Office of Environment, Health, Safety and Security
Operating Experience Level 2

OE-2: 2015-1 June 2015

Evaluation of Nitrate-Bearing Transuranic Waste Streams

PURPOSE

This Operating Experience Level 2 (OE-2) document provides actions to perform an evaluation of nitrate-bearing transuranic (TRU) waste streams at Department of Energy (DOE) nuclear facilities.

The purpose of the evaluation is to perform a records and/or process review to identify and take actions to address any nitrate-bearing transuranic TRU waste streams that may have used organic neutralizers (e.g. organic amines) and/or absorbers (e.g. cellulose, corncobs or other plant based sorbents, as well as organic polymers such as polyacrlyates or polyacrylamide or co-polymers of polyacrylates and acrylamides).

BACKGROUND

On February 14, 2014, an airborne radiological release occurred at DOE's Waste Isolation Pilot Plant (WIPP) near Carlsbad, NM. On March 4, 2014, an Accident Investigation Board (AIB) was appointed to determine the cause of the release. The results of the Phase 2 investigation were issued on April 16, 2015[1].

The AIB determined that the release was a result of an exothermic reaction involving the mixture of the organic materials (Swheat Scoop® absorbent and/or neutralizer) and nitrate salts present inside a TRU drum. The drum had been remediated and certified to meet the WIPP Waste Acceptance Criteria (WAC) at the Los Alamos National Laboratory (LANL) and subsequently shipped to WIPP for permanent disposal. Chemical reactions resulted in heating inside the drum that led to internal pressure buildup of combustible gases which exceeded the drum's venting capacity resulting in drum failure and a rapid release of material. The AIB also determined that other drums had been remediated with organic materials making them potentially susceptible to an exothermic reaction.

REASON FOR CONCERN

There are two concerns associated with this event that lead to issuing this OE-2. First, the control, i.e., remediation and certification to meet the WIPP WAC, relied on to prevent an accident of this type was not adequately implemented. Second, data evaluated and modelled to date shows that the exothermic reaction in the drum was more energetic than accidents previously considered in DOE Standard 5506, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities,* and DOE Handbook 3010, *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*. If a similar accident were to occur in a surface facility or during onsite transit outside a Nuclear Regulatory Commission certified Type B container, consequences could exceed accidents previously analyzed.

ACTIONS

For all nitrate-bearing TRU waste streams that used neutralizers and/or absorbents for mitigation in accordance with generator site permits and the WIPP WAC[2] that have yet to be shipped to WIPP:

(1) Review records to evaluate all additions to nitrate-bearing TRU waste containers for solidification, neutralization or sorption of liquid by using manufacturer information/material safety data sheet of added material to determine whether any additions were organic.

(2) Review records to evaluate nitrate-bearing TRU waste streams to ensure the ignitability characteristic of the remaining nitrate waste was mitigated (i.e., waste no longer has the D001 ignitability characteristic identified in 40 CFR Part 261.21). It is important to ensure that the evaluation is for all the ignitability properties of the waste, including the

[1] The report can be found on the Office of Environmental Management's web site at http://energy.gov/em/downloads/radiological-release-accident-investigation-report-phase-ii-report

[2] This excludes the waste streams from the hazardous waste definitions in 40 Code of Federal Regulations (CFR) Part 261 Subpart C, *Characteristics of Hazardous Waste*, for ignitability

oxidizer property. (Solely establishing that a flammable solid is not present does not ensure the absence of an oxidizer.)

(3) If the records review determined that organic material has or may have been added:

(a) Determine the location of the waste containers;

(b) Evaluate the situation and determine the need for immediate safety measures and enter the Potential Inadequacy of the Safety Analysis process, as appropriate;

(4) Document and notify the Office of Nuclear Safety (AU-30), within the Office of Environment, Health, Safety and Security (AU), and Office of Environmental Management (EM-40) contacts below on the results of the review, including any waste containers where organic material may have been added.

SCHEDULE

The actions should be completed in accordance with Program Secretarial Officer (PSO) direction and schedule; however, because of the potential significance of this issue, prompt attention to this matter is warranted and AU recommends all these actions be completed within 90 days of issuance of this OE-2.

FOLLOW-UP ACTIONS

The Office of Environmental Management is working with AU on additional actions to take to improve the reliability of the WAC to ensure that an exothermic event is not possible (including appropriate classification of critical WAC related controls).

The Office of Environmental Management is also working with AU-30 regarding update of Standard 5506 and DOE Handbook 3010 to reflect appropriate analysis of potential exothermic reactions such as the one that occurred at WIPP.

INFORMATION CONTACTS

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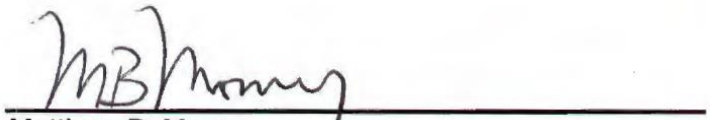

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