LA-SUB--98-37

PERMA-FIX
ENVIRONMENTAL SERVICES

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**Treatability Study
No. PDC-1-O-T
Final Report
April 22, 1998**

Generator:
Los Alamos National Laboratory

Submitted by:
**Perma-Fix Environmental Services
1940 NW 67th Place
Gainesville, Florida 32653**

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MASTER

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1.0 Background

Los Alamos National Laboratory provided treatability study samples from four waste streams, designated *Stream #1*, *Stream #3*, *Stream #6*, and *Stream #7*. *Stream #1* consisted of one 55-gallon drum of personal protective equipment (PPE), rags, and neutralizing agent (bicarbonate) generated during the cleanup of a sodium dichromate solution spill. *Stream #3* was one 55-gallon drum of paper, rags, lab utensils, tools, and tape from the decontamination of a glovebox. The sample of *Stream #6* was packaged in three 30-gallon drums and a 100 ft³ wooden box. It consisted of plastic sheeting, PPE, and paper generated from the cleanup of mock explosive (barium nitrate) from depleted uranium parts. *Stream #7* was scrap metal (copper, stainless and carbon steel joined with silver solder) from the disassembly of gas manifolds.

Samples of the individual waste streams were analyzed by a third party lab for TCLP metals. *Stream #1* was found to be hazardous for chromium (TCLP 43 mg/L). The other streams did not show analytical results above regulated levels. However, due to the difficulty in obtaining a representative sample from such heterogeneous wastes, the generator elected to use process knowledge to characterize all of the wastes as hazardous. A copy of the Mixed Waste Profile Form and Shipping Manifest, along with supporting documentation are attached as Appendices A and B to this report.

2.0 Objective of Study

The objective of the treatability study is to determine: (1) whether the Perma-Fix stabilization/solidification process can treat the waste samples to meet Land Disposal Restrictions and the Waste Acceptance Criteria for LANL Technical Area 54, Area G (attached as Appendix C), and (2) optimum loading and resulting weight and volume of finished waste form.

3.0 Test Procedures

3.1 Test Facility

The treatment portion of the study was conducted in the R&D test facility located in the Nelson Building at Perma-Fix's Gainesville, FL site. The test facility is a quonset hut assembled inside the Nelson Building and having appropriate air handling equipment to provide containment and control of radiological and hazardous chemical constituents. The work area was divided into three zones:

(1) Work Zone - a tented area inside the quonset hut with its own local and general area ventilation. The floor of the Work Zone was protected by two layers of herculite and one of visqueen. Waste sample containers were opened, the waste was treated, and disposal containers were sealed in the Work Zone.

(2) Decontamination Zone - the area between the Work Zone tent and Control Station. An open area inside the quonset hut with visqueen protecting the floor. This area was used for doffing PPE and as a temporary holding area for sealed containers and project equipment awaiting radiological surveys.

(3) Clean Zone - the area inside the quonset hut beyond the Decontamination Zone. Access to the other zones was controlled at the Control Station. Only personnel authorized by the Radiation Work Permit (Appendix D) were allowed beyond the Control Station.

3.2 Treatment Process

3.2.1 Low Density Waste

Plastic, rags, PPE, gloves, paper, etc. was sprayed with a chemical reagent while it was in the original container. This reagent wet the surface to minimize transport of any dust that could spread radioactive contaminants and served to reduce any Cr(VI) that may have been present to Cr(III). It also contained ingredients to precipitate and stabilize Ba. The waste was then removed from its individual containers and cut into nominal 10" x 10" pieces so that treatment chemicals could wet all surfaces. The pieces were soaked in a solution designed to precipitate and stabilize other metals suspected to be present. Finally, the pieces were mixed into a portland cement grout that solidified upon curing. Suspect radiologically contaminated PPE generated during the treatability study was cut up and stabilized/solidified after the last batch of waste.

Two of the drums from Waste Stream #6 contained small chunks (est. < 50 g each) of a pink solid presumed to be barium nitrate. This material was dissolved in the treatment chemical solutions, then used to mix the grout that other items from the drum were solidified in.

The grout was mixed inside a lined drum that would serve as the disposal container. At the end of the project, excess treatment chemicals that had come in contact with waste materials was used to mix the cement grout used to "cap" the treated waste form. Before

each batch of grout cured, samples of the grout with pieces of stabilized waste were collected for subsequent analysis by TCLP and allowed to cure separately.

3.2.2 High Density Waste

Some of the drums contained a variety of "hardware", including an electrical connector, lab utensils, gas manifolds, metal tubing, and plexiglass pieces. These parts were cut up as necessary to ensure all potentially contaminated surfaces could be wetted by the stabilization solutions. Then they were soaked in the two stabilization solutions and solidified in cement. Samples were collected as before.

3.3 Health Physics/Contamination Control

Personnel in the Work Zone wore PPE and dosimeters as described in the Radiation Work Permit (Appendix D). Items such as gloves, aprons, and booties that ran a greater risk of becoming contaminated were removed and left inside the Work Zone tent. Inner gloves, protective coveralls, and respirators were removed in the Decontamination Zone. Protective coveralls designated for reuse were surveyed and results evaluated before each reuse.

The Work Zone tent was maintained at a slight negative pressure. Ventilation was nominally 1000 cfm and was exhausted through HEPA filters. Flexible ducting allowed some ventilation to be directed at the opening of the drums as waste was being treated. The sides and bottom of each drum were protected with plastic wrap before it was taken into the Work Zone. The plastic wrap was discarded and the drum exteriors surveyed with portable meters and smears to confirm they were uncontaminated before they were released from the decontamination area. Tools and equipment used in the project were decontaminated and surveyed prior to release from the holding area.

After the study samples were treated, the Work Zone tent and Decontamination Area were decontaminated and surveyed. All areas were able to be released for non-radioactive use.

3.4 Processing Log/Inventory Tracking

The treatability study samples were processed in whole-drum batches. The stabilized waste was mixed into grout that had been poured into a lined drum. After each original container of waste was processed, the liner was closed and a new liner was placed in the same drum on top of the previous closed liner. This allowed an overall reduction in waste volume but kept waste segregated to minimize the amount of rework in case

analytical results indicated any batch did not meet treatment standards. Some heat is evolved as the cement cures (nominal temperature reaches 110 °F). Once the drum had cooled to room temperature (approximately 36 hours), curing was deemed adequate. At this point, each drum was reopened and inspected for free liquid that might have condensed on the surface of the waste monolith, on internal drum surfaces, and in the space between the drum and the liner. These surfaces were dusted with portland cement as a precautionary measure to dry any liquids that might be present. Then the drum was resealed, painted, and assigned a new drum number for the outgoing shipment. Table 1, attached as Appendix E, summarizes the processing sequence.

