



April 12, 2018

Ms. Annette Vietti-Cook
Secretary, U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTN: Rulemakings and Adjudication Staff

Subject: BWXT Comments on Greater than Class C and Transuranic Waste Disposal

Reference: Docket ID NRC-2017-0081 (83 FR 6475)

Dear Ms. Vietti-Cook:

BWXT Technologies Inc. (BWXT) respectfully submits its perspectives in response to the subject request for comments regarding disposal of greater-than-class C (GTCC) and transuranic wastes from the U.S. Nuclear Regulatory Commission (NRC).

Headquartered in Lynchburg, BWXT is a leading supplier of nuclear components and fuel to the U. S. government, provides technical and management services to support the U. S. government in the operation of complex facilities and environmental remediation activities, and supplies precision manufactured components, services and fuel for the commercial nuclear power industry. With approximately 6,100 employees, BWXT has nine major operating sites in the U.S. and Canada. In addition, BWXT joint ventures provide management and operations and other facility support services at more than a dozen U.S. Department of Energy (DOE) and National Aeronautics and Space Administration (NASA) locations.

Question 1. What are the important radionuclides that need to be considered for the disposal of the GTCC and transuranic waste?

Frame of reference influencing comments

The NRC established regulations governing the disposal of Class A, B, and C Low-Level Waste (LLW) in Title 10, Code of Federal Regulations (CFR), Part 61, *Licensing*

Requirements for Land Disposal of Radioactive Waste, which became effective in January 1982. Certain radioactive waste with concentrations exceeding the limits for Class C LLW, as specified in 10 CFR 61.55, were defined as greater-than-class C LLW (GTCC LLW) and considered as generally not suitable for disposal in the upper 30 meters of the earth's surface. Furthermore, concentration-based limits were established for certain short and long-lived radionuclides that would require protection of the general public, including from inadvertent intrusion into the waste after expiration of the 100-year institutional control period. Such limits were also established for waste containing transuranic radionuclides with half-lives greater than five years.

The concentration-based limits were generically established for Class A, B, and C LLW assuming the disposal of such waste in a humid environment and based on assumptions, practices, and radiation exposure scenarios that existed at the time the regulation was promulgated over 35 years ago.

The DOE published its Final Environmental Impact Statement (FEIS) on GTCC and GTCC-like LLW¹ in February 2016. The DOE analyzed the environmental impacts from distinct categories comprising GTCC and GTCC-like LLW including those with certain transuranic radionuclides exceeding 100 nanocuries per gram (100 nCi/g). Such categories included activated metals, sealed sources, and other waste. The DOE determined as its preferred alternatives that that such waste should be dispositioned at the Waste Isolation Pilot Plant (WIPP) or a commercial disposal facility licensed under 10 CFR 61.

BWXT Comments

BWXT believes that the current regulatory framework and list of short and long-lived radionuclides specified in 10 CFR 61.55 should be analyzed as part of any future rulemaking pertaining to GTCC and transuranic waste. However, BWXT encourages the NRC to consider current waste disposal practices and scientific advancements, such as the use of the updated internal dosimetry model published by the International Commission on Radiological Protection (ICRP). Additionally, the NRC should ensure that its evaluation of short and long-lived radionuclides focuses on the engineered designs, site characteristics, depth of disposal, use of enhanced waste packages, and other barriers to prevent human intrusion, at the commercial disposal facility that would be used by DOE to fulfill its obligations for dispositioning such waste pursuant to the Low-Level Radioactive Waste Policy Act of 1985 (LLWPAA).

¹ Defined at 10 CFR 61.55 as LLW owned or generated by the DOE with concentrations exceeding the limits for Class C LLW.

