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

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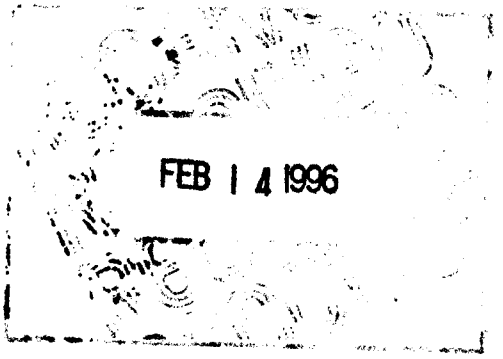

Mr. Benito Garcia, Bureau Chief
Hazardous and Radioactive Materials
Bureau
New Mexico Environment Department
2044 Galisteo Street, Building A
P. O. Box 26110
Santa Fe, New Mexico 87505

Dear Mr. Garcia:

Subject: Treatability Study Notification

The purpose of this letter is to provide notification of intent to conduct two hazardous/mixed waste treatability studies at the Los Alamos National Laboratory (LANL). The studies will be conducted by the Waste Treatment and Minimization Science and Technology Group.

The first study involves the treatment of solvent based paint stripping waste samples containing hazardous toxic metals and Plutonium, generated by LANL. This waste stream is listed in LANL's Site Treatment Plan, Compliance Plan Volume. In the Plan, this waste is addressed in *Section 3.1.4.*, under the Treatability Group *Organic Contaminated Combustible Solids,* with a Mixed Waste Inventory Report Identification Number of *LA-W911.*

The second treatability study will be conducted on waste samples generated by Boeing Aerospace. This waste is a wheat starch based paint stripping waste, which is hazardous because of the presence of toxic metals. This waste stream is not radioactive.

The studies will evaluate the effectiveness of Heterogeneous Waste Processing (HWP), which is an integrated biological/chemical treatment train. The HWP train is a novel way of destroying Resource Conservation and Recovery Act regulated organics using bacteria in a bioreactor, the liquification of bulk components (paint chips) and the mobilization of toxic metals in the paint chips in a digestion chamber using fungal enzymes, and the coupling of water soluble metals by polymer chelators. The HWP is intended to reduce the volume of the waste by 80 percent, consume all the waste's volatile organic compounds, and concentrate the waste's toxic metals.

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After the treatability studies are completed, any untreated LANL generated waste samples and all waste residues will be managed as a mixed waste and stored on-site in an interim status mixed waste storage unit. Any untreated waste originating with Boeing will be returned to Boeing. Treated waste residues from the digestion chamber and the concentrated metal solution will be analyzed to determine Toxicity Characteristic (TC) contaminants using the Toxicity Characteristic Leaching Procedure. All waste residues will be sent back to Boeing or managed by LANL as hazardous waste depending on TC contaminant concentrations.

A total of 10 kilograms of waste samples will be treated in each study. If you have any questions, please contact me at (505) 665-5042.

Sincerely,

H. L. "Jody" Plum
Office of Environment
and Projects

LAAMEP:2JP-027

Enclosures:
1. Process Description, Heterogeneous Waste Processing on LANL Waste Samples
2. Process Description, Heterogeneous Waste Processing on Boeing Waste Samples

cc w/enclosures:
B. Hoditschek, Program Manager
RCRA Permitting Program
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2044 Galisteo Street, Building A
P. O. Box 26110
Santa Fe, New Mexico 87505

ENCLOSURE ONE

PROCESS DESCRIPTION, HETEROGENEOUS WASTE PROCESSING ON LANL WASTE SAMPLES

Los Alamos
NATIONAL LABORATORY

Hazardous & Solid Waste Group
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Facility Name:	**Los Alamos National Laboratory Chemical Science & Technology Division, Waste Treatment and Minimization Science & Technology Group (CST-18)**
Facility EPA ID Number:	**NM0890010515**
Project Title:	**Heterogeneous Waste Processing of LANL Waste Samples**
Location of Project:	**TA-48, Building RC-1 Room 423**
Project Contact:	**Laura Vanderberg-Twary, Ph.D. CST-18, Mail Stop C346 (505) 665 - 6493 FAX (505) 665 - 3166**
Other Contacts:	**Nan Sauer, Ph.D. CST-18, Mail Stop J519 (505) 665 - 3759 Jim Brainard, Ph.D. CST-18, Mail Stop J519 (505) 667 - 0150**

Project Descriptions:

This project is intended to determine the effectiveness of an integrated biological/chemical treatment train known as Heterogeneous Waste Processing (HWP) on solvent based paint stripping waste samples generated at Los Alamos National Laboratory (LANL).

Project Goals and Objectives:

Evaluate HWP on solvent based paint stripping waste generated at LANL. Conduct a bench scale study of HWP to demonstrate the feasibility of safe, economical, and effective treatment of mixed waste, and obtain waste treatability data for prototype design evaluations and patent application.