4.0 Results

Samples of treated waste from each waste stream (waste stream #6 sample was a composite of four samples, one from each batch comprising that waste stream) were analyzed by Perma-Fix Analytical Services (PAS) using a test that approximates SW-846 methods to get a preliminary approximation of TCLP metals. Splits of these samples were sent to American Environmental Network's (AEN) mixed waste analytical lab in Cary, NC for confirmation analysis. Results were all below applicable LDR limits.

Results are summarized in Table 2, which is attached as Appendix F along with AEN's report.

5.0 Conclusions and Recommendations

The results listed in Table 2 indicate that the treated samples meet the applicable LDR treatment standards.

Arrangements will be made to ship the treatability study samples back to LANL. Copies of the shipping documents will be forwarded at the time of shipment. At that time, they may be inserted into this report as Appendix G.

Treatability Study
PDC-1-O-T
April 22, 1998

Appendix A

Treatability Study Samples Mixed Waste Profile

Mixed Waste Profile Form (MWPF)

Control No. R S 2 2 3

Please complete and return to Perma-Fix, Attention: Mixed Waste Manager

Page 1 of 2

GENERAL INFORMATION

Broker Name: Perma-Fix Development Co.

Generator

Los Alamos National LaboratoryPhone (505) 665-1738

Address

PO Box 1663, Mailstop J595

Fax

()E-mail Kellyj@lanl.gov

City

Los Alamos,

State

NM

Zip

87545

USEPA ID No.

NM0890010515

B. WASTE DESCRIPTION (A separate MWPF is required for each description)

☐ Liquid Scintillation Vials☐ Bulk Organic Liquids (other than Liquid Scintillation Media)☐ Lab Pack☐ Liquid Scintillation Fluids (bulk drum)☒ Other (describe) Debris (including plastic, debris, scrap metal)

C. GENERAL CHARACTERISTICS (at 70 ° unless otherwise specified)

COLOR clear, brown, grey☐ Liquid

%

ODOR

☒ None☒ Solid100

%

☐ Strong☐ Sludge

%

☐ Mild

PHASES:

☐ Single Layer☐ Double Layer☐ Multi Layer☒ Other heterogeneous solidD. BENZENE EXEMPTION Is this waste subject to Benzene Waste Operations NESHAP? ☐ Yes ☒ No (If yes, contact Perma-Fix to obtain Generator's Benzene NESHAP worksheet)

E. RCRA INFORMATION (List all applicable waste codes)

USEPA Hazardous Waste ☐ Yes ☒ No
(Please give USEPA hazardous waste codes:)Treatability study samplesexempt under 40 CFR 261.4

F. SHIPPING INFORMATION

DOT Hazardous Material

☒ Yes ☐ NoProper Shipping Name Environmentally hazardousSubstance, NOS or non-regulatedHazard Class 9 Anticipated Volume 513 ☐ gals ☒ lbs☒ One Time ☐ Other

G. PHYSICAL/CHEMICAL PROPERTIES (Check appropriate boxes for items 1-5)

1. Specific Gravity	2. Viscosity (centipoise)	3. pH	4. BTUS (000/lb)	5. Flash Point (closed cup)	6. Halogens (%)
☐ < 0.8	☐ 1 - 100	☐ < 2 ☐ _____ Actual	☒ < 1	☐ < 100 F	Chlorine _____
☐ 0.8 - 1.0	☐ 100 - 1000	☐ 2 - 6	☐ 1 - 4	☐ 100-140	Bromine _____
☐ 1.0 - 1.2	☐ 1000 - 10,000	☐ 6 - 8	☐ 4 - 8	☐ 141 - 200 F	Fluorine _____
☐ 1.2 - 1.4	☒ > 10,000	☐ 8 - 10	☐ 8 - 12	☐ > 200 F	Iodine _____
☐ 1.4 - 1.7		☐ 10 - 12.5 Constituent	☐ 12 - 16	<u>N/A</u>	Total <u>10-85 mc</u>
☒ > 1.7		☐ > 12.5 <u>Solids</u>	☐ > 16	<u>Solids</u>	

7. Hazardous Characteristics and Other Components: (This box must be completed)

REACTIVITY:

☐ Shock Sensitive☐ Water Reactive☐ Explosives☐ Pyrophoric☐ PCBs _____ (ppm)☒ None

Water _____

Sodium _____

Potassium _____

Phosphorus _____

Ash Content 10-20 (in weight percent)

9. Metals & Other Inorganics (Please indicate what metals your waste contains if metals are present)

☐ Arsenic (As) _____ ppm	☒ Lead (Pb) <u>0-2.8</u> ppm	☒ Zinc (Zn) <u>0-1.2</u> pp
☒ Barium (Ba) <u>0-2.0</u> ppm	☐ Selenium (Se) _____ ppm	☐ Antimony (Sb) _____ pp
☐ Cadmium (Cd) <u>0-0.74</u> ppm	☒ Silver (Ag) <u>< 0.05</u> ppm	☐ Beryllium (Be) _____ pp
☒ Chromium (Cr) <u>0-42.9</u> ppm	☒ Copper (Cu) <u>0-54.5</u> ppm	☐ Thallium (Tl) _____ pp
☐ Mercury (Hg) _____ ppm	☐ Nickel (Ni) _____ ppm	

PERMA-FIX
ENVIRONMENTAL SERVICES**Mixed Waste Profile Form (M')**Control No. R S 2 2 3

Please complete and return to Perma-Fix, Attention: Mixed Waste Manager

Page 2 of 2

CHEMICAL COMPOSITION (must total 100%)

Name	Organic / Inorganic	%	Name	Organic / Inorganic	%
Plastic / PPE / Paper / Rags		80-90			
Copper / steel		5-10			
Plexiglass		5			
laboratory glassware / tools		< 2			

SPECIAL HANDLING INSTRUCTIONS (If special handling techniques are required, i.e. overpacking, specify. If none, so state.) none**SPECIFIC RADIOACTIVITY (SA) AND TOTAL RADIOACTIVITY**☐ Check here if data is based on an estimate ☒ Check here if data is based on analytical results (attach analytical results)

Radionuclide	Specific Radioactivity ($\mu\text{Ci/g}$)	Total Radioactivity (mCi)	Radionuclide	Specific Radioactivity ($\mu\text{Ci/g}$)	Total Radioactivity (mCi)
U-238	16×10^{-6}	1.24×10^{-2}			
U-234	1.8×10^{-6}	1.59×10^{-3}			
H-3	15.8×10^{-6}	1.21×10^{-2}			
Tc-99	1.5×10^{-6}	7.75×10^{-4}			
Pu-239	1.7×10^{-6}	6.48×10^{-5}			
Am-241	2.4×10^{-6}	9.15×10^{-5}			
Th-234	9.7×10^{-6}	3.35×10^{-4}			

GENERATOR'S CERTIFICATION (Mixed Waste Profile Form cannot be processed unless completed and signed.)