The DOE has established robust programs to manage the radioactive wastes that it owns or generates pursuant to Order 435.1, *Radioactive Waste Management*. Accordingly, DOE has garnered substantial experience in safely managing and dispositioning of the three categories of GTCC-like LLW identified in the FEIS, including such waste containing transuranic radionuclides. As such, the NRC should reach out for additional details regarding the best disposal practices that have previously been used to disposition the three categories of GTCC and GTCC-like waste discussed in the FEIS.

Question 2. How might GTCC and transuranic wastes affect the safety and security of a disposal facility during operations (i.e., pre-closure period)?

Frame of reference influencing comments

The NRC has established performance objectives to ensure, among other things, that radiation doses to workers and members of the public during the pre-closure period will not exceed the limits as specified in 10 CFR 61.43, *Protection of Individuals During Operations*. Over the past several decades, both the DOE and disposal facility operators in the commercial sector have garnered considerable experience in safely handling radioactive waste with waste characteristics and hazards similar to the three categories of GTCC and GTCC-like LLW identified in the FEIS. Such experience includes not only handling such waste during disposal operations, but also related to transport, receipt, storage and waste treatment.

Agreement States² have also promulgated compatible regulations required to implement the regulatory requirements governing the physical protection of certain sealed sources with high levels of radioactivity as specified in 10 CFR 37, *Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material*. Moreover, these regulatory requirements have been implemented at disposal facilities operated in the commercial sector to ensure the physical protection of high activity sealed sources and other types of GTCC and transuranic wastes in storage and during disposal operations. The experience acquired through implementation of this rulemaking and should ensure that adequate controls are in place to physically protect each of the three categories of GTCC and transuranic wastes.

At present, the physical security and nuclear criticality safety provisions specified in 10 CFR 73, *Physical Protection of Plants and Materials*, and 10 CFR 70, *Domestic Licensing of*

² Agreement State means any State with which the Commission or the Atomic Energy Commission has entered into an effective agreement under subsection 274b of the Act. (10 CFR 150.3)

Special Nuclear Material, respectively are, pursuant to 10 CFR 61.16, *Other Information*, only applicable prior to disposals of waste containing Special Nuclear Materials (SNM) in a disposal facility. Additionally, Agreement State licensees may only possess SNM (including special moderators) in quantities not sufficient to form a critical mass as specified 10 CFR 150.11, *Critical Mass*. Several Agreement State licensees have also requested and obtained an exemption from 10 CFR 70 by the NRC to establish concentration-based limits for SNM to ensure possession of such SNM will remain subcritical in an infinite array or infinite medium. A disposal facility operator licensed by an Agreement State licensee currently has authorization to possess more than a critical mass of SNM on a conveyance so long as it is transported and remains in compliance with the transportation requirements for SNM as specified in 49 CFR 173. These regulatory provisions ensure that SNM possessed at an Agreement State licensee disposal facility remains subcritical with a large margin of safety whether the waste is in storage or remains on a conveyance in compliance with regulations established by the U.S. Department of Transportation.

At present, the NRC has established regulatory programs to make determinations whether or not High Level Waste that has been processed to remove the high activity radionuclides to the maximum extent technically and economically practicable may be reclassified as Waste Incidental to Reprocessing (WIR) and dispositioned in a facility licensed under 10 CFR 61. In making such determinations, the NRC evaluates if the fissile materials present in the waste form requires a greater degree of isolation based on, among other things, the levels of attractiveness that are required to ensure adequate safeguards in place for its physical security. Moreover, similar evaluations are made by the NRC to determine whether such radioactive waste owned or generated by the DOE: (1) may be reclassified and dispositioned as LLW based on a Site-Specific Analysis in accordance with 10 CFR 61, or (2) require a greater degree of isolation and must be dispositioned in a geologic repository.

