



Department of Energy  
Washington, DC 20585

MAY 07 2019

The Honorable Bruce Hamilton  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW, Suite 700  
Washington, DC 20004

Dear Chairman Hamilton:

Thank you for your March 12, 2019, letter regarding safety implications of the April 2018 drum over-pressurization event at the Idaho Cleanup Project's Accelerated Retrieval Project (ARP) V facility. The Secretary has asked that I respond on his behalf.

The Department of Energy's (DOE) Office of Environmental Management (EM) is the DOE Program Secretarial Office responsible for overseeing the ARP V event. Enclosed are EM's responses to the Defense Nuclear Facilities Safety Board's (DNSFB) six questions raised in your letter. EM and the Idaho Cleanup Project appreciated the opportunity to brief the Board on April 17, 2019, on the responses and status of ARP V corrective actions.

We appreciate the Board's perspectives outlined in its Staff Report, *Idaho Waste Drums with Elevated Methane Concentrations*, dated December 10, 2018, and will consider these perspectives as EM proceeds with corrective actions, lessons-learned, and extent of condition reviews in response to the ARP V event. In conducting these activities, EM will coordinate with the National Nuclear Security Administration and other DOE Program Secretarial Offices, as appropriate.

During the past few years, DOE has strengthened its processes and controls for the certification and safe disposal of transuranic waste, such as requiring chemical compatibility evaluations (CCE) and basis of knowledge (BOK) reviews as part of the certification process. The 2018 ARP V event involved processing of legacy waste drums prior to the certification process. The Idaho Cleanup Project is completing corrective actions to ensure safe practices and controls are in place for stored and treated drums. Effective controls have been established to ensure adequate worker protection during waste drum handling and storage. These enhancements include routine waste drum storage area flammable gas monitoring, and segregated storage for waste drums with known headspace flammable gas concentrations at or near flammable concentrations.

EM will continue to keep the Board staff informed of the progress on this issue, including the ongoing and planned activities identified in our enclosed response.



If you have any questions, please contact me or Mr. Gregory Sosson, Associate Deputy Assistant Secretary for Field Operations Oversight/Chief of Nuclear Safety at (202) 586-4505.

Sincerely,

A handwritten signature in blue ink, appearing to read "J.C. Griffin", with a stylized flourish at the end.

Jeff C. Griffin, Ph.D.  
Associate Principal Deputy Assistant  
Secretary for Field Operations

Enclosure

**Department of Energy Responses to  
Defense Nuclear Facilities Safety Board Questions on  
April 2018 Idaho Cleanup Project Over-Pressurization Event**

1. Does the Department plan to use its Corporate Operating Experience Program to alert other sites to this issue, to gauge the potential for occurrence of this type of event, and to take steps to prevent such an occurrence?

Response: The Department of Energy (DOE) is preparing a Safety Alert on the Accelerated Retrieval Project (ARP) V over-pressurization event and plans to issue it to DOE Office of Environmental Management (EM) sites in the near future. The Safety Alert will heighten complex-wide awareness of the event, provide recommendations for additional action, and request DOE EM Field Offices and operating contractors to report specific data back to DOE EM Headquarters which include questions that address the Board's March 12, 2019 letter. DOE will provide the Board staff with a copy of the Safety Alert when issued. The DOE is also considering issuing an Operating Experience Report more broadly than EM sites. The Board staff will be kept apprised of the status.

Additionally, all DOE sites were initially notified of the event through the Department's Occurrence Reporting and Processing System in April of 2018. The National TRU Corporate Board continues to be engaged on this issue.

2. Has the Department conducted an assessment to determine if INL and other defense nuclear facilities have product drums that have not had their flammable gas concentrations measured?

Response: The Idaho Cleanup Project has approximately 10,884 contact handled transuranic (CH-TRU) drums (the exact number is fluid and is dependent on waste drum processing) awaiting flammable gas measurement. They consist of the following drum types and generation locations:

- Accelerated Retrieval Project (ARP): 5,314-55gal. drums
- Sludge Repackage Project (SRP): 226-55 gal. drums
- Product Drums: 5,231-100 gal. drums
- Legacy Waste Drums: 113-55 gal. drums

For waste drums at other defense nuclear facilities, EM Headquarters will direct EM generator sites to complete an extent of condition review in fiscal year (FY) 2019 to determine the population of product drums at those facilities that have not had their flammable gas concentrations measured. This review will also identify facility practices and procedures for testing product drums (e.g., when and how often measurements are taken). This extent of condition review will include product drums in storage at generator sites (including drums that may have originated from other sites) that have not been certified for

shipment. We are exploring the possibility of gathering similar data from defense nuclear facilities within other DOE program secretarial offices through the Operating Experience reporting process and will keep the Board staff apprised of results.

The National TRU Program (NTP) certified programs conduct flammable gas sampling for shipments of TRU waste generated by atomic energy defense activities to the Waste Isolation Pilot Plant (WIPP) and for safe waste management at WIPP. The NTP-certified program that conducts the sampling activity maintains procedures specifying that when flammable gas is detected in a container above WIPP acceptance limits, a non-conformance report is issued for the container and the host site is notified. NTP and its associated certified programs share information with the host sites based on sampling, but do not perform additional flammable gas analysis or other characterization or monitoring of waste—beyond that needed for WIPP shipping and for safe waste management at WIPP.

3. What is the Department's schedule for measuring the flammable gas concentrations in untested product drums at INL, and what is the safety strategy for such drums that are found to be flammable or near-flammable?