I certify that

- All information submitted in this and all attached documents contains true and accurate descriptions of this waste and all relevant information regarding known or suspected hazards in the possession of the generator, have been disclosed.
- Perma-Fix is authorized to obtain a sample from any waste shipment for purposes of recertification.
- If this certification is made by a broker, the undersigned signs as an authorized agent for the generator. Please attach authorization by the generator (one time requirement only).

Certification Signature (required)

Print Name

John C. Kelly

Date

11/19/97

☐ Check here if additional information is attached and indicate the number of attached pages _____**FOR PERMA-FIX USE ONLY**☒ Accepted ☐ Not Accepted (if not accepted, explain)

(Waste "accepted" certifies that Perma-Fix has the appropriate permits for, and will accept the waste the generator is shipping) 40CFR264.12(b)

PERMA-FIX PRICING: \$ per contract per PO

Signature

Date

12/02/97

D.1. Description and History of Waste / Waste Stream #1

96.05158

This waste stream consists of one 20 gallon polyethylene drum overpacked in a 55 gallon drum. The inner drum contains low density debris (rags, plastic and gloves) contaminated with traces of sodium dichromate. Other white residues on rags are neutralizing agents (bicarbonate). The waste was generated as a result of a spill cleanup involving dichromate in solution. There is no free liquids present in the drum. All liquids were either absorbed onto rags or neutralized with agents. The laboratory where the spill occurred is located in LANL's low level liquid waste treatment facility (TA-50, Building 1) which regularly treats a wide range of isotopes including transuranics. The approximate percentages of each component are as follows:

Rags, gloves, plastic.....99 - 100 %
neutralizing agent.....< 1 %

The following is a list of chemical properties and contaminants that were found associated with this waste through testing by a Utah-certified laboratory:

TOX.....59.1 mg/kg
chromium.....42.9 mg/l
cadmium.....0.74 mg/l

This waste stream has been assigned characteristic EPA waste code D007 for chromium.

Radiological analyses showed minor transuranic isotopic contamination from Pu-239 (1.70 pCi/gram) and Am-241 (2.40 pCi/gram).

The drum number associated with this waste stream is 89367800. PPC-1-0-R
6

96.04776

D.1. Description and History of Waste / Waste Stream #3

This waste stream consists of one (55 gallon) drum of kimwipes, rags, laboratory equipment/utensils, paper, tools, and tape contaminated with traces of heavy metals and U238. The waste was generated during decontamination of a glovebox which had contained U238 as well as metals. Cleaning solvent used in decon process believed to be ethanol. The approximate percentages of each component are as follows:

glass.....	5 - 10 %
tools, laboratory equip.....	10 - 20 %
rags, kimwipes, tape.....	40 - 60 %

The following is a list of chemical properties and contaminants that were found associated with this waste through testing by a Utah-certified laboratory:

TOX.....	14.7 mg/kg
barium.....	0.6 mg/l
cadmium.....	0.11 mg/l
lead.....	2.8 mg/l
chromium.....	0.09 mg/l
mercury.....	0.029 mg/l

Because of the heterogeneity of the waste and the difficulties associated with representative sampling, the we would like to continue to manage this waste as hazardous and assign the EPA code D008 based on process knowledge.

Radiological analyses showed elevated TH-234 (9.7 pCi/gram) a daughter product of uranium-238.

The drum number associated with this waste stream is 908229. PDC-1-0-8
EM # 5

D.1. Description and History of Waste / Waste Stream #6

96.04775

This waste stream consists of three (30 gallon) drums and one box (5'x5'x4') of low density lab trash (predominantly plastic with some personal protective equipment and brown paper trash) contaminated with traces of a mock explosive (this is not an explosive but a formulation used to simulate explosive. The material is not unstable and will not detonate). The mock explosive is a pinkish granular powder composed 46% barium nitrate and the balance is an organic binder material. This process waste originated from the cleaning of residue (mock explosive) from depleted uranium parts used in impact studies. Before initiating any cleaning, the weapons group would lay on the ground surface a sheet of plastic to conduct their work and avoid the spread of contamination. At the end of the process, the plastic was folded up and inserted into waste drums or boxes. The approximate percentages of each component in this waste stream are as follows:

plastic/ppe/paper.....99-100%
granular powder w/ 46 % BaNO₃.....<1 %

The following is a list of chemical properties and contaminants that were found associated with this waste through testing by a Utah-certified laboratory:

TOX.....	81.8 mg/kg
barium.....	4.5 mg/l
mercury.....	0.005 mg/l

Because this waste stream is predominantly plastic with other trash and the mock residue makes up a very small proportion of the waste, the waste has not been assigned a D001 waste code as an oxidizer. However, because of the heterogeneity of the waste stream and the difficulties associated with performing representative sampling on lab trash, the Laboratory would like to manage this waste as hazardous and assign a D005 waste code based on process knowledge.

Radiological analyses confirm the presence of U-238 (16 pCi/gram) and slightly elevated tritium (15.8 pCi/gram).

The drum numbers associated with this waste stream are as follows:

PDC-1-0-R
91021706 - DM #2
91021710 - DM #1
91021713 - DM #3
91021717 (wooden box) #7

D.1. Description and History of Waste / Waste Stream #7 96.04764

One drum (55 gallon) of scrap metals from disassembly of gas manifolds and vacuum lines that were used in conjunction with U-238 salt, U-235 salt, as well as fluorides of lead, chromium and nickel. All chemicals were removed from vacuum line prior to disassembly but may still be present as trace contaminants. The scrap metal, which is mostly soldered copper and carbon and stainless steel, is mixed with some plexiglass and was placed in a plastic bag which was then inserted into a 55 gallon steel drum. The approximate percentages of each component are as follows:

Copper.....	5 - 10 %
Steel.....	5 - 10 %
Plexiglass.....	10 - 20 %
Plastic bags.....	40 - 60 %

The following is a list of chemical properties and contaminants that were found associated with this waste through testing by a Utah-certified laboratory:

TOX.....	17.1 mg/kg
barium.....	2.0 mg/l
copper.....	54.5 mg/l
zinc.....	1.2 mg/l

Based on the process knowledge that silver was used in the solder to join tubing, this waste stream has been assigned the EPA characteristic waste code D011.