Project Tasks:

1. Obtain characterized sample from TA-54
2. Conduct study with waste sample
3. Analyze results
4. Return unused material and all treated waste residues to LANL's mixed waste storage

Project Discussion:

Description of Waste to Be Treated: This is a mixed waste that was generated by LANL's decontamination and decommissioning activities from actinide processing facilities. A methylene chloride paint stripper containing methanol, xylene, methyl ethyl ketone, methyl isobutyl ketone, and isopropanol was used to remove Pu surface contamination from building and equipment surfaces. The paint stripper was also used to remove paint high in chromium and possibly lead. The waste to be treated in HWP are paint stripper residues (hazardous waste regulated organics), chromium and cellulose-based paint with possible presence of lead in the paint pigments, suspect Pu, cheesecloth rags, cardboard, and cotton lab coats.

Waste Amounts to be Treated: Mixed Paint Stripper Waste - 10 Kg

RCRA Waste Code(s): D007, F002, F003, F005,

Site Treatment Plan Information:

Waste Stream Name - Paint Stripping Waste

Section 3.1.4

Treatability Group Organic Contaminated Combustible Solids

Mixed Waste Inventory Report Identification Number
is LA-W911

Description of The Waste Treatment Technology: HWP is an environmentally benign, modular treatment train for the destruction of hazardous and mixed heterogeneous wastes. Heterogeneous wastes contains bulk components, often cheesecloth rags, cotton materials, cardboard etc. The presence of the bulk components renders the waste difficult to treat by a single treatment method. The HWP train is a novel way of destroying Resource Conservation and Recovery Act (RCRA) regulated organics by bacteria in an bioreactor, the liquification of bulk components and the mobilization of toxic metals in a digestion chamber by using fungal enzymes, and the coupling of metals with water soluble polymer chelators. The HWP is intended to reduce the volume of the waste by 80%, consume all the waste's volatile organic compounds (VOC's), and concentrate the waste's toxic metals.

The VOC's in the waste are first extracted by flowing air through a waste holding chamber. The air then travels to a bioreactor where bacteria assimilate and degrade the organics into water, carbon dioxide, and biomass. After the air extraction of the VOC's, the bulk components in the waste holding chamber are ball-milled. The bulk components are then placed into a digestion chamber were fungal enzymes digest the bulk components. Any VOC's produced in the digestion process are carried by air to the bioreactor for assimilation. At no time do the microbes in the bioreactor come in contact with the contents in the digestion chamber.

The bulk components in the digestion chamber are eventually reduced by the fungal enzymes into a liquefied media containing sludge, plastics, toxic metals, and Pu if present. The toxic metals are solubilized into the fluids in the digestion chamber. Low levels of toxic metals remain in the sludge. The toxic metals in the fluid are then separated in the digestion chamber with water soluble polymer chelators that have been developed at LANL. The toxic metals become fixed to the polymer chelators. The polymer chelators are then regenerated for reuse leaving all the toxic metals in a concentrated solution. The remaining sludge and plastics will pass the Toxicity Leaching Characteristic Procedure (TCLP).

Surrogate Waste Treatment Results: CST-18 has run numerous studies with surrogate wastes both as single step processes (e.g.,. bioreactor alone, bulk components liquification alone) and as a unified process. In all cases, the hazardous organic components were degraded by the bacteria to below our detection limits (< 80 ppb) and the bulk components were reduced to 20% of its original volume. Metals were removed so that the final sludge passed the Toxicity Leaching Characteristic Procedure (TCLP).

Waste Management: Any untreated sample waste will be returned to TA-54's mixed waste interim status storage unit. All waste residues, regardless if any VOC's are detected, will be managed as a mixed waste and shipped to TA-54 for storage.

Project Milestones:

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

Qualifications:

Experience: Our team has been working to develop and test Heterogeneous Waste Processing for 2 years. Each team member has a different background with many years of experience in his/her relevant field of research. We have experience in environmental microbiology, biochemistry, inorganic chemistry and environmental engineering. This process was developed by integration of successful individual treatment methods for more simplified waste streams and we have performed extensive studies on surrogate wastes employing this methodology.

Key Staff: Laura Vanderberg-Twary: Ph.D. in Microbiology, North Carolina State University, 1993. Experience: 2 years postdoctoral (at LANL in CST-18) research and development of Heterogeneous Waste Processing, extensive background in analytical methodologies, biodegradation of halogenated and nonhalogenated RCRA organics, fermentations etc.

Nan Sauer: Ph.D. in Inorganic Chemistry, Iowa State University, 1986. Current position LANL technical staff member in CST-18. 8 years experience in technology development for treatment of radioactive and mixed wastes.

Jim Brainard: Ph.D. in Chemistry, Indiana University, 1979. Current position LANL technical staff member in CST-18. 6 years experience in research and development of technologies for treatment wastes and contaminants.

