to key documents used by agency staff in classifying low-level radioactive waste (LLRW) and the Branch Technical Position (BTP) on Concentration Averaging and Encapsulation, as requested in the U.S. Nuclear Regulatory Commission's (NRC's) Federal Register Notice dated January 26, 2011.

Thank you for the opportunity to comment on classifying low-level radioactive waste (LLRW) and the Branch Technical Position (BTP) on Concentration Averaging and Encapsulation. Please contact me at (978) 929-9133 or emaher@moellerinc.com if you have any questions concerning these comments and suggestions.

Respectfully Submitted,

Edward F. Maher, Sc.D., CHP
President
Health Physics Society

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Add = M. Heath (mth5)

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COMMENTS ON CLASSIFYING LOW-LEVEL RADIOACTIVE WASTE (LLRW) AND THE BRANCH TECHNICAL POSITION (BTP) ON CONCENTRATION AVERAGING AND ENCAPSULATION

WASTE CLASSIFICATION

Low-level radioactive waste (LLRW) is an inevitable byproduct of beneficial uses of radioactive materials in the United States. It arises from biomedical research, diagnosis and treatment of diseases, industrial processes, national defense, and electric power generation—all vital to our national interests. LLRW will continue to be generated, requiring the availability of disposal methods and sites so that society can continue to fully benefit from the use of radioactive materials. Safe and effective methods and standards for processing, transport, and disposal of LLRW are well established.

The HPS believes that the goal of managing LLRW is to ensure the safety of workers and the public and to protect the environment. To achieve this goal, disposal, not long-term storage, is the best and safest long-term approach. The HPS recommends that the regulatory framework for management and disposal of LLRW be given a complete and coordinated overhaul. These fundamental changes in LLRW management should include the following:

a. Waste classification and disposal requirements for any type of radioactive waste should be based on its potential risk to public health and safety, not on its origin or legislative stature. Therefore, we endorse the approach for a waste-disposal classification system proposed by the National Council on Radiation Protection and Measurements (NCRP Report 139) or that of the international community, e.g., IAEA, Classification of Radioactive Waste, Safety Standards Series No. GSG-1, 2009.

b. Risk-informed waste-disposal requirements for radioactive materials should be consistent and integrated with waste disposal for nonradioactive hazardous waste. Moreover, the HPS strongly supports the Environmental Protection Agency's efforts to move forward with a rulemaking to promulgate regulations allowing disposal of low-activity radioactive waste (LARW) and low-activity mixed waste (LAMW) at Resource Conservation and Recovery Act (RCRA) Subtitle C sites.

c. The HPS supports the use of uranium mill-tailings sites regulated under the Uranium Mill Tailings Radiation Control Act (UMTRCA) for disposal of radioactive materials that are appropriate for these sites. Examples of potentially appropriate materials are certain non-11e.(2) byproduct material such as the LARW and LAMW; technologically enhanced naturally occurring radioactive materials (TENORM); high-volume, low-activity waste from reactor decommissioning; and certain low-activity resins from operating reactors.

d. The HPS strongly supports Department of Energy efforts to prepare an Environmental Impact Statement under the National Environmental Policy Act to evaluate additional alternatives for disposal of greater-than-Class C wastes. These include deep geological disposal facilities, existing

LLRW disposal facilities (both commercial and federal), and new facilities (both commercial and federal) at federal sites or on private land.

e. The HPS urges Congress to direct federal action to ensure that disposal options and capacity for Class B and Class C waste will exist for all states in the future. This can be achieved by use of commercial or private facilities on federal or private lands to mitigate significant adverse consequences to generators of these wastes.

CONCENTRATION AVERAGING AND ENCAPSULATION

The NRC is currently revising the BTP to implement the Commissioners' directive (Staff Requirements Memorandum [SRM] for SECY-l0-0043) to include provisions that would allow for the blending of Class B/C LLRW to lower its concentrations, and thus allow its disposal as Class A LLRW at the Energy Solutions facility located in Clive. Utah. While blending of radioactive waste is only one of eight major areas of the BTP, clarification in a revised BTP is needed to distinguish "blending" from "dilution." The NRC staff has previously stated (SECY-lO-0043) that "blending" is limited to the mixing of LLRW with different concentrations of radionuclides which results in a relatively homogenous mixture that may be appropriate—if sufficient Class A LLRW has been included in the mix—for disposal in a licensed facility. "Dilution" on the other hand has been described by the NRC (SECY-l0-0043) as "the intentional mixing of waste with clean or uncontaminated material to lower its waste classification or to release it into the general environment."