Radiological analyses showed slightly elevated U-238 and Th-234.

The drum number associated with this waste is 92025887.

POC-1-a-R
DM #4

CHEMICAL WASTE MANAGEMENT

3-Jul-96

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Job: 962205E

Status: Final

Sample Id: 96.04764 -
Lab Id: 962205-4
Date Sampled: 6-Jun-96

Project: 311599
Matrix: Solid

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
EOX		9020M	17.1 mg/kg	0.05	26-Jun-96

Sample Id: 96.04772 -
Lab Id: 962205-5
Date Sampled: 7-Jun-96

Project: 311599
Matrix: Solid

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
EOX		9020M	8.23 mg/kg	0.05	26-Jun-96

Sample Id: 96.04775 -
Lab Id: 962205-7
Date Sampled: 7-Jun-96

Project: 311599
Matrix: Solid

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
EOX		9020M	81.8 mg/kg	0.05	26-Jun-96

Sample Id: 96.04776 -
Lab Id: 962205-8
Date Sampled: 7-Jun-96

Project: 311599
Matrix: Solid

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
EOX		9020M	14.7 mg/kg	0.05	26-Jun-96

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CHEMICAL WASTE MANAGEMENT

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Job: 962205E

Status: Final

Sample Id: 96.04763
Lab Id: 962205-3
Date Sampled: 6-Jun-96

Project: 311599
Matrix: Solid

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
Arsenic	TCLP	6010A	U mg/l	0.5	27-Jun-96
Barium	TCLP	6010A	2.0 mg/l	0.1	27-Jun-96
Cadmium	TCLP	6010A	U mg/l	0.03	27-Jun-96
Copper	TCLP	6010A	54.4 mg/l	0.05	27-Jun-96
Chromium	TCLP	6010A	U mg/l	0.05	27-Jun-96
Lead	TCLP	6010A	U mg/l	0.3	27-Jun-96
Mercury	TCLP	7470A	U mg/l	0.002	25-Jun-96
Selenium	TCLP	6010A	U mg/l	0.5	27-Jun-96
Silver	TCLP	6010A	U mg/l	0.05	27-Jun-96
Zinc	TCLP	6010A	1.2 mg/l	0.1	27-Jun-96
Cyanide	Reactive	7.3.3.2	U mg/kg	0.3	24-Jun-96
Sulfide	Reactive	7.3.4.2	U mg/kg	30	24-Jun-96

Sample Id: 96.04774
Lab Id: 962205-6
Date Sampled: 7-Jun-96

91006502

Project: 311599
Matrix: Solid

Analyte	Fraction	Method	Concentration	MDL	Date Analyzed
Arsenic	TCLP	6010A	U mg/l	1	27-Jun-96
Barium	TCLP	6010A	0.2 mg/l	0.20	27-Jun-96
Cadmium	TCLP	6010A	U mg/l	0.06	27-Jun-96
Copper	TCLP	6010A	U mg/l	0.1	27-Jun-96
Chromium	TCLP	6010A	U mg/l	0.1	27-Jun-96
Lead	TCLP	6010A	1340 mg/l	0.60	27-Jun-96
Mercury	TCLP	7470A	U mg/l	0.002	25-Jun-96
Selenium	TCLP	6010A	U mg/l	1	27-Jun-96
Silver	TCLP	6010A	U mg/l	0.1	27-Jun-96
Zinc	TCLP	6010A	0.8 mg/l	0.20	27-Jun-96
Cyanide	Reactive	7.3.3.2	U mg/kg	0.3	24-Jun-96
Sulfide	Reactive	7.3.4.2	U mg/kg	30	24-Jun-96

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CHEMICAL WASTE MANAGEMENT

3-JUL-96

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Job: 962205E

Status: Final

Analyte: C-14
 Fraction: Total
 Method: 520-84-006
 Units: pCi/g

Project: 311599
 Date Analyzed: 06/13-06/21
 LLD: 2

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758 9202587	Waste stream 7 0.0±1.1	2
962205-12	6-Jun-96	Solid	96.04759 902826	Waste stream 2 0.0±1.1	2
962205-13	6-Jun-96	Solid	96.04760 902636	Waste stream 20.0±1.6	2
962205-14	7-Jun-96	Solid	96.04773 91006502	Waste stream 4 0.0±4.4	2
962205-15	7-Jun-96	Solid	96.04777 C91021710	Waste stream 6 0.0±8.4	2
962205-16	7-Jun-96	Solid	96.04778 908229	Waste stream 3 0±16	2

Analyte: Tritium
 Fraction: Total
 Method: 906.0
 Units: pCi/g

Project: 311599
 Date Analyzed: 06/20-06/24
 LLD: 460

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	0.3±1.4	460
962205-12	6-Jun-96	Solid	96.04759	0.7±1.5	460
962205-13	6-Jun-96	Solid	96.04760	0.1±2.4	460
962205-14	7-Jun-96	Solid	96.04773	3.6±1.7	460
962205-15	7-Jun-96	Solid	96.04777	15.8±8.3	460
962205-16	7-Jun-96	Solid	96.04778	0.0±3.9	460

Analyte: I-129
 Fraction: Total
 Method: 520-84-006
 Units: pCi/g

Project: 311599
 Date Analyzed: 06/24-06/28
 LLD: 1

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	0.0±0.5	1
962205-12	6-Jun-96	Solid	96.04759	0.0±0.5	1
962205-13	6-Jun-96	Solid	96.04760	0.0±0.2	1
962205-14	7-Jun-96	Solid	96.04773	0.0±0.3	1
962205-15	7-Jun-96	Solid	96.04777	0.0±1.3	1
962205-16	7-Jun-96	Solid	96.04778	0.0±0.8	1

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CHEMICAL WASTE MANAGEMENT

3-Jul-96

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Job: 962205E

Status: Final

Analyte: Pu-238
Fraction: Total
Method: 520-84-006
Units: pCi/g

Project: 311599
Date Analyzed: 06/13-06/23
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	0.0±0.4	0.4
962205-12	6-Jun-96	Solid	96.04759	0.1±0.5	0.4
962205-13	6-Jun-96	Solid	96.04760	0.4±0.6	0.4
962205-14	7-Jun-96	Solid	96.04773	0.0±0.4	0.4
962205-15	7-Jun-96	Solid	96.04777	0.0±0.3	0.4
962205-16	7-Jun-96	Solid	96.04778	0.0±0.3	0.4

