



**Allen, Pam, NMENV**

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**From:** Maestas, Ricardo, NMENV  
**Sent:** Monday, June 15, 2015 2:29 PM  
**To:** Allen, Pam, NMENV  
**Subject:** FW: Testing for Ignitability Characteristic  
**Attachments:** Testing for Ignitability Characteristic 10\_1\_14.docx

Email and attachment for file.

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**From:** Chavez, Rick - RES [<mailto:Rick.Chavez@wipp.ws>]  
**Sent:** Wednesday, October 01, 2014 5:22 PM  
**To:** Kliphuis, Trais, NMENV; Maestas, Ricardo, NMENV  
**Cc:** Basabilvazo, George - DOE; Day, Karen - RES; [rkehrman@plateautel.net](mailto:rkehrman@plateautel.net)  
**Subject:** Testing for Ignitability Characteristic

Attached is the requested document.

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## Determination of Ignitability Characteristic for Transuranic Mixed Waste Destined for Disposal at the Waste Isolation Pilot Plant Facility

After the February 14, 2014, radiological release, re-entries into Panel 7, Room 7, of the Waste Isolation Pilot Plant (WIPP) repository indicated that the release most-likely originated from at least one waste container from the Los Alamos National Laboratory waste stream LA-MIN02-V.001. The formal description of this waste stream is as follows:

*Waste stream LA-MIN02-V.001 consists primarily of inorganic particulate waste generated in TA-55. The waste is largely comprised of Transuranic (TRU) waste such as liquids and solids absorbed or mixed with absorbent (e.g., Ascarite, diatomaceous earth, kitty litter, vermiculite, Waste Lock 770, and/or zeolite)...Solids mixed with absorbents are typically evaporator salts (i.e., nitrate salts).*

It is suspected that the presence of acidic nitrate salts mixed with an organic wheat-based absorbent (in lieu of an inorganic absorbent as described in the Acceptable Knowledge (AK)) was the cause of a heat event during which the container was breached. The LA-MIN02-V.001 waste stream was approved on August 13, 2013, subsequent to recent changes to the Waste Analysis Plan (WAP), Attachment C of the Hazardous Waste Facility Permit (Permit), which removed requirements for generator/storage sites to routinely characterize their wastes using chemical sampling/analysis. Recently, a question has been raised as to whether retention of the chemical sampling/analysis requirements in the Permit would have precluded the acceptability of the waste stream and, therefore, the heat event which resulted in a radiological release. This paper serves to address this question.

In March 2013, the New Mexico Environment Department (NMED) approved a Class 2 Permit Modification Request (PMR) to revise the waste characterization methods so that waste characterization is accomplished using only AK, radiography, and visual examination. Chemical sampling/analysis is no longer required by the Permit, with the exception of the condition in the Permit, Part 2, Section 2.3.1.3., which requires chemical sampling/analysis of waste under certain circumstances as determined by the Permittees or as directed by the Secretary. Prior to these recent changes to the WAP, either headspace-gas sampling/analysis of debris waste or solidified-waste sampling/analysis of homogenous waste was required on a statistically-based population of each waste stream. The Permit required comparison of the data obtained by chemical sampling/analysis to AK information. The purpose of this comparison was to resolve the assignment of Environmental Protection Agency (EPA) hazardous waste numbers (HWNs) determined through the use of AK. Specifically, chemical sampling/analysis was used to:

- Identify the presence of volatile organic compounds (VOCs) in the headspace of debris waste containers in order to resolve the assignment of EPA F-listed (i.e., specifically listed in 40 CFR 261.31) HWNs; and

- Compare the concentrations in a homogenous waste stream with specific toxicity-characteristic (i.e., D004-D043 per 40 CFR 261.24) levels in 40 CFR Part 261 to resolve the assignment of EPA toxicity-characteristic HWNs.

Prior to the March 2013 modification, the Permit required that a specific list of target analytes be examined and that a specific list of approved methods for chemical sampling/analysis be used by the generator/storage sites to characterize TRU mixed waste. These requirements did not include determining or resolving the application of the D001 HWN for the characteristic of ignitability (40 CFR 261.26). The only methods required by the Permit for ensuring that waste is not ignitable are AK, radiography, and visual examination (Permit Attachment C, Sections C-3a and C-3b).

The premise of the Class 2 PMR that led to the March 2013 Permit modification was that the general waste analysis standards of 40 CFR 264.13, applicable to TRU mixed waste destined for disposal at the WIPP facility, could be met using AK, radiography, and visual examination. This was proposed because chemical sampling/analysis results had not been shown to significantly alter the initial HWN assignments made through AK (Appendix D of the Class 2 PMR). As part of the justification for the reduction in testing requirements, the Permittees demonstrated that the information that had been gained from chemical sampling/analysis had not been used to make decisions regarding the storage and disposal of TRU mixed waste at the WIPP facility and was not required to meet the Resource Conservation and Recovery Act (RCRA) regulations. In other words, the management methods and processes for TRU mixed waste are the same regardless of the hazardous waste determination.