The NRC has used these terms synonymously (as noted in SECY-10-0043), which has led to various inconsistencies in interpretations of NRC policy. The HPS encourages the NRC to expand this portion of the BTP to specifically define these terms, as well as to discuss the potential for introduction of other uncontaminated materials (such as process additives) that may be used or added in the waste treatment or blending process. Revisions to the BTP should provide guidance to waste generators/processors and Agreement States on whether uncontaminated materials maybe considered in calculating the overall radionuclide concentration for the purpose of waste classification. The BTP should also clarify this aspect to ensure that the introduction of such materials does not inadvertently change the waste characteristics such that it would require waste management practices under the Resource Conservation and Recovery Act (RCRA) regulated by the U.S. Environmental Protection Agency.

The NRC should also consider defining "blending" and "dilution" as part of the forthcoming rulemaking to revise Title 10 of the Code of Federal Regulations, Part 61(10 CFR 61). Defining such terms in rulemaking is needed because NRC licensees are only required to comply with codified regulations and Agreement States are not required to use or to enforce regulatory guidance.

INTRUDER SCENARIO: Risk Informed and Performance-Based Approach

During the NRC public meeting in Rockville, Maryland of February 24th the Commission discussed the likelihood of a future site resident unknowingly intruding into buried radioactive waste. HPS agrees that the NRC should to assume that an inadvertent intruder is protected by using a risk-informed, performance-based approach. For the process to be truly risk-informed, the NRC should focus additional attention on the radiological consequences that would be incurred than simply on the likelihood of intrusion after institutional controls have expired.

HPS is concerned that the intruder analysis for a generic site with waste blended to the upper bounds of the Class A limits after expiration of the institutional control period could pose significant and unacceptably high radiation doses. We believe that waste blended to just below the Class B concentration limit should require additional controls that are not mandated by regulations or otherwise the consequences to the intruder could result in unacceptably high doses of radiation. Such controls may reasonably include requiring disposal at depths greater than 5 meters, reinforced concrete canisters (including a lid), and additional intruder barriers with defense-in-depth or some combination of these controls.

HPS encourages the Commission to continue past practices that demonstrate a reasonably conservative approach ensuring the protection of an inadvertent intruder. Such approaches would continue to ensure that a future resident intrudes into the waste with a 100% probability. An intruder analysis should be performed to calculate the radiological consequences to the intruder after the institutional control period expires. If the analysis indicates that the consequences to the intruder are unacceptably high, then HPS supports the use of additional controls such as deeper burial or intruder barriers would be needed to prevent or mitigate the radiological consequences. If additional controls are required as a result of the intruder analysis, then additional engineering analysis may also be needed to ensure that there is defense in depth when controls or barriers degrade or fail to perform their intended function as long as the radiological consequences are estimated to be unacceptably high. The HPS encourages the Commission to broaden the BTP discussions of using risk-informed methods needed to demonstrate that the intruder will be protected after the institutional control has expired.

The 1995 BTP's Enclosure 2, Basis for Concentration Averaging and Encapsulation Guidance for Classification of Discrete (Heterogeneous) Wastes Reflected in Revised Branch Technical Position, accounts for radiation doses to an intruder encountering waste concentrations at the upper end of the Class C limits. However, it does not address the radiological risks to an intruder encountering waste at the upper end of the Class A limits. HPS encourages the Commission to include a similar analysis in revisions to the BTP for waste blended to the upper end of the Class A limits once institutional controls have expired to communicate to Agreement States and other stakeholders the hazards associated with this particular Unique Waste Stream.

HOMOGENEITY

The NRC recently published interim guidance that was issued to the Agreement States to address specific actions which should be taken to ensure that waste blended by a waste processor in one state would not become problematic in the Agreement State hosting a disposal facility. The NRC's interim guidance addressed several major topics including determining homogeneity, waste classification and radionuclide concentrations. HPS supports the interim guidance recommendations submitted to the Agreement States to ensure that blended wastes would remain homogenous, properly characterized, and not adversely impact the resident intruder. However, we believe the interim guidance's definition of homogeneity is somewhat vague. HPS encourages the NRC to provide a more robust definition that includes measurable parameters. The definition would ensure that this important characteristic is uniformly implemented by all regulators. HPS also encourages the NRC to revise the BTP to provide specific requirements on the types and numbers of measurements/samples from the blending equipment that would be needed to demonstrate to the NRC and Agreement States that the average concentration and measurement uncertainty are acceptable. The HPS would also like to see the BTP recommend a minimum volume (with reference to the waste vessel volume) for assessing concentration and homogeneity.