Analyte: Pu-239
Fraction: Total
Method: 520-84-006
Units: pCi/g

Project: 311599
Date Analyzed: 06/13-06/23
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	0.3±0.3	0.4
962205-12	6-Jun-96	Solid	96.04759	0.1±0.3	0.4
962205-13	6-Jun-96	Solid	96.04760	0.2±0.5	0.4
962205-14	7-Jun-96	Solid	96.04773	0.8±0.6	0.4
962205-15	7-Jun-96	Solid	96.04777	0.8±0.6	0.4
962205-16	7-Jun-96	Solid	96.04778	0.1±0.3	0.4

Analyte: Sr-90
Fraction: Total
Method: 905.0
Units: pCi/g

Project: 311599
Date Analyzed: 06/20-06/25
LLD: 1

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	0.6±0.3	1
962205-12	6-Jun-96	Solid	96.04759	0.1±0.2	1
962205-13	6-Jun-96	Solid	96.04760	0.1±0.2	1
962205-14	7-Jun-96	Solid	96.04773	0.1±0.2	1
962205-15	7-Jun-96	Solid	96.04777	0.0±0.9	1
962205-16	7-Jun-96	Solid	96.04778	0.0±0.2	1

CHEMICAL WASTE MANAGEMENT

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Page: R-8

Job: 362205E

Status: Final

Analyte: Th-228
Fraction: Total
Method: 3008
Units: pCi/g

Project: 311599
Date Analyzed: 06/21-07/01
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 3σ	LLD
962205-11	6-Jun-96	Solid	96.04758	0.0±0.2	0.4
962205-12	6-Jun-96	Solid	96.04759	0.0±0.2	0.4
962205-13	6-Jun-96	Solid	96.04760	0.0±0.2	0.4
962205-14	7-Jun-96	Solid	96.04773	0.0±0.2	0.4
962205-15	7-Jun-96	Solid	96.04777	0.0±0.2	0.4
962205-16	7-Jun-96	Solid	96.04778	0.0±0.2	0.4

Analyte: Th-230
Fraction: Total
Method: 3008
Units: pCi/g

Project: 311599
Date Analyzed: 06/21-07/01
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758 7	0.0±0.2	0.4
962205-12	6-Jun-96	Solid	96.04759 2	0.1±0.2	0.4
962205-13	6-Jun-96	Solid	96.04760 2	0.0±0.2	0.4
962205-14	7-Jun-96	Solid	96.04773 4	0.0±0.2	0.4
962205-15	7-Jun-96	Solid	96.04777 6	0.0±0.2	0.4
962205-16	7-Jun-96	Solid	96.04778 5	0.0±0.1	0.4

Analyte: U-234
Fraction: Total
Method: 908.0
Units: pCi/g

Project: 311599
Date Analyzed: 06/24-07/01
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	3.7±0.8	0.4
962205-12	6-Jun-96	Solid	96.04759	338±7	0.4
962205-13	6-Jun-96	Solid	96.04760	148±5	0.4
962205-14	7-Jun-96	Solid	96.04773	0.0±0.2	0.4
962205-15	7-Jun-96	Solid	96.04777	1.8±0.6	0.4
962205-16	7-Jun-96	Solid	96.04778	0.2±0.3	0.4

CHEMICAL WASTE MANAGEMENT

3-Jul-96
Page: R-9
Job: 9622CSE
Status: Final

Analyte: U-235
Fraction: Total
Method: 908.0
Units: pCi/g

Project: 311599
Date Analyzed: 06/24-07/01
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	✓ 0.0±0.2	0.4
962205-12	6-Jun-96	Solid	96.04759	✓ 18±2	0.4
962205-13	6-Jun-96	Solid	96.04760	✓ 7.6±1.1	0.4
962205-14	7-Jun-96	Solid	96.04773	✓ 0.0±0.2	0.4
962205-15	7-Jun-96	Solid	96.04777	✓ 0.2±0.3	0.4
962205-16	7-Jun-96	Solid	96.04778	✓ 0.0±0.2	0.4

Analyte: U-238
Fraction: Total
Method: 908.0
Units: pCi/g

Project: 311599
Date Analyzed: 06/24-07/01
LLD: 0.4

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	✓ 2.8±0.7	0.4
962205-12	6-Jun-96	Solid	96.04759	✓ 21±2	0.4
962205-13	6-Jun-96	Solid	96.04760	✓ 7.5±1.1	0.4
962205-14	7-Jun-96	Solid	96.04773	✓ 0.0±0.2	0.4
962205-15	7-Jun-96	Solid	96.04777	✓ 16±2	0.4
962205-16	7-Jun-96	Solid	96.04778	✓ 0.2±0.3	0.

Analyte: Tc-99
Fraction: Total
Method: TEVA SPEC
Units: pCi/g

Project: 311599
Date Analyzed: 06/26-06/28
LLD: 1

Lab Id	Date Sampled	Matrix	Sample Id	Concentration+ 2σ	LLD
962205-11	6-Jun-96	Solid	96.04758	✓ 1.5±0.5	
962205-12	6-Jun-96	Solid	96.04759	✓ 2.0±0.7	
962205-13	6-Jun-96	Solid	96.04760	✓ 0.6±0.6	
962205-14	7-Jun-96	Solid	96.04773	✓ 1.3±0.7	
962205-15	7-Jun-96	Solid	96.04777	✓ 0.9±1.3	
962205-16	7-Jun-96	Solid	96.04778	✓ 0.6±0.7

