



Department of Energy

Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

SEP - 3 1999



Red LANK FFCO/99

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. John Tymkowych
FFCO Project Manager
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2044 Galisteo St., Building A
P. O. Box 26110
Santa Fe, NM 87505

Dear Mr. Tymkowych:

Subject: Notice of Completion of On-Site Waste Shipment for Treatability Study,
Federal Facility Compliance Order (FFCO), Site Treatment Plan (STP),
Los Alamos National Laboratory (LANL)

The purpose of this letter is to notify the New Mexico Environment Department (NMED) of the completion of two on-site shipments of STP covered waste for treatability studies. The LANL treatability studies are being developed to remove elemental and ionic forms of mercury from solid debris.

Two on-site shipments that included STP covered waste listed in Section 3.2 of the Compliance Plan Volume (CPV) were made. One shipment was made on July 16, 1999 and another on July 26, 1999. The total volume of STP waste shipped to Technical Area (TA) 46 Building 24 was 0.237 cubic meters. The STP waste shipped on-site is described in the following table.

| Date Shipped | STP Section | MWIR Waste ID | Treatability Group | Volume Shipped (m ³) |
|--------------|-------------|---------------|----------------------|----------------------------------|
| 7/16/99 | 3.2 | LA-W925 | Mercury Wastes - TBD | 0.007 |
| 7/26/99 | 3.2 | LA-W925 | Mercury Wastes - TBD | 0.23 |
| | | | TOTAL | 0.237 |

Included as Enclosure A is a Certification Statement. Also included is a copy of the November 12, 1998 letter to Benito Garcia submitting the treatability study reporting document. These documents were prepared in accordance with the requirements of Section XX, "Documents, Information, and Reporting Requirements," of the FFCO.



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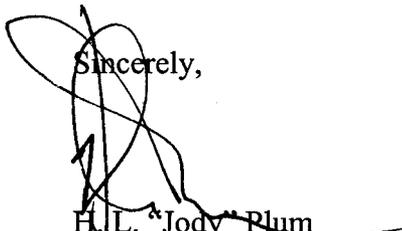
Mr. John Tymkowych

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SEP - 3 1999

Please contact me at (505) 665-5042, or Beverly Martin at (505) 665-0714, if you have any questions.

Sincerely,



H.L. Jody Plum
Office of Environment

LAAME:6JP-154

Enclosure

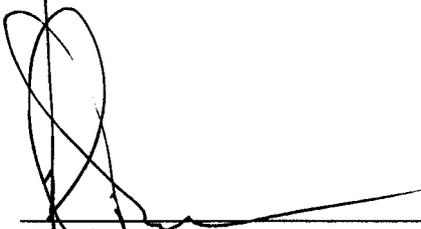
**ENCLOSURE A
CERTIFICATION**

**NOTICE OF COMPLETION OF ON-SITE WASTE SHIPMENTS,
FEDERAL FACILITY COMPLIANCE ORDER (FFCO)
SITE TREATMENT PLAN (STP),
LOS ALAMOS NATIONAL LABORATORY (LANL)**

I certify that I am the project manager responsible for overseeing the implementation of the Site Treatment Plan for the Los Alamos National Laboratory. To the best of my knowledge and belief, the information in this document is true, accurate, and complete.

Beverly Martin
Beverly Martin
STP Project Manager
Waste Management Program
Environmental Science and Waste Technology
Los Alamos National Laboratory
Operator

Sept 1, 1999
Date Signed



H.L. Plum
Regulatory Permitting and Compliance Manager
Los Alamos Area Office
U.S. Department of Energy
Albuquerque Operations
Owner/Operator

9/2/99
Date Signed

Memo for Record: 5400.1.2.3.6



Department of Energy
Albuquerque Operations Office
Los Alamos Area Office
Los Alamos, New Mexico 87544

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NOV 12 1998

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Benito J. Garcia, Bureau Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2044 Galisteo St., Building A
P. O. Box 26110
Santa Fe, NM 87505

Dear Mr. Garcia:

Subject: Hazardous Waste Treatability Study

The purpose of this letter is to submit a treatability study reporting document as required by Title 20 of the New Mexico Administrative Code, Chapter 4, Part 1 (20 NMAC 4.1), which incorporates Title 40 of the Code of Federal Regulations, Part 261.4(f)(1). Los Alamos National Laboratory anticipates beginning this study in January 1999. The enclosed document contains specific information regarding the study, including a description of the project and where it will be conducted.

If you have any questions regarding the treatability study reporting document, please contact me at (505) 665-5042.

