



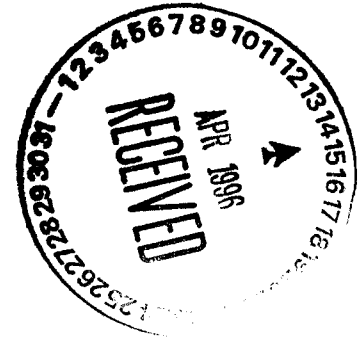
Department of Energy
 Albuquerque Operations Office
 Los Alamos Area Office
 Los Alamos, New Mexico 87544

APR 12 1996

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

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



Dear Mr. Garcia:

Subject: Treatability Study Notification

The purpose of this letter is to provide notification of intent to conduct six mixed waste treatability studies at the Los Alamos National Laboratory (LANL). The studies will be conducted by the Environmental Science and Waste Technology Group (CST-7). The wastes to be studied are samples of wastes inventoried in the Federal Facilities Compliance Order Site Treatment Plan (STP).

These six treatability studies are intended to determine the effectiveness of a process known as Electrochemical Treatment (ET) in treating characteristic hazardous mixed wastes containing metals, cyanides, acids, and base reagents. These six studies will not treat listed hazardous waste. The ET technology consists of a stack of electrochemical cells and auxilliary equipment. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. The remaining solution will contain low-level radioactivity but will no longer exhibit the characteristics of a hazardous waste and will no longer be a hazardous waste.

LANL has completed initial testing with ET via surrogate studies and a treatability study in 1995 that showed impressive results in treating mixed waste streams identified in the STP. It is unclear exactly how versatile this technology may be, however, with other waste streams identified in the STP. In order to clarify the system's ability to treat the diversity of STP wastes, LANL is interested in conducting additional bench scale treatability studies in 1996 using treatability study samples of STP wastes. Further treatability studies are necessary to obtain more information on process treatment capabilities, and additional engineering data for designing prototype equipment in the future.

The STP samples to be studied in 1996 include various types of inorganic characteristic hazardous waste streams inventoried in the STP. Waste stream descriptions begin on Page 2 of the enclosed treatability study notifications, "Treatability Studies Process



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Benito Garcia

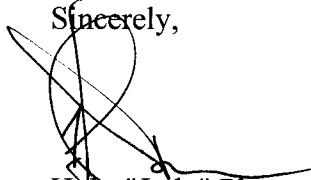
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Description, Electrochemical Treatment of Mixed Waste." A total of 900 kilograms of waste samples will be treated in all six studies combined.

If you have any questions, please contact me at (505) 665-5042.

Sincerely,

A handwritten signature in black ink, appearing to be "H. L. 'Jody' Plum". The signature is written over a circular stamp that is partially obscured. The signature is written in a cursive style with a long horizontal stroke extending to the right.

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

LAAMEP:7HJP-024

Enclosure

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,
Environmental Science and Waste Technology
Group (CST-7)

Facility EPA ID Number: NM0890010515

Project Title: Electrochemical Treatment of Mixed Waste

Location of Project: TA-48, Building RC1, Rooms 423 and 430

Project Contact: Jacek Dziewinski
CST-7, Mail Stop J514
(505) 667-9792; FAX (505) 665-5886

Other Contacts: Stanislaw Marczak, Ph.D.
CST-18, Mail Stop J514
(505) 667-4487; FAX (505) 665-5886

Kurt Anast
CST-7, Mail Stop E517
(505) 665-4360; FAX (505) 665-3750

Background: Los Alamos National Laboratory (LANL) is developing an electrochemical process called Electrochemical Treatment (ET) to treat mixed wastes containing toxic metals, cyanides, and toxic organic compounds. LANL has completed initial testing via surrogate studies and a treatability study in 1995 that showed impressive results in treating mixed waste streams identified in the LANL Federal Facilities Compliance Order Site Treatment Plan (STP). It is unclear exactly how versatile this technology may be, however, with other waste streams identified in the STP. In order to clarify the system's ability to treat the diversity of STP wastes, LANL is interested in conducting additional bench scale treatability studies in 1996 using treatability study samples of STP wastes. For the 1996 ET treatability studies, only STP wastes that are Resource Conservation and Recovery Act (RCRA) characteristic hazardous mixed wastes will be studied

The range of STP wastes that ET can effectively treat to RCRA treatment levels was not clearly determined in 1995. Although fundamental research, theoretical development, and

basic experimentation have been performed, further treatability studies are necessary to obtain more information on process treatment capabilities, and additional engineering data for designing prototype equipment in the future.