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CHEMICAL WASTE MANAGEMENT

Gamma Spectroscopy

3-Jul-96
 Page: R-10
 Job: 962205E
 Status: Final

Sample Id: 96.04758
 Lab Id: 962205-11
 Date Sampled: 6-Jun-96

Project: 311599
 Matrix: Solid

Analvte	Fraction	Conc. $\pm 2\sigma$	LLD	Date Analyzed
K-40*	GS	U	pCi/g	1.8 06/18-06/28
Tl-208*	GS	U	pCi/g	0.1 06/18-06/28
Pb-212*	GS	U	pCi/g	0.2 06/18-06/28
Pb-214*	GS	U	pCi/g	0.3 06/18-06/28
Bi-214*	GS	U	pCi/g	0.3 06/18-06/28
Ac-228*	GS	U	pCi/g	0.5 06/18-06/28
Th-234*	GS	$\sqrt{5.4} = 2.4$	pCi/g	2.7 06/18-06/28
U-235*	GS	U	pCi/g	1.1 06/18-06/28
Th-229*	GS	U	pCi/g	0.3 06/18-06/28
Na-22*	GS	U	pCi/g	0.2 06/18-06/28
Cr-51*	GS	U	pCi/g	0.7 06/18-06/28
Mn-54*	GS	U	pCi/g	0.1 06/18-06/28
Fe-59*	GS	U	pCi/g	0.2 06/18-06/28
Co-56*	GS	U	pCi/g	0.2 06/18-06/28
Co-57*	GS	U	pCi/g	0.1 06/18-06/28
Co-58*	GS	U	pCi/g	0.1 06/18-06/28
Co-60*	GS	U	pCi/g	0.1 06/18-06/28
Ni-56*	GS	U	pCi/g	0.1 06/18-06/28
Zn-65*	GS	U	pCi/g	0.3 06/18-06/28
Y-88*	GS	U	pCi/g	0.2 06/18-06/28
Zr-95*	GS	U	pCi/g	0.2 06/18-06/28
Nb-94*	GS	U	pCi/g	0.2 06/18-06/28
Nb-95*	GS	U	pCi/g	0.1 06/18-06/28
Ru-103*	GS	U	pCi/g	0.1 06/18-06/28
Ru-106*	GS	U	pCi/g	1.1 06/18-06/28
Sn-113*	GS	U	pCi/g	0.1 06/18-06/28
Sb-125*	GS	U	pCi/g	0.4 06/18-06/28
I-131*	GS	U	pCi/g	0.1 06/18-06/28
Cs-134*	GS	U	pCi/g	0.2 06/18-06/28
Cs-137*	GS	U	pCi/g	0.1 06/18-06/28
Ba-133*	GS	U	pCi/g	0.2 06/18-06/28
Ba-140*	GS	U	pCi/g	0.5 06/18-06/28
La-140*	GS	U	pCi/g	0.2 06/18-06/28
Ce-141*	GS	U	pCi/g	0.2 06/18-06/28
Ce-144*	GS	U	pCi/g	0.8 06/18-06/28
Eu-152*	GS	U	pCi/g	0.4 06/18-06/28
Eu-154*	GS	U	pCi/g	0.2 06/18-06/28
Eu-155*	GS	U	pCi/g	0.4 06/18-06/28
Pb-210*	GS	U	pCi/g	2.3 06/18-06/28
Bi-212*	GS	U	pCi/g	1.0 06/18-06/28
Pa-234*	GS	U	pCi/g	0.4 06/18-06/28
Pa-234M*	GS	U	pCi/g	28 06/18-06/28
Am-241*	GS	U	pCi/g	0.2 06/18-06/28

22-Jul-96

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Job: 962353E

Status: Final

CHEMICAL WASTE MANAGEMENT

Gamma Spectroscopy

Sample Id: 96.05161

Lab Id: 962353-5

Date Sampled: 19-Jun-96

Project: 311805

Matrix: Soil

Analyte	Fraction	Conc. + 2σ		LLD	Date Analyzed
Cs-137*	GS	U	pCi/g	0.5	07/03-07/17
Th-229*	GS	U	pCi/g	0.9	07/03-07/17
Am-241*	GS	2.7±0.8	pCi/g	0.8	07/03-07/17
Na-22*	GS	U	pCi/g	0.4	07/03-07/17
K-40*	GS	U	pCi/g	5.9	07/03-07/17
Cr-51*	GS	U	pCi/g	3.7	07/03-07/17
Mn-54*	GS	U	pCi/g	0.5	07/03-07/17
Fe-59*	GS	U	pCi/g	0.8	07/03-07/17
Co-56*	GS	U	pCi/g	0.6	07/03-07/17
Co-57*	GS	U	pCi/g	0.3	07/03-07/17
Co-58*	GS	U	pCi/g	0.4	07/03-07/17
Co-60*	GS	U	pCi/g	0.5	07/03-07/17
Ni-56*	GS	U	pCi/g	0.3	07/03-07/17
Zn-65*	GS	U	pCi/g	0.9	07/03-07/17
Y-88*	GS	U	pCi/g	0.5	07/03-07/17
Zr-95*	GS	U	pCi/g	0.7	07/03-07/17
Nb-94*	GS	U	pCi/g	0.4	07/03-07/17
Nb-95*	GS	U	pCi/g	0.4	07/03-07/17
Ru-103*	GS	U	pCi/g	0.4	07/03-07/17
Ru-106*	GS	U	pCi/g	4.5	07/03-07/17
Sn-113*	GS	U	pCi/g	0.5	07/03-07/17
Sb-125*	GS	U	pCi/g	1.2	07/03-07/17
I-131*	GS	U	pCi/g	0.4	07/03-07/17
Cs-134*	GS	U	pCi/g	0.5	07/03-07/17
Ba-133*	GS	U	pCi/g	0.6	07/03-07/17
Ba-140*	GS	U	pCi/g	1.6	07/03-07/17
La-140*	GS	U	pCi/g	0.4	07/03-07/17
Ce-141*	GS	U	pCi/g	0.6	07/03-07/17
Ce-144*	GS	U	pCi/g	2.4	07/03-07/17
Eu-152*	GS	U	pCi/g	1.3	07/03-07/17
Eu-154*	GS	U	pCi/g	0.7	07/03-07/17
Eu-155*	GS	U	pCi/g	1.2	07/03-07/17
Tl-208*	GS	U	pCi/g	0.5	07/03-07/17
Pb-210*	GS	U	pCi/g	7.1	07/03-07/17
Pb-212*	GS	U	pCi/g	0.8	07/03-07/17
Pb-214*	GS	U	pCi/g	1.3	07/03-07/17
Bi-212*	GS	U	pCi/g	4.0	07/03-07/17
Bi-214*	GS	U	pCi/g	1.4	07/03-07/17
Ac-228*	GS	U	pCi/g	1.5	07/03-07/17
Th-234*	GS	U	pCi/g	6.9	07/03-07/17
Pa-234*	GS	U	pCi/g	1.3	07/03-07/17
Pa-234M*	GS	U	pCi/g	77	07/03-07/17
U-235*	GS	U	pCi/g	2.6	07/03-07/17