BWXT Comments

The NRC should reach out to Agreement States and disposal facility operators to assess the current practices and experiences acquired to safely handle high activity radionuclides such as are present in GTCC LLW and transuranic wastes in accordance with 10 CFR 61.43 and 10 CFR 37. Additionally, the NRC should assess whether or not waste disposal facility operators currently have the regulatory authority to possess GTCC LLW and transuranic wastes containing SNM with masses or concentrations expected to be transported for treatment, storage or disposal. Such an assessment may conclude that disposal facility operators licensed by an Agreement State already have

acquired sufficient radiological safety and physical security experience to safely handle GTCC and transuranic wastes during operations.

The NRC should also rely on the extensive experience it has already acquired to make determinations of whether or not radioactive waste owned or generated by the DOE is considered WIR and disposition as LLW in accordance with 10 CFR 61 or requires a greater degree of isolation as provided by a geologic repository. The NRC should determine if the regulatory process is appropriate for making such waste determination process to both protect public health and safety and to ensure adequate safeguards are in place for its physical security.

Question 3. How might GTCC and transuranic wastes affect disposal facility design for post-closure safety including protection of an inadvertent intruder?

Frame of reference influencing comments

The DOE has established programs and gained experience in safely disposing of certain types of radioactive waste that have the potential for producing significant thermal output and hydrogen gas generation through radiolysis. The experience acquired by DOE may provide useful insights regarding the types of waste forms and packages that should be considered for disposal criteria for GTCC and transuranic wastes.

With SECY-99-272, Agreement State Compatibility Requirements Applicable to Low-Level Radioactive Waste Disposal Facilities, the NRC previously provided regulatory guidance to Agreement States to assess the potential for a nuclear criticality incident involving disposal of SNM. Additionally, the NRC has approved requests for exemptions to the licensing requirements specified in 10 CFR 70, authoring disposal of SNM using concentration-based limits as opposed to the mass base limits specified in 10 CFR 150. Accordingly, disposal facility operators licensed by Agreement States may have acquired experience in safely handling fissile materials in quantities that remain subcritical.

Disposal facility operators licensed by Agreement States have acquired experience in receiving and storing transuranic wastes owned or generated by the DOE in transportation packages (TRUPACT-II or TRUPACT-III) approved by the NRC and the U.S. Department of Transportation. The concentration-based SNM limits that have been approved by the NRC for use by disposal facility operators, approximate the concentrations of fissile materials present in several of the inner containers, such as standard waste boxes (SWB), pipe overpacks, ten drum overpacks (DOP), and 55, 85, and 100 gallon drums. Such inner containers are removed from the TRUPACT-II or

TRUPACT-III packages and emplaced in panels for permanent disposal at the Waste Isolation Pilot Plant (WIPP). The safety basis supporting disposal of this waste at WIPP is supported, in part, by Nuclear Criticality Safety Evaluations that demonstrate emplacement of such transuranic waste with concentration similar to the SNM concentration-based limits that have already been approved by the NRC for use by commercial disposal facility operators remains subcritical in an infinite array. These important safety evaluations may be useful given that transuranic wastes have previously been transported in a TRUPACT-II or TRUPACT-III package to a disposal facility operator and may support a conclusion that disposal of such waste in a similar configuration in a facility licensed under 10 CFR 61 would also remain subcritical in an infinite array.

Over the past 10 years, the NRC has acquired considerable experience in establishing a regulatory framework that will govern the requirements for dispositioning other long-lived radionuclides, such as large quantities of Depleted Uranium (DU) as part of an extensive revisions to 10 CFR 61. Similar regulatory concepts may also be appropriate for consideration to protect the public health and safety, especially for ensuring adequate isolation/containment of actinides that may be present in the waste form.

BWXT Comments

The NRC should reach out to gather information regarding DOE' experience in safely handling and disposing of certain types of radioactive waste that could produce significant thermal output or generate hydrogen gas through radiolysis. This experience could provide useful insights to the NRC in determining disposal criteria for GTCC and transuranic wastes.