Liquid wastes are not allowed, and have never been allowed, to be disposed at the WIPP facility. This prohibition is stated as a condition of the Permit. According to the Permit, Attachment C, Section C-3b, the characterization requirements to inspect waste containers using radiography and/or visual examination for liquids, in addition to other prohibited items such as compressed gases, assures that D001 ignitable waste is not shipped to the WIPP facility. Approved EPA methods for the determination of ignitability are available; however, all but one method pertain to the testing of liquid waste. EPA Method 1030, "Ignitability of Solids," is suitable for the determination of the ignitability of solidified waste. The method itself states that although it may be used with respect to the characteristic of ignitability, it is not required because it may be impractical to perform the test because of the physical form of the sample. In these cases, the method recommends that the waste generator use knowledge of the waste to determine the ignitability hazard posed by the material.

EPA Method 1040 "Test Method for Oxidizing Solids," is not required by the RCRA regulations to determine if a waste exhibits the characteristic of ignitability, and the test results of this method cannot be used to directly assign the D001 HWN to a waste. Only a waste meeting the regulatory definition in 40 CFR 261.21(a)(4) is an ignitable hazardous waste due to its oxidizing properties. This method was developed to evaluate the oxidizing hazard of solid substances, the results of which could provide relevant information that may be applied to the knowledge of a waste in making a hazardous waste determination.

TRU mixed waste streams are not amenable to these sampling/analysis methods due to the radioactive nature of the waste. Furthermore, neither of these test methods has ever been part of the Permit. The Permit has always stated that ignitable wastes are not acceptable for disposal at the WIPP facility and that the final verification of waste compatibility will be performed using Appendix C1 of the WIPP RCRA Part B Permit Application, the compatibility study. The compatibility study, which was updated in 2012 to support the Class 2 PMR submittal, states that any potential incompatibility that could render a waste ignitable will be prevented because the waste will be remediated via generator/storage site packaging procedures to remove the incompatibility prior to being shipped to the WIPP facility for disposal.

A secondary question has recently been raised as to whether generator/storage sites have conducted ignitability testing on waste streams containing nitrate salts. In 2010, testing was conducted by New Mexico Institute of Mining and Technology, Energetic Materials Research and Testing Center (EMRTC)<sup>1</sup> at the request of Idaho National Laboratory, on surrogate waste to determine the minimum amount of inert material (e.g., zeolite clay) that must be mixed into the most reactive ratio of sodium nitrate and potassium nitrate in order to classify the mixture as a non-oxidizer. Testing results indicated that waste treated with inert inorganic sorbent must have inorganic sorbent equal to or exceeding 18 weight percent of the composite weight including waste, nitrate, and inorganic sorbent. The EMRTC testing was conducted in the presence of cellulose, a fuel source; therefore, the presence of organic sorbents, which would also act as fuels in these waste streams, has been shown by testing to pass the oxidizer test, as long as the oxidizer has been mitigated by the minimum ratios established in the study. These testing results are referenced in the Acceptable Knowledge (AK) summary report for LA-MIN02-V.001<sup>2</sup> as a source document and are, therefore, part of the AK record for LA-MIN02-V.001. The AK summary report states that LANL has determined that nitrate salts present in the LA-MIN02-V.001 waste stream do not meet the definition of a DOT oxidizer and that the mixing of the nitrate salts with an inert absorbent material, the minimum ratio of which is 1.5 to 1, further supports the managing of the waste as non-ignitable.

In summary, the most important distinction to be made between the methods described above and those historically described in the Permit is that prior to the Permit revision in 2013, headspace gas and solidified-waste sampling/analysis methods were required for the purposes of resolving the application of EPA HWNs associated with toxicity characteristic constituents (as opposed to ignitability characteristic) and serving as an indicator of the presence of listed HWNs associated with spent solvents (e.g., F001). The methods listed in the WAP (Compendium Method TO 14A and 15 and SW-846) were to be used for quantifying the concentrations of VOCs in the headspace of debris waste containers and the total concentrations of VOCs, semi-VOC, and metals in homogenous waste matrices. Chemical sampling/analysis was not specified for the following: the presence of oxidizers (i.e., nitrate salts), the presence of organic/inorganic waste matrices, or the characteristic of ignitability. Furthermore, the

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<sup>1</sup> "Results of Oxidizing Solids Testing," Report FR 10-13, April 12, 2010, Energetic Materials Research and Testing Center, New Mexico Institute of Mining and Technology, Socorro, NM 87801

<sup>2</sup> "Central Characterization Program Acceptable Knowledge Summary Report for Los Alamos National Laboratory TA-55 Mixed Transuranic Waste, Waste Streams: LA-MHD01.001, LA-CIN01.001, LA-MIN02-V.001, LA-MIN04-S.001," CCP-AK-LANL-006, Revision 13, February 10, 2014

chemicals involved in the postulated chemical reaction that led to the drum breach are not chemicals of interest to the Permit (i.e., are not on the chemical lists previously specified for testing prior to the March 2013 Permit modification) and are not hazardous wastes unless presented by the generator/storage site in an incompatible final form.

The assignment of the D001 HWN to the LA-MIN02-V.001 waste stream resulted from the identification of an undocumented process change from an inorganic absorbent to an organic absorbent. It is incumbent on the generator/storage site to accurately record relevant information regarding waste stream treatment in the AK record. Had this occurred, those containers in the waste stream that were improperly treated would have been identified and excluded from shipment to the WIPP facility for disposal. No amount of RCRA-based sampling/analysis, as required by the WIPP Permit, either before the March 2013 revision or after, would have discovered these conditions and precluded the February 14, 2014, radiological release.