CHEMICAL WASTE MANAGEMENT

Gamma Spectroscopy

3-Jul-96

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Job: 962205E

Status: Final

Sample Id: 96.04777 6
Lab Id: 962205-15
Date Sampled: 7-Jun-96

Project: 311599
Matrix: Solid

Analyte	Fraction	Conc. $\pm$ 2 σ	LLD	Date Analyzed
K-40*	GS	$\sim 15 \pm 6$	7.8	06/18-06/28
Tl-208*	GS	U	0.5	06/18-06/28
Pb-212*	GS	U	0.8	06/18-06/28
Pb-214*	GS	U	1.2	06/18-06/28
Bi-214*	GS	U	1.1	06/18-06/28
Ac-228*	GS	U	1.7	06/18-06/28
Th-234*	GS	U	13	06/18-06/28
U-235*	GS	U	2.9	06/18-06/28
Th-229*	GS	U	1.0	06/18-06/28
Na-22*	GS	U	0.4	06/18-06/28
Cr-51*	GS	U	3.5	06/18-06/28
Mn-54*	GS	U	0.5	06/18-06/28
Fe-59*	GS	U	0.8	06/18-06/28
Co-56*	GS	U	0.6	06/18-06/28
Co-57*	GS	U	0.3	06/18-06/28
Co-58*	GS	U	0.6	06/18-06/28
Co-60*	GS	U	0.6	06/18-06/28
Ni-56*	GS	U	0.3	06/18-06/28
Zn-65*	GS	U	0.8	06/18-06/28
Y-88*	GS	U	0.5	06/18-06/28
Zr-95*	GS	U	0.7	06/18-06/28
Nb-94*	GS	U	0.4	06/18-06/28
Nb-95*	GS	U	0.5	06/18-06/28
Ru-103*	GS	U	0.4	06/18-06/28
Ru-106*	GS	U	5.2	06/18-06/28
Sn-113*	GS	U	0.5	06/18-06/28
Sb-125*	GS	U	1.2	06/18-06/28
I-131*	GS	U	0.4	06/18-06/28
Cs-134*	GS	U	0.6	06/18-06/28
Cs-137*	GS	U	0.4	06/18-06/28
Ba-133*	GS	U	0.6	06/18-06/28
Ba-140*	GS	U	1.7	06/18-06/28
La-140*	GS	U	0.7	06/18-06/28
Ce-141*	GS	U	0.6	06/18-06/28
Ce-144*	GS	U	2.7	06/18-06/28
Eu-152*	GS	U	1.4	06/18-06/28
Eu-154*	GS	U	0.6	06/18-06/28
Eu-155*	GS	U	1.4	06/18-06/28
Pb-210*	GS	U	8.6	06/18-06/28
Bi-212*	GS	U	3.4	06/18-06/28
Pa-234*	GS	U	1.4	06/18-06/28
Pa-234M*	GS	U	85	06/18-06/28
Am-241*	GS	U	0.9	06/18-06/28

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CHEMICAL WASTE MANAGEMENT

Gamma Spectroscopy

3-Jul-96

Page: R-15

Job: 962205E

Status: Final

Sample Id: 96.04778

Lab Id: 962205-16

Date Sampled: 7-Jun-96

Project: 311599

Matrix: Solid

Analvte	Fraction	Conc. - 2σ	LLD	Date Analyzed
K-40*	GS	U	pCi/g	4.9 06/18-06/28
Tl-208*	GS	U	pCi/g	0.3 06/18-06/28
Pb-212*	GS	U	pCi/g	0.4 06/18-06/28
Pb-214*	GS	U	pCi/g	0.5 06/18-06/28
Bi-214*	GS	U	pCi/g	0.7 06/18-06/28
Ac-228*	GS	U	pCi/g	0.8 06/18-06/28
Th-234*	GS	9.7±4.3	pCi/g	4.5 06/18-06/28
U-235*	GS	U	pCi/g	1.1 06/18-06/28
Th-229*	GS	U	pCi/g	0.5 06/18-06/28
Na-22*	GS	U	pCi/g	0.2 06/18-06/28
Cr-51*	GS	U	pCi/g	1.7 06/18-06/28
Mn-54*	GS	U	pCi/g	0.2 06/18-06/28
Fe-59*	GS	U	pCi/g	0.4 06/18-06/28
Co-56*	GS	U	pCi/g	0.3 06/18-06/28
Co-57*	GS	U	pCi/g	0.1 06/18-06/28
Co-58*	GS	U	pCi/g	0.2 06/18-06/28
Co-60*	GS	U	pCi/g	0.2 06/18-06/28
Ni-56*	GS	U	pCi/g	0.1 06/18-06/28
Zn-65*	GS	U	pCi/g	0.3 06/18-06/28
Y-88*	GS	U	pCi/g	0.2 06/18-06/28
Zr-95*	GS	U	pCi/g	0.3 06/18-06/28
Nb-94*	GS	U	pCi/g	0.2 06/18-06/28
Nb-95*	GS	U	pCi/g	0.1 06/18-06/28
Ru-103*	GS	U	pCi/g	0.2 06/18-06/28
Ru-106*	GS	U	pCi/g	2.0 06/18-06/28
Sn-113*	GS	U	pCi/g	0.2 06/18-06/28
Sb-125*	GS	U	pCi/g	0.5 06/18-06/28
I-131*	GS	U	pCi/g	0.2 06/18-06/28
Cs-134*	GS	U	pCi/g	0.2 06/18-06/28
Cs-137*	GS	U	pCi/g	0.2 06/18-06/28
Ba-133*	GS	U	pCi/g	0.3 06/18-06/28
Ba-140*	GS	U	pCi/g	0.6 06/18-06/28
La-140*	GS	U	pCi/g	0.3 06/18-06/28
Ce-141*	GS	U	pCi/g	0.2 06/18-06/28
Ce-144*	GS	U	pCi/g	1.0 06/18-06/28
Eu-152*	GS	U	pCi/g	0.5 06/18-06/28
Eu-154*	GS	U	pCi/g	0.3 06/18-06/28
Eu-155*	GS	U	pCi/g	0.7 06/18-06/28
Pb-210*	GS	U	pCi/g	4.0 06/18-06/28
Bi-212*	GS	U	pCi/g	1.9 06/18-06/28
Pa-234*	GS	U	pCi/g	0.6 06/18-06/28
Pa-234M*	GS	U	pCi/g	37 06/18-06/28
Am-241*	GS	U	pCi/g	0.4 06/18-06/28