The NRC should also evaluate recent regulatory decisions related to nuclear criticality safety that would be applicable to disposal facility operations. Such evaluations should consider whether the concentration-based limits for SNM are sufficient for ensuring that the disposal of SNM remains subcritical. Important insights could also be obtained to further evaluate the nuclear criticality safety basis related to disposing of waste packages transported in a TRUPACT at the disposal facilities (the Preferred Alternatives in the FEIS).

Building from the extensive experience it has acquired by the ongoing rulemaking to revise Part 61, the NRC should also evaluate if GTCC and transuranic wastes may be safely disposed of. This should ensure that other long-lived radionuclides, such as large quantities of DU, can be adequately isolated from the biosphere based on a Site-Specific Analysis. The NRC should consider many of the same issues that were assessed in

support of this rulemaking such as depth of disposal, use of engineered barriers, defense-in-depth, and a period of performance that is suitable to protect the public health and safety, including for inadvertent human intrusion into the waste. The NRC should specially evaluate whether certain subsets of GTCC and/or transuranic waste may be disposed of in the near surface or would require disposal at depths greater than 30 meters below the earth's crust, such as provided in an Intermediate Depth Waste Disposal Facility.

Conclusions

BWXT believes that much experience has already been acquired that may provide considerable insights into establishing criteria governing the disposition of GTCC and transuranic wastes. The DOE has published its GTCC and GTCC-like FEIS and is awaiting further direction from the U.S Congress before finalizing its Record of Decision. The DOE has considerable experience and has established programs, policies, and procedures that, if reviewed by NRC, should be helpful as it proceeds down the path of promulgating regulations for disposal of GTCC and transuranic waste pursuant to the LLWPAA.

Over the past decade, the DOE has worked in consultation with the NRC to determine if HLW, that has been processed to remove high activity radionuclides to the maximum extent technically and economically practicable may be dispositioned as LLW in accordance with 10 CFR 61. The NRC should build upon these successes as it determines whether or not the inventory of GTCC and transuranic waste is suitable for disposal by means other than in a geologic repository. Such consideration should continue to ensure both the protection of the public health and safety and the safeguard controls needed for the physical security of the waste form.

The NRC and Agreement States have also promulgated regulations that establish requirements to ensure the physical protection of high activity disused sealed sources exceeding the thresholds specified in the IAEA Code of Conduct. These regulations ensure the adequacy of the physical security of both disused sealed sources with concentrations exceeding the limits for Class C LLW and certain waste with transuranic radionuclides with concentrations exceeding 100 nCi/g.

Over the past 10 years, the NRC has gained significant insights developed with substantial stakeholder involvement, regarding the disposal concepts needed to isolate long-lived radionuclides in the biosphere to protect public health and safety. Many of the same concepts, such as depth of disposal, use of intruder barriers and defense-in-

depth, should also be applied as the NRC establishes its requirements for dispositioning GTCC and transuranic waste.

BWXT greatly appreciates the opportunity to provide comments on this important initiative. We commend the DOE, NRC and the Agreement States for moving forward to develop a disposal path for waste streams consistent with the consideration specified in the FEIS. Please contact Robert Hogg, (434) 665-3453 and/or Scott Kirk (434) 221-6728 of my staff if you would like to discuss these comments in more detail.

Sincerely,

A handwritten signature in black ink, appearing to read "Ken Camplin".

Kenneth R. Camplin, President
BWXT, Nuclear Services Group

cc: Robert C. Hogg
J. Scott Kirk

From: Camplin, Ken R
To: [RulemakingComments Resource](#)
Cc: [Camplin, Ken R](#); [Hogg, Robert C](#); [Kirk, J. Scott](#)
Subject: [External_Sender] BWXT Comments on Greater than Class C and Transuranic Waste Disposal
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Dear Ms. Vietti-Cook, please see the attached BWXT Comments on Greater than Class C and Transuranic Waste Disposal in reference to Docket ID NRC-2017-0081 (83 FR 6475).

At your earliest convenience, please acknowledge receipt of this email and one attachment.

Kind regards,

Ken

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