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Environmental Stewardship Division
Solid Waste Regulatory Compliance
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Date: January 11, 2006
Refer To: ENV-SWRC: 06-003

Mr. John E. Kieling
Manager, Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

JAN 2006

Dear Mr. Kieling:

SUBJECT: TREATABILITY STUDY NOTIFICATION

The purpose of this letter is to provide notification of intent to conduct one mixed waste treatability study at Los Alamos National Laboratory (LANL) (EPA ID # NM0890010515), pursuant to Title 20 of the New Mexico Administrative Code, Chapter 4, Part 1 (20.4.1 NMAC), which incorporated 40 CFR 261.4(f)(1). The study is to be conducted by the Tritium Science and Engineering Group (ESA-TSE) of the Engineering Sciences and Applications Division (ESA).

The waste sample to be studied will be lithium powder with approximately 1500 curies of tritium bound in the material as a hydride. This waste is a waste management challenge because there are few disposal options for the reactive tritiated lithium. ESA-TSE is currently looking into new experiments with tritiated lithium, therefore; this project is necessary to determine a practical method for future economical treatment and disposal. This project, described in detail in the enclosure, will evaluate at least one method of removing the bulk of the tritium from the lithium and converting the lithium to a non-reactive low level tritiated waste. The anticipated start date for this study is March 6, 2006.

If you have any questions, please contact me at (505) 667-0666 or Luciana Vigil-Holterman of my staff at (505) 665-3435.

Sincerely,

Tony Grieggs

Tony Grieggs
Group Leader
Solid Waste Regulatory Compliance

Enclosure: Treatability Study Process Description, Reacting Lithium Hydride to Recover the Tritium and Convert the Lithium to a Nonreactive Low Level Radiological Material

Cc with enclosure:

G. Turner, DOE-NNSA LASO, MS A316
C. Tesch, ESA-TSE, MS C348
J. Wermer, ESA-TSE, MS C348

10886

N. Hotz, ESA-TSE, MS C348

cc without enclosure:

James P. Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

ENCLOSURE

TREATABILITY STUDY PROCESS DESCRIPTION

REACTING LITHIUM HYDRIDE TO RECOVER THE TRITIUM AND CONVERT THE LITHIUM TO A NONREACTIVE LOW LEVEL RADIOLOGICAL MATERIAL

Los Alamos
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Facility Name:	**Los Alamos National Laboratory (LANL)** **Engineering Sciences and Applications Division** **Tritium Science and Engineering Group (ESA-TSE)**
Facility EPA ID Number:	**NM0890010515** **Project Title: Reacting Lithium Hydride to Recover the Tritium and Convert the Lithium to a Nonreactive Low Level Radiological Material**
Location of Project:	**TA-21, Building 209**
Project Contact:	**Chuck Tesch** **ESA-TSE, Mail Stop C348** **(505) 665-5602**
Other Contacts:	**Joe Wermer** **ESA-TSE, Mail Stop C348** **(505) 665-1346** **Norm Hotz** **ESA-TSE, Mail Stop C348** **(505) 667-7019**

Project Description:

The Tritium Science and Fabrication Facility (TSFF) has less than 1 kilogram (kg) of lithium powder with approximately 1500 curies of tritium bound in the material as a hydride. There are few disposal paths for the reactive tritiated lithium. Since the Tritium Science and Engineering Group (ESA-TSE) is looking into new experiments with tritiated lithium, a practical method for future economical treatment and disposal is necessary.

Project Goals and Objectives:

The primary objective of this project is to evaluate at least one method of removing the bulk of the tritium from the lithium and converting the lithium into a nonreactive low level tritiated waste.

Projected Tasks:

Use one or two test methods to make lithium hydride non reactive and collect the tritium on a substance such as molecular sieve or a metal getter.

Determine the efficiency of the method(s) used by performing calorimetry on the tritium held up in the tritium absorption media.

Project Discussion Treatability Study:

Description of Waste to Be Treated: Less than 1 kg of lithium hydride with approximately 1500 curies of tritium as the main hydrogen isotope.

Sample Waste Amounts to be Treated: Approximately 1 kg

RCRA Waste Code(s): Reactive, D003 or H_2 gas are formed. The HT0 will be collected on a sieve and the gas on a getter for recovery or disposal as a non-reactive radioactive solid. Water will be added in sufficient quantity to ensure full reaction of the lithium. The excess water will then be recovered leaving a solid lithium hydroxide.

Site Treatment Plan Information: The waste samples to be evaluated have not been included in the Compliance Plan Volume of LANL's Federal Facility Compliance Order Site Treatment Plan. The material to be treated had/has the potential to be used for the current lithium hydride studies but has a greater value for future studies on disposal methods.

Description of The Waste Treatment Technology:

Method 1- When lithium hydride is mixed with tin and heat is added (to approximately 250 °C), the tin is melted and the exothermic chemical reaction between the tin and lithium liberates any hydrogen isotopes (DT). As a gas, the DT can be collected and recovered or disposed of as a non-reactive radioactive solid.

Method 2- When water is added to lithium hydride, the chemical reaction leaves lithium hydroxide and liberates any hydrogen isotopes as water and gas (as H_20, DT0, HT0). Water vapor and HT, DT or H_2 gas are formed. The HT0 will be collected on a sieve and the gas on a getter for recovery or disposal as a non-reactive radioactive solid. Water will be added in sufficient quantity to ensure full reaction of the lithium. The excess water will then be and then recovered leaving a solid lithium hydroxide.

Method 1 has only been tested on a milligram quantity of non-tritiated surrogate compounds. It has not been tested on tritiated quantities as suggested in this study. The drawback of Method 1 is the exothermic reaction that is created while the samples are already at elevated temperatures. Method 2 is the easiest method for reacting lithium hydride, however, the method generates tritiated water and gaseous tritium from the reaction. The testing will be performed in order of complexity and the simplest method will be evaluated first.

Surrogate Waste Treatment Results: The milligram quantity tests done with lithium hydride and tin produced promising results.

Waste Management: All wastes generated from the tests will be treated as low level waste and disposed of in an appropriate manner once the material is verified to be non-reactive.

Project Milestones:

1.	Begin testing	45 Days after notification
2.	Determine the effectiveness of method(s)	120 days after notification
3.	Complete data evaluation	180 days after notification

Qualifications:

Experience: Chuck Tesch, BS Mechanical Engineer, Qualified waste handler.
Joe Wermer, Chemical PHD
Norm Hotz, Chemical Engineer, Qualified waste handler

Equipment and Facilities:

This project will be conducted within LANL's radiological controlled Tritium Science and Fabrication Facility. Work to be performed inside a glovebox when possible.