Sincerely,

H. L. "Jody" Plum
Office of Environment

LAAME:6JP-109

Enclosure

bcc w/enclosure:
B. Smith, CST-12, LANL, MS-J964
A. Barr, ESH-19, LANL, MS-K498
ESH-19 (980238.AB), LANL, MS-K490

CONCURRENCES
RAG SYMBOL
NAME
DATE

LAAME:sc

JPlum

11/09/98

LC

HHaynes

11/ /98

LAAME

JPlum

11/10 /98

NOTICE OF INTENT TO CONDUCT A TREATABILITY STUDY

LANL proposes to conduct a pilot project to demonstrate the removal of mercury (Hg) from mixed waste. The resulting data may be used to treat waste streams that were generated at LANL and will be reported to the Department of Energy for use in cleanup of mercury contaminated facilities. The proposed leaching process uses water-soluble chelating polymers that have been designed for metal-ion selectivity. When these polymers are used to leach solid debris, the resulting aqueous phase can be treated with ultrafiltration to concentrate the polymer/metal ion complex. Metal ions are released from the polymer, and the polymer is recycled in the system. The resulting aqueous solution of metal ions can then be stabilized as the sulfide in its final waste form. Wash waters will be recycled through the process.

Waste to be evaluated during the treatability study consists of low-level mixed waste obtained from TA-54. The drums contains items such as packages of mercury-contaminated clothing, glass, paper wipes and containers as well as mercury from switches, fluorescent lamps and laboratory equipment. The debris is suspect radioactively contaminated, with < 2.0 nCi/g per drum. According to the Rad-NESHAP study, the project will not require EPA pre-approval or emissions monitoring.

We are seeking to conduct the experiments in accordance with Title 20 of the New Mexico Administrative Code (20 NMAC) Chapter 4, Part 1(40 CFR261.4 (e)-(f)). The experiments are necessary to test prototype equipment for mixed waste treatment. To comply with the treatability exemption rule, we will conduct the experiments within the range of quantity limits for shipment, treatment and storage.

The limitations specified under the existing treatability studies exemption rule are as follows:

Shipment: The mass of each sample shipment may not exceed 1000 kg of "as received" waste [40 CFR 261.4(e)(2)(ii)].

Storage: The Laboratory may store up to 1000 kg of non-acute hazardous waste [40 CFR 261.4(f)(4)]. This quantity limitation does not include treatability study residues and treatment materials added to "as received" hazardous waste. Any untreated sample and any mixed waste residue generated during the treatability study will be returned to the LANL Mixed Waste Storage and Disposal Facility within 90 days of study completion or within one year from the date of shipment from TA-54 to the processing facility at TA-46, whichever is earlier. Specific site information is provided later in this document.

Treatment: The laboratory or testing facility, on a per waste stream per treatment process basis, may conduct treatability tests on up to 1000 kg of non-acute hazardous process waste [40 CFR 261.4(e)(2)(i)]. The rule imposes a treatment initiation rate limit of 250 kg per day of "as received" waste for the entire Laboratory [40 CFR 261.4(f)(3)]. "As received" waste refers to the waste shipped by TA-54 to TA 46, building 24. Actual

processing of waste for this study following segregation is anticipated to be approximately 25 kg per day.

Reporting and Record keeping Requirements: The EPA has stipulated specific reporting and record keeping requirements to document compliance within the quantity and time limitations set forth in the Rule.

1) TA-54 must maintain records indicating the following:

- a) The amount of waste shipped under the exemption.
- b) The name and address of the Laboratory or testing facility (CST-12) conducting the study.
- c) The date shipment was made.
- d) Whether or not any unused sample or any residue generated from the study was returned.

2) CST-12 must accomplish the following:

- a) CST-12 must maintain appropriate records and documentation for a period of three years following completion of the treatability study to show compliance with the appropriate quantity and time limitations. The records must indicate that CST-12 is meeting the requirements for shipment limits, treatment rate limits, and storage rate limits. Specific minimum information that must be maintained includes the following:
 - i) The name, address and EPA ID of the supplier (TA-54) of the waste samples.
 - ii) The quantity of waste accepted.
 - iii) The date CST-12 received shipment.
 - iv) The quantity of "as received" waste introduced to treatment each day.
 - v) The date the treatability study was initiated. Treatment begins with segregation of materials from drums into several waste categories which may not be treated simultaneously.
 - vi) The date the treatability study was concluded.
 - vii) The date any unused sample and residue were returned to TA-54, including EPA ID number and name of generator. CST-12 must keep copies of shipping documents associated with transport of waste to and from the facility.
- b) Provide information as requested by ESH-19, by March 15 of each year, so they can submit a report to the State of New Mexico that includes an estimate of the number of studies and the amount of waste expected to be used in treatability studies during the current year. Also, provide the following information to ESH-19 for the previous calendar year, as this information is also submitted to

the State of New Mexico by March 15 of each year.