Project Description:

This project consists of six separate treatability studies involving six different characteristic hazardous mixed waste streams that are inventoried in the LANL STP and currently stored at Technical Area 54 (TA-54), Area L.. This project is intended to determine the effectiveness of ET on these mixed waste streams.

Project Goals and Objectives:

- 1) Determine the extent of ET's capabilities for treating the diversity of STP mixed waste streams.
- 2) Optimize the conditions for effective, safe and economical treatment of these mixed wastes.
- 3) Demonstrate the feasibility and the advantages of the ET process on these wastes and deliver data for designing a prototype plant.
- 4) Determine the potential of the ET process for material recovery and recycling.

Project Tasks:

- 1) Obtain treatability study samples from the storage area (TA-54, area L).
- 2) Analyze the samples.
- 3) Conduct treatability studies on six different STP mixed waste stream samples using ET.
- 5) Wrap up the ET equipment.
- 6) Return unused samples (if any left) and secondary waste (if any generated) to the mixed waste storage area at TA-54, Area L.

Project Milestones:

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

Qualifications:

Experience: Our team has many years of diversified experience in chemical engineering and chemistry, including radiochemistry and environmental chemistry. Among others we have

developed electrochemical systems for recovery of nitric acid from plutonium waste, treatment for water-reactive mixed waste, we modified industrial processes, and developed new analytical procedures. Our team has recently completed studies on different waste groups found at TA-54 using this technology to successfully treat the RCRA components of those wastes. Our experience treating this waste has allowed us to understand what precautions to take, what procedures are necessary, and how to analyze and handle the waste.

Key Staff:

Jacek Dziejewski

Education: M.Sc. Chemical Process Engineering, Technical University of Cracow;
Experience: 5 yrs industrial research experience, University of Mining and Metallurgy (mass, heat exchange, reaction kinetics, adsorption), 6 yrs. industrial operations experience as Senior Process Engineer, BRZ Corporation (electrochemical processes, extractive metallurgy), 3 yrs with LANL, Principal Investigator (environmental projects).

Stanislaw Marczak

Education: Ph.D. Inorganic Chemistry and Electrochemistry (Warsaw University, Poland), 8 yrs Warsaw University.
Experience: Chemical analysis (spectral and electrochemical), transition metals chemistry (separation, complex compounds), mechanisms of electrode reactions, chemical and electrochemical kinetics, 1 year with LANL.

Kurt Anast

Education: Extractive Metallurgical Process Engineering, Colorado School of Mines;
Experience: Over 15 years industrial experience as operations manager at metal R&D facility and pilot plant operations manager for AMAX Inc. , a minerals and energy company. Waste treatment process development at mines and refineries - developed treatments, designed and implemented processes. Design, fabricate and start-up pilot plants at mine sites and at central pilot plant facility for metals industry

Equipment and Facilities: The tests will be performed in radiation controlled room equipped with appropriate monitoring and ventilation systems, and a radioactive waste water drainage system. Radioactivity Control Technician will be available on call as required by the regulations. We will use two RETEC cells 0.63 m² each, a packed bed Electro Syn ES-Cell, 0.1 - 1.0 m² Electro Prod Cell, 100 A Dynatronix DPR20-100-400 power supply. The auxiliary equipment will include pumps, pH meters, thermometers, chart recorders, alarms, and vapor condensing system. We have adequate analytical capabilities which will include ICP AES, GC-MS, FT-IR, UV-VIS cyanide analyzer, stripping voltametry, and ion sensitive electrodes.