HPS agrees with the NRC that for some waste streams it may be difficult to demonstrate that the waste samples in process tanks or individual disposal containers are representative of all the waste in those containers for content and concentration. Therefore, given the importance of understanding the measurement uncertainty in relation to potential impacts to the intruder, the NRC should provide specific examples on acceptable methods needed to address the five sources of uncertainty discussed in the interim guidance. The HPS recommends that waste processors collect independent verification samples from the generator's waste stream, which will be useful to the Agreement States that are reviewing any future license amendment requests related to large-scale blending.

DISCRETE SOURCES OF CESIUM-137

As discussed in the public meeting held in Rockville, Maryland, on February 24, 2011, it was assumed that a future site resident would intrude into the waste once the institutional control period had expired because the behavior of the resident 100+ years into the future was "unknowable." Additionally, the guidance constrained the limit for discrete sources containing Cs-137 at 30 Curies (Ci) in 0.2 m^3 (150 Ci/m^3) when compared to the actual regulatory limit of 4600 Ci/m^3 for Class C LLRW when 10 CFR 61.55 was established in 1981. This constraint was believed prudent to prevent future radiological accidents involving sealed sources, such as the accident in Goiânia, Brazil.

The BTP does not explain why the differences exist between the Cs-137 limits contained in the BTP and the concentration tables in 10 CFR 61.55. HPS encourages the NRC to include the discussions on the aforementioned lessons learned from previous radiological accidents involving sealed sources so that stakeholders using the BTP have a clear understanding of the rationale behind this limit. Such

background information would provide clarity and would also ensure the rationale extends beyond the institutional knowledge of the NRC staff.

HPS agrees that the NRC should revise the BTP to increase the Class C concentrations of discrete sources of Cs-137 from 30 Ci in 0.2 m^3 (150 Ci/m3) to 4600 Ci/m^3 consistent with the limit specified in 10 CFR 61.55. However, the NRC is strongly encouraged to include guidance in the BTP to Agreement States hosting a LLRW disposal facility to evaluate the need for engineered controls to protect an intruder. Ensuring that an exhumed sealed source is readily identifiable is not in-and-of-itself sufficient to protect public health as evidenced by past radiological accidents. The use of steel or reinforced concrete canisters that are resistant to intrusion, coupled with disposal at depths greater than 10 meters, are needed not only to address potential impacts to public health but also for reasons of homeland security.

AGREEMENT STATE COORDINATION

The HPS encourages the NRC to include a section in the BTP regarding the importance of coordination between the Agreement States that regulate the processing/blending of radioactive waste and the Agreement States that host a disposal facility. Information contained in the interim guidance is an excellent starting point. HPS believes that such interactions between Agreement States are important to ensure that licensed activities conducted in one Agreement State do not adversely impact the ability to safely dispose of radioactive waste within the border of the Agreement State hosting a disposal facility. Otherwise, certain waste streams, such a blended waste, could be returned to the waste processor and become potentially stranded if a disposal outlet is not readily accessible.

GREATER-THAN-CLASS C LLRW AND 10 CFR 20 APPENDIX C

The Commissioners directed the NRC staff not to include waste at Greater- than- Class C (GTCC) concentrations in the scope of the 10 CFR Part 61 site-specific analysis rulemaking (i.e., blended waste should not include any GTCC component) because GTCC waste is only a Federal responsibility.

The NRC interim guidance directs Agreement States that review requests from licensees to blend waste to consider the Commissioners' position on GTCC. It furthers states that generators and processors can determine waste concentration (and the implied waste classification) using any one of the methods in the NRCs Waste Classification Technical Position, including 10 CFR 20, Subpart 0 and 10 CFR 61.55. The NRC has expressed the position during deliberations on waste blending (SECY-10-0043) regarding the interpretation of 10 CFR 20, Appendix G, that licensees are only required to classify waste at the time of its disposal and not at any intermediate steps in the waste management process.

HPS encourages the NRC to better clarify the timing on when GTCC LLRW should be classified (i.e., at the point of generation or the point of disposal) with the Agreement States that regulate the processors and those hosting a disposal facility. HPS believes that without this clarification, an Agreement State may not be provided with guidance that is needed should they decide to impose more stringent requirements than contained in 10 CFR 20, Subpart G, on when the waste should be classified to avoid a shift in the

responsibility for providing a waste disposition pathway for GTCC LLRW from the Federal government to the States.