- i) The name, address and EPA ID number of the shipper (TA-54) of the waste samples.
 - ii) The quantity of waste accepted.
 - iii) The date CST-12 received the shipment.
 - iv) The quantity of "as received" waste introduced to treatment each day.
 - v) The date the treatment study was initiated.
 - vi) The date the treatability study was concluded.
 - vii) The date the unused sample and residue were returned to TA-54 including their EPA ID number.
- c) Notify ESH-19 in writing when CST-12 is planning to discontinue this treatability study.

Facility Name: Los Alamos National Laboratory (LANL)
Chemical Science and Technology Division
Physical Organic Chemistry Group (CST-12)

EPA ID Number: 98-0114

DOE ID Number: LAN-98-105

Project Title: Performing Debris Leaching Studies

Project Contact: Barbara F. Smith, LANL; CST-12
MS J964
(505) 667-2391
FAX (505) 665-2342

Other Contacts: Yvonne Rogers, LANL; CST-12
MS J964
(505) 665-3410
FAX (505) 665-4364

Project Description:

This project will consist of one (1) treatability study involving mixed waste (low-level radionuclide waste contaminated with mercury). This project intends to demonstrate the dissolution of elemental and ionic mercury and its subsequent removal from solid debris which is currently stored in drums at TA-54.

Treatability Study Objectives:

Objectives for this treatability study are as follows:

- 1.) Demonstrate the feasibility and advantage of polymer filtration technology as a safe, effective method for decontamination of solid debris.
- 2.) Obtain experimental data to troubleshoot our process and to optimize operating conditions.
- 3.) Prepare a final report with cost comparison to other commercially available technologies.
- 4.) Transfer the technology to our industrial partner for further development and deployment.

Project Tasks:

- 1.) Design and build a prototype unit which will allow for a prewash of shredded debris prior to exposing the debris to a chelating polymer solution. The system will include tanks for prewash and dissolution procedures, sonication plates for the mixing and solids separation component, ultrafiltration cartridges, recycling lines for polymer and water, and a precipitation tank.
- 2.) Obtain and transport mixed waste from TA-54 according to RCRA, DOT and DOE standards.
- 3.) Analytically verify mercury content of debris prior to treatment.
- 4.) Sort and shred the debris based on makeup.
- 5.) Clean the mixed waste using the polymer filtration technology described above.
- 6.) Analytically verify removal of mercury from the waste.
- 7.) Analytically characterize for underlying inorganic hazardous constituents (UHC) and Toxic Characteristic Leaching Procedure (TCLP) metals and repackage the treated waste for transport back to TA-54 as low level radioactive waste.
- 8.) Analytically characterize for underlying inorganic hazardous constituents and TCLP metals, stabilize the ionic mercury recovered from the cleaning process and package for transport to TA-54.
- 9.) Analytically characterize and dispose of all secondary waste generated by the process as appropriate, including radioactive contaminated wastewater which will go to TA-50. Analysis will determine any underlying inorganic hazardous constituents and TCLP metals concentrations.

Project Milestones:

The start date will be a minimum of 45 days after the submittal of the treatability study notification to NMED.

Qualifications:

Our team has many years of experience with designing, synthesizing and testing of water soluble polymers for use in many applications. Recently we received an R&D award for our patented Polymer Filtration Technology. Our industrial partner has successfully built and sold our units for removal of metal contaminants from electroplating bath rinse water.

Key Staff: Dr. Barbara F. Smith

Education: Ph.D. Chemistry, University of California 1973.

Experience: Over 20 years of experience in developing separations materials and technology. Has worked at LANL for 15 years as a Team Leader of a Metal Separations team.

Equipment and Facilities:

The treatability study will be performed in a radiologically controlled laboratory equipped with a walk-in hood. Treatment will be performed at TA 46, building 24, room B30. Drums from TA-54 containing mixed waste to be treated will be stored in a covered receiving area on the east side of TA 46, building 24. A Radiological Control Technician will be consulted prior to start-up to assist in writing an appropriate Radiation Work Permit. Protective clothing and monitoring instrumentation will be used according to the recommendations of our Industrial Hygienist and ESH-1. The polymer filtration system will be operated in the walk-in hood to protect personnel and contain contamination. The debris will also be segregated and shredded in the walk-in hood. Auxiliary equipment will include pumps, pH meters and a shredder.

Project Discussion:

Description of Waste to be Treated: Mixed waste is defined as waste containing both hazardous waste and a radioactive component. The waste to be treated in this study consists of material such as clothing, paper wipes, glass, metal and fluorescent lamps contaminated with mercury. The waste is legacy waste generated at various sites around LANL. The waste is suspect radioactive, containing < 2.0 nCi/g radioactivity. The radioactive contamination, if present, could come from Pu 239, U 238, Cs 137 and mixed fission products.

Quantity of Sample Waste to be stored: No more than 250 kg /day will be stored in drums in the receiving area or in room B30.