Project Discussion - Treatability Study 1:

Description of Waste to Be Treated: Spectrographic solutions, photographic fixers, and other similar aqueous wastes. These wastes contain primarily silver, but also contain other RCRA heavy metals and radionuclides.

RCRA Waste Codes: Mixed D002, D004, D005, D006, D007, D008, D009, D010, D011

Sample Waste Amounts to be Treated: 90 Kg

Site Treatment Plan (STP) Information:

Treatability Group: Aqueous Waste with Heavy Metals

MWIR Waste ID: LA-W913

Description of the Waste Treatment Technology: This technology consists of a stack of electrochemical cells and auxiliary equipment, such as pumps, agitators, pH meters, thermometers, alarm, power supplies, rectifiers, a feed system, tanks with feed and treated solutions, and a gas venting system. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. Since listed hazardous wastes will not be treated in this study, the remaining solution will contain low level radioactivity but will no longer exhibit the characteristic of a hazardous waste and will no longer be a hazardous waste.

Waste Management: Treated liquid effluents will be sampled and analyzed. The waste samples treated are RCRA characteristic hazardous wastes only. Therefore, if the effluent no longer exhibits a characteristic of a RCRA hazardous waste, it will no longer be a hazardous waste and it will be discharged to the Radioactive Liquid Waste Treatment Facility at TA-50, as low level radioactive wastewater. If the effluent exhibits a characteristic of a hazardous waste, it will be re-run through the electrochemical process, or returned to TA-54, Area L for storage as a mixed waste. Any untreated waste samples will be returned to TA-54, Area L for storage as a mixed waste.

Recovered metals will be monitored for radioactivity. The recovered metals will be converted to sulfates, chlorides, nitrates, or oxides, and used as reagents. These metals will be reused for other laboratory activities. The metals may also be used by the plating shop for plating work. If trace radioactivity is detected, the metals will be returned to TA-54, Area L for storage as mixed waste.

Project Discussion - Treatability Study 2:

Description of Waste to Be Treated: Acidic solutions, and chemical salt solutions containing various RCRA metals and other metals such as zinc, aluminum, vanadium, and copper, with radionuclides.

RCRA Waste Codes: Mixed D002, D004, D005, D006, D007, D008, D009, D010, D011

Waste Amounts to be Treated: 180 Kg

Site Treatment Plan (STP) Information:

Treatability Groups: Aqueous Waste with Heavy Metals
Corrosive Solutions
Aqueous cyanides, nitrates, chromates, and arsenates

MWIR Waste IDs: LA-W913
LA-W914
LA-W915

Description of the Waste Treatment Technology: This technology consists of a stack of electrochemical cells and auxiliary equipment, such as pumps, agitators, pH meters, thermometers, alarm, power supplies, rectifiers, a feed system, tanks with feed and treated solutions, and a gas venting system. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. Since listed hazardous wastes will not be treated in this study, the remaining solution will contain low level radioactivity but will no longer exhibit the characteristic of a hazardous waste and will no longer be a hazardous waste.

Waste Management: Treated liquid effluents will be sampled and analyzed. The waste samples treated are RCRA characteristic hazardous wastes only. Therefore, if the effluent no longer exhibits a characteristic of a RCRA hazardous waste, it will no longer be a hazardous waste and it will be discharged to the Radioactive Liquid Waste Treatment Facility at TA-50, as low level radioactive wastewater. If the effluent exhibits a characteristic of a hazardous waste, it will be re-run through the electrochemical process, or returned to TA-54, Area L for storage as a mixed waste. Any untreated waste samples will be returned to TA-54, Area L for storage as a mixed waste.

Recovered metals will be monitored for radioactivity. The recovered metals will be converted to sulfates, chlorides, nitrates, or oxides, and used as reagents. These metals will be reused for other laboratory activities. The metals may also be used by the plating

shop for plating work. If trace radioactivity is detected, the metals will be returned to TA-54, Area L for storage as mixed waste.

