

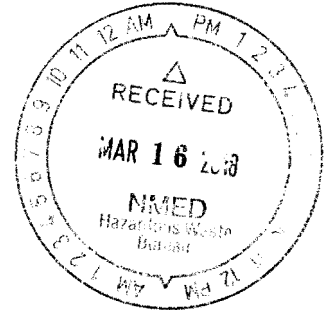


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Department of Energy
National Nuclear Security Administration
Sandia Field Office
P.O. Box 5400
Albuquerque, NM 87185



MAR 14 2018



Mr. John E. Kieling
Compliance and Technical Assistance Program
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Bldg. 1
Santa Fe, New Mexico 87505

Subject: 2017-2018 Report of Hazardous Waste Treatability Studies at Sandia National Laboratories/New Mexico (SNL/NM), EPA ID NM5890110518

Dear Mr. Kieling:

The Department of Energy/National Nuclear Security Administration (DOE/NNSA) is providing information regarding hazardous waste treatability studies conducted during 2017 and planned during 2018 at SNL/NM. According to Title 20, Chapter 4, Part 1 of the New Mexico Administrative Code (20.4.1.200 NMAC), incorporating Title 40 of the Code of Federal Regulations, Part 261 (40 CFR 261.4[f]), each facility performing hazardous waste treatability studies is required to submit a report to the authorized regulatory agency (by March 15th of each year) with the following information:

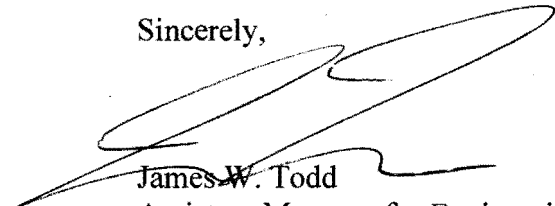
- Information on treatability studies performed during the previous calendar year; and,
- An estimate of the number of treatability studies and the amount of waste expected to be used in treatability studies during the current calendar year.

On May 30, 2017, DOE/NNSA and National Technology and Engineering Solutions of Sandia, LLC (NTESS) completed one study that was initiated in 2015. Information regarding the waste and study is summarized in the Enclosure. No other hazardous waste treatability studies were performed during the 2017 calendar year.

No hazardous waste treatability studies are anticipated at SNL/NM during calendar year 2018. In accordance with 40 CFR 261.4(f)(1), the DOE/NNSA and NTESS will notify the New Mexico Environment Department at least 45 days prior to the initiation of any hazardous waste treatability study at SNL/NM.

If you have questions please contact David Rast of our staff at (505) 845-5349.

Sincerely,



James W. Todd
Assistant Manager for Engineering

Enclosure:
Hazardous Waste Treatability Study Final Report

cc: w/enclosure
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782052

HAZARDOUS WASTE TREATABILITY STUDY FINAL REPORT

Location of Study (40 CFR 261.4(f)(9)(i))

Sandia National Laboratories/New Mexico (SNL/NM)

EPA ID NM5890110518

Study Type (40 CFR 261.4(f)(9)(ii))

The study evaluated the feasibility of chemical deactivation of three classes of reactive wastes using strong basic compounds. The three classes of reactive compounds (explosives) in the wastes are:

- Nitroamines (including hexanitrohexaazaisowurtzitane (CL-20), Research Development Explosive cyclotrimethylenetrinitramine (RDX), and cyclotetramethylene-tetranitramine (HMX));
- Nitroaromatic compounds (including hexanitrostibene (HNS)); and,
- Nitrate esters (including pentaerythritol tetranitrate (PETN)).

Name/Address of Persons for Whom Study was Conducted (40 CFR 261.4(f)(9)(iii))

SNL/NM

PO Box 5800

Albuquerque, New Mexico 87185

Total Quantity of Waste in Storage Each Day (40 CFR 261.4(f)(9)(iv))

Prior to the treatability study, simulated waste mixtures containing CL-20 were successfully treated with sodium hydroxide (NaOH). NaOH was less successful in treating simulated waste mixtures containing HMX and PETN.

Samples of wastes containing explosives in solvents were introduced into the study following treatment of the simulated mixtures. Waste samples were introduced into the study between June 1 and December 28, 2015. No samples were introduced after December 28, 2015.

Acceptance dates	Waste description	Sample volume	Cumulative quantity of waste in study
6/1/15	CL-20 and HMX in isopropyl alcohol and water	0.2 L	0.2 L
6/1/15	CL-20 in GPC eluent containing tetrahydrofuran (THF)	0.1 L	0.3 L
7/9/15	CL-20 in solvent mixture including THF and ammonium compounds	0.1 L	0.3 L
7/9/15	CL-20 in isopropyl alcohol and water	1.0 L	1.3 L
7/27/15	CL-20 in solvent mixture including hexanes, ethyl acetate, and acetone	0.1 L	1.3 L
12/28/15	CL-20 in isopropyl alcohol and water	1.0 L	2.3 L
12/28/15	CL-20 in isopropyl alcohol, water, and acetone	18.93 L	21.23 L
Total quantity in storage as part of study		-	21.23 L

Quantity/Types of Waste Treated in the Study (40 CFR 261.4(f)(9)(v))

All samples introduced in June and July 2015 were treated with NaOH. Treatment of the waste samples was not as successful as treatment of the simulated waste mixtures prior to the study. The success of the treatment in the study was strongly affected by the concentration of explosives and the presence of various solvents in the waste samples.