Equipment and Facilities:

The treatability study will be conducted in a radiologically controlled laboratory with appropriate ventilation and monitoring systems. The Radioactivity Control Technician will be available on call as required by laboratory regulations. Laboratory equipment includes a 1 liter glass bioreactor that is supplied air by a sealed air pump with a flow rate of 5 scfh and a sealed stainless steel dressing jar (enzyme digestion chamber). The laboratory will also contain analytical equipment includes gas chromatograph-mass spectrometer, inductively coupled plasma, spectrophotometer, and high performance liquid chromatography.

ENCLOSURE TWO

PROCESS DESCRIPTION, HETEROGENEOUS WASTE PROCESSING ON BOEING WASTE SAMPLES

Los Alamos
NATIONAL LABORATORY

Hazardous & Solid Waste Group
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Facility Name:	**Los Alamos National Laboratory Chemical Science & Technology Division, Waste Treatment and Minimization Science & Technology Group (CST-18)**
Facility EPA ID Number:	**NM0890010515**
Project Title:	**Heterogeneous Waste Processing of Boeing Aerospace Waste Samples**
Location of Project:	**TA-21, Building 2N Room 201**
Project Contact:	**Laura Vanderberg-Twary, Ph.D. CST-18, Mail Stop C346 (505) 665 - 6493 FAX (505) 665 - 3166**
Other Contacts:	**Nan Sauer, Ph.D. CST-18, Mail Stop J519 (505) 665 - 3759 Jim Brainard, Ph.D. CST-18, Mail Stop J519 (505) 667 - 0150**

Project Descriptions:

This project is intended to determine the effectiveness of an integrated biological/chemical treatment train known as Heterogeneous Waste Processing (HWP) on wheat starch based paint stripping waste samples generated by Boeing Aerospace.

Project Goals and Objectives For Project:

Evaluate HWP on wheat starch based paint stripping waste. Conduct a bench scale study of HWP to demonstrate the feasibility of safe, economical, and effective treatment of hazardous waste, and obtain waste treatability data for prototype design evaluations and patent application.

Project Tasks:

1. Obtain sample from Boeing
2. Characterize sample for contents
3. Conduct study with waste sample
4. Analyze results
5. Return unused material and treated waste residues to Boeing

Project Discussion:

Description of Waste to Be Treated: This waste is generated by Boeing Aerospace located in Wichita, Kansas. Boeing is researching a novel type of paint stripper (wheat starch) as the blasting media to remove aircraft paint. The waste to be treated in HWP are powered wheat starch and stripped aircraft paint chips. The aircraft paint contains two hazardous toxic metals, lead and sometimes chromium. No radioactivity is associated with this waste.

Description of The Waste Treatment Technology: HWP is an environmentally benign, modular treatment train for the destruction of hazardous heterogeneous wastes. In the case of the Boeing waste, the HWP is intended to remove the waste's toxic metals below toxic characteristic (TC) levels rendering the waste residues (sludge) non-hazardous. No Resource Conservation and Recovery Act regulated organics are associated with this waste.

To remove the toxic metals from the paint chips and starch, they will be liquefied in the digestion chamber using fungal enzymes. Toxic metals are then solubilized into the fluids in the digestion chamber. Low levels of toxic metals will remain in the digestion residues. The toxic metals in the fluid are then separated and mixed with water soluble polymer chelators that have been developed at LANL. The toxic metals become fixed to the polymer chelators. The polymer chelators are then regenerated for reuse leaving all the toxic metals in a concentrated solution. The remaining residues in the digestion chamber will passed the Toxicity Leaching Characteristic Procedure for lead and chromium.

Waste Amounts to Be Treated: Paint Stripper Waste - 10 Kg

Waste Management: Any untreated waste will be returned to Boeing. Treated waste residues from the digestion chamber and the concentrated metal solution will be analyzed to determine TC contaminants using the TCLP. All waste residues will be sent back to Boeing or managed by LANL as hazardous waste depending on TC contaminant concentrations.

Project Milestones:

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

Qualifications:

Experience: Our team has been working to develop and test Heterogeneous Waste Processing for 2 years. Each team member has a different background with many years of experience in his/her relevant field of research. We have experience in environmental microbiology, biochemistry, inorganic chemistry and environmental engineering. This process was developed by integration of successful individual treatment methods for more simplified waste streams and we have performed extensive studies on surrogate wastes employing this methodology.

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Jim Brainard: Ph.D. in Chemistry, Indiana University, 1979. Current position LANL technical staff member in CST-18. 6 years experience in research and development of technologies for treatment wastes and contaminants.

Equipment and Facilities:

This treatability study will be conducted in a laboratory that is properly ventilated and equipped with proper safety equipment. The laboratory will contain a sealed stainless steel dressing jar (enzyme digestion chamber) and analytical equipment includes gas chromatograph-mass spectrometer, inductively coupled plasma, spectrophotometer, and high performance liquid chromatography.