Project Discussion Treatability Study 3:

Description of Wastes to be Treated: Nitric, acetic, or sulfuric acid solutions and basic solutions containing primarily lead, but also may contain other RCRA metals, with radionuclides.

RCRA Waste Codes: Mixed D002, D003, D004, D005, D006, D007, D008, D009, D010, D011

Waste Amounts to be Treated: 180 Kg

Site Treatment Plan (STP) Information:

Treatability Groups: Aqueous Waste with Heavy Metals
Corrosive Solutions

MWIR Waste IDs: LA-W913
LA-W914

Description of the Waste Treatment Technology: This technology consists of a stack of electrochemical cells and auxiliary equipment, such as pumps, agitators, pH meters, thermometers, alarm, power supplies, rectifiers, a feed system, tanks with feed and treated solutions, and a gas venting system. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. Since listed hazardous wastes will not be treated in this study, the remaining solution will contain low level radioactivity but will no longer exhibit the characteristic of a hazardous waste and will no longer be a hazardous waste.

Waste Management: Treated liquid effluents will be sampled and analyzed. The waste samples treated are RCRA characteristic hazardous wastes only. Therefore, if the effluent no longer exhibits a characteristic of a RCRA hazardous waste, it will no longer be a hazardous waste and it will be discharged to the Radioactive Liquid Waste Treatment Facility at TA-50, as low level radioactive wastewater. If the effluent exhibits a characteristic of a hazardous waste, it will be re-run through the electrochemical process, or returned to TA-54, Area L for storage as a mixed waste. Any untreated waste samples will be returned to TA-54, Area L for storage as a mixed waste.

Recovered metals will be monitored for radioactivity. The recovered metals will be converted to sulfates, chlorides, nitrates, or oxides, and used as reagents. These metals will be reused for other laboratory activities. The metals may also be used by the plating shop for plating work. If trace radioactivity is detected, the metals will be returned to TA-54, Area L for storage as mixed waste.

Project Discussion Treatability Study 4:

Description of Wastes to be Treated: Aqueous actinide solutions containing uranium and/or thorium compounds in solution, some of which contain chromium.

RCRA Waste Codes: Mixed D002, D007

Waste Amounts to be Treated: 180 Kg

Site Treatment Plan (STP) Information:

Treatability Groups: Aqueous Waste with Heavy Metals
Corrosive Solutions
Aqueous cyanides, nitrates, chromates, and arsenates

MWIR Waste IDs: LA-W913
LA-W914
LA-W915

Description of the Waste Treatment Technology: This technology consists of a stack of electrochemical cells and auxiliary equipment, such as pumps, agitators, pH meters, thermometers, alarm, power supplies, rectifiers, a feed system, tanks with feed and treated solutions, and a gas venting system. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. Since listed hazardous wastes will not be treated in this study, the remaining solution will contain low level radioactivity but will no longer exhibit the characteristic of a hazardous waste and will no longer be a hazardous waste.

Waste Management: Treated liquid effluents will be sampled and analyzed. The waste samples treated are RCRA characteristic hazardous wastes only. Therefore, if the effluent no longer exhibits a characteristic of a RCRA hazardous waste, it will no longer be a hazardous waste and it will be discharged to the Radioactive Liquid Waste Treatment Facility at TA-50, as low level radioactive wastewater. If the effluent exhibits a characteristic of a hazardous waste, it will be re-run through the electrochemical process, or returned to TA-54, Area L for storage as a mixed waste. Any untreated waste samples will be returned to TA-54, Area L for storage as a mixed waste.

Recovered metals will be monitored for radioactivity. The recovered metals will be converted to sulfates, chlorides, nitrates, or oxides, and used as reagents. These metals will be reused for other laboratory activities. The metals may also be used by the plating shop for plating work. If trace radioactivity is detected, the metals will be returned to TA-54, Area L for storage as mixed waste.