Quantity of Sample Waste to be Treated: Not in excess of 1000 kg.

RCRA Waste Code: D009 (mercury)

Description of the Waste Treatment Technology: The proposed leaching process uses a water-soluble chelating polymer that has been designed for metal-ion selectivity. The waste is first segregated and, if appropriate, shredded, then pre-washed, mixed with polymer, filtered, and finally stabilized. The following describes these activities in more detail:

Segregation:

Prior to shredding, waste from drums will be manually segregated according to physical properties such as density and ability to be shredded. Glass and metal will be separated from paper and textile products. Those materials that cannot be shredded will be analyzed for mercury levels and placed into the process without further sizing.

Shredding:

Light debris, containing fabric, gloves and paper will be cryo-shredded to achieve sample homogeneity and increase surface area for contact with the chelating polymer. After shredding, the concentration of mercury present will be determined by total digestion of representative samples taken in triplicate and analyzed by cold vapor atomic emission spectroscopy.

Pre-Wash:

Debris will be placed in a basket and put through a pre-wash step to wet the debris and allow heavy particles to fall to the bottom of the tank where they will be trapped. The pre-wash liquid will then be analyzed for metal content. The trapped material will be entered into the polymer filtration process but will not come in contact with previously treated debris.

Polymer Filtration:

The debris will then be moved to a tank equipped with ultrasonic plates for mixing as it is contacted with polymer solution at a fixed pH. The water-soluble polymer is then concentrated to remove water by cycling it through ultrafiltration cartridges with a high molecular weight cut-off. After concentrating to the desired volume, the pH is lowered and bound mercury is released from polymer. During the next step, diafiltration, polymer is retained by the ultrafiltration membranes while small molecules, including ionic mercury and water, pass through and are collected as permeate. Mercury-free polymer is recycled for treating the next batch of debris.

Stabilization:

The aqueous permeate will be analyzed for UHCs prior to precipitation of ionic mercury with sulfide. Mass balance to establish complete removal of mercury will be determined by gravimetric analysis of the sulfide precipitate. TCLP metals analysis will also be performed to ensure that the material is not hazardous waste.

Filter Cake:

The washed, shredded debris is removed, rinsed, and caked in a filter press. This filter cake will later be analyzed for UHCs and TCLP metals. It is anticipated that the cake will not contain hazardous waste or UHCs above the Universal Treatment Standards, but if it does, it will be placed back into the process under modified conditions to ensure adequate removal.

A variance from the treatment standard of amalgamation for radioactive elemental mercury may be applied for because:

- 1) The properties of the waste differ significantly from wastes analyzed in developing the treatment standard,
- 2) Elemental mercury will be absent from waste, and
- 3) The concentration of mercury will be extremely low or below detection limits.

Wastewater:

Resultant wastewater from the process (including stabilization) will be analyzed for UHCs and TCLP metals prior to discharge into the Industrial Wastewater Treatment Plant at TA-50.

Waste Management: Packing materials used in drums, such as vermiculite and secondary containment (plastic bags, metal cans), personal protective equipment, and other material which have not come into contact with waste can be classified as non-RCRA waste. If the materials are swiped and found to be non-radioactive, they can go to the TA-54, Area G landfill. The Radiological Work Permit should state that "knowledge of process" was used to characterize waste.

Four waste streams will be generated by the polymer filtration process. It is anticipated that none of these waste streams will be hazardous. They are as follows:

1.) The filter cake resulting from the washed debris will be tested by TCLP for metals. While the Waste Profile Forms (WPF) do not indicate the presence of constituents other than mercury in the initial waste, the possibility exists for some metals to be extracted from items such as bolts, etc., by the process. To ensure that any potential UHCs have been addressed, analysis will include cadmium, chromium, lead, nickel, and silver. All other UHCs, including cyanides, are not expected to be present in the debris received from TA-54.

2. Treated debris that was not shredded will be repackaged in new containers and WPFs prepared prior to transfer to TA-54 for disposal.

3.) Mercury removed from the waste will be analyzed for the UHCs listed above and then precipitated as mercuric sulfide. The mercuric sulfide precipitate will be analyzed for TCLP metals prior to shipment to TA 54 as a new waste form.

4.) As previously mentioned, resultant wastewater from the process (including stabilization) will be analyzed for UHCs and TCLP metals prior to discharge into the Industrial Wastewater Treatment Plant at TA-50.

WPFs will be submitted with all newly generated waste resulting from the treatment process in accordance with LANL and DOE requirements.

If any waste constituents meet or exceed the Universal Treatment Standard (UTS), this waste will be processed to meet the UTS standards prior to disposal. Waste returned to TA 54 after removal of mercury will be fully characterized for these constituents.

After completion of the treatability study, the equipment utilized will be decontaminated or disposed of appropriately.