Response: The schedule and strategy are as follows:

#### Idaho Cleanup Project Schedule for Sampling

- Untested waste drums will be sampled prior to shipment to WIPP.
- Waste drums that previously exceeded WIPP acceptance limits for headspace flammable gas concentrations are segregated from certified waste containers and will be sampled to ensure flammable gas concentrations are acceptable prior to shipment to WIPP.
- The Idaho Cleanup Project is researching the feasibility of conducting waste drum headspace flammable gas sampling on newly packaged drums, and will keep the Board staff apprised of actions in this area.

#### Idaho Cleanup Project Safety Strategy

The Idaho Cleanup Project safety strategy for waste drums found to have a headspace flammable gas concentration greater than or equal to 25 percent the lower flammability limit (LFL) will have a suite of controls applied (these are interim controls, contingent on completion of a formal fire protection evaluation, which is in progress, and will be provided to the DNFSB staff once issued):

- Segregation from certified drum rows.
- Drum handling and storage in accordance with approved methods, permits, and safety standards.
- Daily storage area flammable gas monitoring
  - If area monitoring results are greater than or equal to ten (10) percent of the lower flammability limit, additional controls will be implemented, consistent with fire protection program requirements

4. Has the Department identified any vented drums, beyond those listed in this report, at defense nuclear facilities that were sampled and found to have flammable or near-flammable conditions?

Response: There are currently 33 containers within the Idaho Cleanup Project facilities (all located at the Radioactive Waste Management Complex—RWMC) which have measurable flammable gas concentrations that exceeded the lower flammability limit when sampled (list already provided to DNFSB staff separately). These waste drums are located in segregated, limited access storage.

The extent of condition review to be directed by DOE EM Headquarters at EM defense nuclear waste sites in FY 2019 will further identify whether any stored waste drums have been sampled and found to contain flammable or near-flammable conditions and, if so, to identify what facility controls are in place to mitigate potential deflagration hazards. This information will be provided to the Board staff separately, once collated. The DOE is also considering issuing an Operating Experience Report more broadly than EM sites. The Board staff will be kept apprised of the status.

5. Has the Department identified other defense nuclear facilities that have, or could have, solid wastes that include metal carbides?

Response: At the Idaho Cleanup Project, in addition to beryllium carbide, there are a number of metal carbides that have been identified as potentially present in Idaho Cleanup Project waste (Table 1). This information has been excerpted from RPT-TRUW-96 Rev. 1, “Acceptable Knowledge Document For Waste Retrieved From Designated Areas Within The Subsurface Disposal Area At The Idaho National Laboratory,” and RPT-1644 “Chemical Compatibility Evaluation for Supercompacted Debris Waste Streams BN510, BN510.1, BN510.2, BN510.3, and BN510.4,” Revision 0 (these documents to be provided separately to DNFSB staff).

The extent of condition review to be directed by DOE EM Headquarters at EM defense nuclear waste sites in FY 2019 will further identify whether any stored waste may contain metal carbides. This information will be provided to the Board staff separately, once collated. The DOE is also considering issuing an Operating Experience Report more broadly than EM sites. The Board staff will be kept apprised of the status.

Table 1. Metal Carbides potentially present in Idaho Cleanup Project waste.

Chemical/Material	Notes
Aluminum nitride-silicon carbide	
Beryllium carbide	
Boron carbide	
Boron carbide granules	a
Boron carbide-impregnated aluminum foil	
Calcium carbide	c
Hafnium carbide	c
Molybdenum carbide	
Molybdenum carbide-cobalt	
Niobium carbide	d
Plutonium carbide	
Silicon carbide	d
Tantalum carbide	c
Tantalum carbide-niobium carbide-titanium carbide- cobalt	
Tantalum carbide-niobium carbide-titanium carbide- nickel	
Thorium carbide	
Titanium carbide	a
Titanium carbide- molybdenum carbide	
Titanium carbide- molybdenum-cobalt	
Titanium carbide-aluminum oxide-cobalt	
Titanium carbide-boron carbide-cobalt	
Titanium carbide-cobalt	
Titanium carbide-tantalum carbide-cobalt	
Titanium carbide-tantalum carbide-niobium carbide- cobalt	
Titanium carbide-tungsten carbide	
Titanium carbide-tungsten carbide-niobium carbide- cobalt	
Titanium carbide-tungsten- cobalt	
Titanium carbide-tungsten carbide-molybdenum carbide-aluminum oxide- cobalt	
Titanium carbide-tungsten carbide-molybdenum carbide-aluminum oxide- cobalt	
Tungsten carbide	a
Uranium carbide	a
Vanadium carbide	
Zirconium carbide	d
Notes (excerpted from RPT-1644):	
a. Incidentally added to the input Item Description Code (IDC), very small quantities may be present in the waste on rags or other debris.	
c. Only used in laboratory operations in small quantities – not expected to be in the waste streams in significant quantities.	
d. Used in laboratory operations or in very small quantities in production – not expected to be in the waste streams in significant quantities.	

6. While the Department is revising DOE Standard 5506, how does it plan to address the deficiencies in that standard in the short-term?

Response: When new significant information is obtained and verified that affects the guidance that is presented in DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*, impacted Field Offices have been, and will continue to be, directly notified when individual circumstances are identified, limited, and timely notification essential. When broader notification is justified beyond the distribution of Lesson's Learned, the Department's Operational Experience system has been used and will continue to be used.

DOE-STD-5506 identifies three types of events that are potentially related to elevated flammable gas concentrations in TRU Waste Drums. These events are: (1) Event 6, Waste Container Deflagration; (2) Event 7, Multiple Waste Container Deflagration; and (3) Event 12, Waste Container Over-Pressurization. These events should be evaluated and incorporated, as applicable, within any TRU waste generator facility's Safety Basis. To support those facility analyses, DOE-STD-5506, in addition, contains appendices with available information and test data to support facility assumptions and calculations.