Project Discussion Treatability Study 5:

Description of Wastes to be Treated: Wastes generated in the laboratory during Chemical Oxygen Demand (COD), NO_2^- , NO_3^- , Total Kjeldahl, Nitrogen, and ammonia analyses. Wastes contain RCRA metals and radionuclides.

RCRA Waste Codes: Mixed D001, D002, D003, D007, D009, D011

Waste Amounts to be Treated: 180 Kg

Site Treatment Plan (STP) Information:

Treatability Groups: Aqueous Waste with Heavy Metals
Corrosive Solutions

MWIR Waste ID: LA-W913
LA-W914

Description of the Waste Treatment Technology: This technology consists of a stack of electrochemical cells and auxiliary equipment, such as pumps, agitators, pH meters, thermometers, alarm, power supplies, rectifiers, a feed system, tanks with feed and treated solutions, and a gas venting system. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. Since listed hazardous wastes will not be treated in this study, the remaining solution will contain low level radioactivity but will no longer exhibit the characteristic of a hazardous waste and will no longer be a hazardous waste.

Waste Management: Treated liquid effluents will be sampled and analyzed. The waste samples treated are RCRA characteristic hazardous wastes only. Therefore, if the effluent no longer exhibits a characteristic of a RCRA hazardous waste, it will no longer be a hazardous waste and it will be discharged to the Radioactive Liquid Waste Treatment Facility at TA-50, as low level radioactive wastewater. If the effluent exhibits a characteristic of a hazardous waste, it will be re-run through the electrochemical process, or returned to TA-54, Area L for storage as a mixed waste. Any untreated waste samples will be returned to TA-54, Area L for storage as a mixed waste.

Recovered metals will be monitored for radioactivity. The recovered metals will be converted to sulfates, chlorides, nitrates, or oxides, and used as reagents. These metals will be reused for other laboratory activities. The metals may also be used by the plating shop for plating work. If trace radioactivity is detected, the metals will be returned to TA-54, Area L for storage as mixed waste.

Project Discussion Treatability Study 6:

Description of Wastes to be Treated: Solutions which have significant amounts of a base reagent or may be contaminated with concentrated base reagents, with radionuclides.

RCRA Waste Codes: Mixed D001, D002, D003

Waste Amounts to be Treated: 90 Kg

Site Treatment Plan (STP) Information:

Treatability Groups: Aqueous Waste with Heavy Metals
Corrosive Solutions

MWIR Waste ID: LA-W913
LA-W914

Description of the Waste Treatment Technology: This technology consists of a stack of electrochemical cells and auxiliary equipment, such as pumps, agitators, pH meters, thermometers, alarm, power supplies, rectifiers, a feed system, tanks with feed and treated solutions, and a gas venting system. Metals will be electrochemically extracted from the waste solutions and deposited on cathodes, acids and bases will be neutralized, and nitrates will be electrochemically reduced. Since listed hazardous wastes will not be treated in this study, the remaining solution will contain low level radioactivity but will no longer exhibit the characteristic of a hazardous waste and will no longer be a hazardous waste.

Waste Management: Treated liquid effluents will be sampled and analyzed. The waste samples treated are RCRA characteristic hazardous wastes only. Therefore, if the effluent no longer exhibits a characteristic of a RCRA hazardous waste, it will no longer be a hazardous waste and it will be discharged to the Radioactive Liquid Waste Treatment Facility at TA-50, as low level radioactive wastewater. If the effluent exhibits a characteristic of a hazardous waste, it will be re-run through the electrochemical process, or returned to TA-54, Area L for storage as a mixed waste. Any untreated waste samples will be returned to TA-54, Area L for storage as a mixed waste.

Recovered metals will be monitored for radioactivity. The recovered metals will be converted to sulfates, chlorides, nitrates, or oxides, and used as reagents. These metals will be reused for other laboratory activities. The metals may also be used by the plating shop for plating work. If trace radioactivity is detected, the metals will be returned to TA-54, Area L for storage as mixed waste.