The low concentrations of CL-20 in the waste samples reduced the rate of deactivation such that a large quantity of NaOH and/or an extended time was required for successful treatment. In some cases, the treatment was not completely successful (even after an extended time) due to the presence of various solvents in the samples.

Additional samples were introduced to the study in December 2015 to further investigate the effects of CL-20 concentration and additional solvents on deactivation. The study was subsequently suspended (before treatment of the additional samples) pending the results of tests to establish the requirements for transporting the reactive wastes to a permitted off-site hazardous waste facility.

The treatment results for each sample are summarized in the following table.

Acceptance dates	Waste description	Treatment and Status
6/1/15	CL-20 and HMX in isopropyl alcohol and water	Treated with NaOH, large quantity required to deactivate CL-20 and most of HMX
6/1/15	CL-20 in GPC eluent containing tetrahydrofuran (THF)	Treated with NaOH, deactivated CL-20 after two weeks
7/9/15	CL-20 in solvent mixture including THF and ammonium compounds	Treated with NaOH, deactivated CL-20 after two weeks
7/9/15	CL-20 in isopropyl alcohol and water	Treated with NaOH, large quantity required to deactivate CL-20
7/27/15	CL-20 in solvent mixture including hexanes, ethyl acetate, and acetone	Treated with NaOH, did not completely deactivate CL-20
12/28/15	CL-20 in isopropyl alcohol and water	Not treated
12/28/15	CL-20 in isopropyl alcohol, water, and acetone	Not treated

Dates of Study (40 CFR 261.4(f)(9)(vi))

The study began on June 1, 2015 and was expected to last approximately 18 months. Hazardous waste samples were introduced into the study through December 2015 as shown in Table 1. The study was suspended in March 2016 pending an investigation into the feasibility of transporting the hazardous waste to a permitted off-site Treatment, Storage, and Disposal Facility (TSDF). The investigation (discussed in the summary at the end of this report) indicated that transportation to a permitted off-site TSDF is feasible. Therefore, the treatability study was terminated on May 30, 2017. The study lasted approximately 6 months longer than the 18 months specified in the initial notification; the additional time was due to the separate investigation.

Disposition of Residues and Unused Samples (40 CFR 261.4(f)(9)(vii))

All untreated samples, treated samples, and residues from this study were managed as hazardous waste and were transported to a permitted off-site TSDF for treatment after transportation was determined to be feasible.

Summary of Treatability Study

Department of Energy/National Nuclear Security Administration (DOE/NNSA) and SNL personnel evaluated the feasibility and effectiveness of using strong basic compounds to chemically deactivate reactive wastes. The objective was to develop one or more methods that would consistently and effectively deactivate the wastes. The study samples contained explosive compounds in various solvents and thus exhibited the hazardous waste characteristic of reactivity prior to treatment. Some of the samples also exhibited the hazardous waste characteristic of ignitability.

The study was designed for evaluation of three classes of reactive wastes: nitroamines, nitroaromatic compounds, and nitrate esters. Nitroamines were tested in the study.

Preliminary results indicated NaOH was successful in chemically deactivating CL-20 in samples of simulated waste. NaOH was less successful in chemically deactivating HMX and PETN in simulated waste.

Treatment of waste samples during the treatability study was not as successful as treatment of the simulated mixtures prior to the study. Treatment success for waste samples was strongly affected by the concentration of explosives and the presence of various solvents. The low concentrations of CL-20 and HMX in the waste samples reduced the rate of deactivation such that a large quantity of NaOH and/or an extended time was required for treatment. In some cases, the treatment was not completely successful (even after an extended time) due to the presence of various solvents in the samples. The study demonstrated that use of strong basic compounds for deactivating reactive wastes containing CL-20 at SNL/NM would not be feasible.

DOE/NNSA and SNL personnel suspended the treatability study in March 2016 and investigated whether shipment to a permitted off-site TSDF would be appropriate for management of the hazardous wastes. In August 2016, Explosive Examiners, LLC conducted explosives classification tests on a mixture of CL-20 in acetone to examine its properties and recommend appropriate packaging, hazard classification, and shipping name for transportation. The mixture of CL-20 and acetone was chosen for the tests because it represented the most hazardous properties of the wastes that would be transported. DOE/NNSA evaluated the results, determined that transportation is feasible, and issued an interim hazard classification for use in transporting the wastes. DOE/NNSA and SNL personnel requested U.S. Department of Transportation approval of the classification recommendations.

The treated and untreated samples from the treatability study were managed as hazardous waste at SNL/NM and were transported to a permitted off-site TSDF for treatment.