505 663 3701

LOS ALAMOS NATIONAL LABORATORY MANIFEST				Manifest Document No. 97361 P. 1 of 1	
Generator's Name and Mailing Address Los Alamos National Laboratory P.O. Box 1663, MS J595 Los Alamos, NM 87545				2. Generator's Phone (505)-665-6158	
Transporter 1 Name and Address HITTMAN TRANSPORTATION SERVICES, INC. 1560 BEAR CREEK ROAD OAK RIDGE, TN 37830				4. Transporter's Phone (800)-233-9933	
Designated Facility Name and Site Address PERMA-FIX 1940 NW 67th PLACE GAINESVILLE, FL 32653				6. Facility's Phone (352)-373-6066 7. Facility ID Number FLD980711071	
US DOT Description (including Proper Shipping Name, Technical Name, Hazard Class, ID Number, and Packing Group)				9. Containers No.	10. Total Quantity
HM	NON-REGULATED SOLID	6	DM	595	11. Unit Wt/Vol p
	NON-REGULATED SOLID	1	CW	18	p
1.					
12. Special Handling Instructions and Additional Information 3a. ERGNO: 8b. ERGNO: 3a. 89167800 908229 C91021706 C91021710 C91021717 C92025887 8b. C91021713 HMTF#: *EMERGENCY PHONE NO: (505) 667-6211* Treatability Study 40CFR 261.4(e)					
13. Generator's Certification This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. Printed/Typed Name: JAY STIMMEL Signature: [Signature] Month: 12 Day: 17 Year: 97					
14. Transporter 1 Volume/Weight of Waste at Pickup Total Quantity Unit Wt/Vol					
15. Transporter 1 Acknowledgement of Receipt of Materials Printed/Typed Name: FRED TURNER Signature: [Signature] Month: 12 Day: 17 Year: 97					
16. Discrepancy Indication Space					
17. Location to Which Waste Was Delivered 18. Month Day Year					
19. Designated Facility Volume/Weight of Waste Received Total Quantity Unit Wt/Vol					
20. Facility Owner or Operator: Certification of receipt of materials covered by this manifest except as noted in item 16. Printed/Typed Name: Thomas A. Hansen Signature: [Signature] Month: 12 Day: 22 Year: 97					

JH
DRUM PROCESSING LOG (LST WASTE)

Shipment No: PDC-1-0

Treatability

Page of

Generator No: RS 223

LOS ALAMOS

55 GALLONS							30 GALLONS						
DRUM TYPES	EX	MI	RE	EB	RB	MB		EX	MI	RE	EB	RB	MB
TOTALS													
Q#	IN		OUT		TYPE	SIZE	Q#	IN		OUT		TYPE	SIZE
1					TRASH	30							
2					TRASH	30							
3					TRASH	30							
4					SCRAP METAL	55							
5					TRASH	55							
6					GLOVES RAGS METAL	85							
7					TRASH	BOX							

WASTE DATA FORM

COPY

Container #: C91021710 <i>PF DM #</i> <i>PDC-1-0 #1</i> WDR #: 1000736 <i>(30gml)</i> DIS/TRE #:	WMC: FUEHRER MANDY Z #: 084661 Phone: 54591 TA: 16 Building: 243 Room: 122
---	---

WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA: NO

Shipping Name: NON-REGULATED SOLID

Hazard Class : 99	DOT ID# :	Packing Group : NONE
Secondary Label :		
Technical Name :		
Additional Desc :		
Haz Substance :	ERG# :	LSA/SCO Group :

Waste Code: M1 - CHEMICAL/RAD WASTE Storage Code: GF RGN #: 24	Other Con #: Container Type: DM Volume: 30G Container Gross Wgt: 53p Net Wgt: 23p Reviewed By: 090019 Data Entry By: 111093 DOT Check By: Picked Up By/Date&Time: 088896 / 01-OCT-91 00:00 Load Check By/Date: 109152 / 01-OCT-91 Pickup Update Check By: Off-Site Check By/Date: Update By/Date: Final Update Check By:
Treat/Disp Loc: Transported By: Other Document: AreaG/J Loc: Treat/Disp By: Treat/Disp Date: TSDF Date: Destruction #: Destruction Date:	

Item 2521 : TRASH W/U238, BARIUM NITRATE

Generator: HORAK HENRY LOUIS

WPN: 359

RAD Code: U238

U234

H3

TC99

Phy_state: S

6.18E-09

6.96E-10

6.11E-09

3.48E-10

Group: WX1

Volume: 30 G

TBq

TBq

TBq

TBq

1.67E-07 Ci

1.88E-08 Ci

1.65E-07 Ci

9.40E-09 Ci

Phone: 75768

Weight: 23 P

1.60E-02 nCi/G

1.80E-03 nCi/G

1.58E-02 nCi/G

9.01E-04 nCi/G

CONTAINER SUMMARY

C91021710

P: 2

RAD Code : H3	6.11E-09 TBq	1.65E-07 Ci	1.58E-02 nCi/G
TC99	3.48E-10 TBq	9.40E-09 Ci	9.01E-04 nCi/G
U234	6.96E-10 TBq	1.88E-08 Ci	1.80E-03 nCi/G
U238	6.18E-09 TBq	1.67E-07 Ci	1.60E-02 nCi/G
TOTAL:	1.33E-08 TBq	3.60E-07 Ci	3.45E-02 nCi/G

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)	APPROVER SIGNATURE	DATE APPROVED
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HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	. E +/-	. E +/-
BETA-GAMMA CONT.(DPM/100CM2)	. E +/-	. E +/-
GAMMA DOSE RATE(MREM/H)	. E +/-	. E +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME		
SIGNATURE		
DATE		

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

WASTE DATA FORM

COPY

Container #: C91021706 <i>PF Drum # PDC-1-0 #2</i> WDR #: 1000736 (30944) DIS/TRE #:	WMC: FUEHRER MANDY Z #: 084661 Phone: 54591 TA: 16 Building: 243 Room: 122
--	---

WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA: NO

Shipping Name: NON-REGULATED SOLID	
Hazard Class: 99	DOT ID#:
Secondary Label:	Packing Group: NONE
Technical Name:	
Additional Desc:	
Haz Substance:	ERG#:
	LSA/SCO Group:

Waste Code: M1 - CHEMICAL/RAD WASTE Storage Code: GF RGN #: 24	Other Con #: Container Type: DM Volume: 30G Container Gross Wgt: 38p Net Wgt: 8p
Treat/Disp Loc: Transported By: Other Document: AreaG/J Loc: Treat/Disp By: Treat/Disp Date: TSDF Date: Destruction #: Destruction Date:	Reviewed By: 090019 Data Entry By: 111093 DOT Check By: Picked Up By/Date&Time: 088896 / 01-OCT-91 00:00 Load Check By/Date: 109152 / 01-OCT-91 Pickup Update Check By: Off-Site Check By/Date: Update By/Date: Final Update Check By:

Item 2520 : TRASH W/U238,BARIUM NITRATE

Generator: HORAK HENRY LOUIS

WPN: 359

RAD Code: U238

U234

H3

TC99

Phy_state: S

Group: WX1

Volume: 30 G

2.15E-09 TBq

2.42E-10 TBq

2.12E-09 TBq

1.21E-10 TBq

5.81E-08 Ci

6.54E-09 Ci

5.74E-08 Ci

3.27E-09 Ci

Phone: 75768

Weight: 8 P

1.60E-02 nCi/G

1.80E-03 nCi/G

1.58E-02 nCi/G

9.01E-04 nCi/G

CONTAINER SUMMARY

C91021706

P: 2

RAD Code :	H3	2.12E-09 TBq	5.74E-08 Ci	1.58E-02 nCi/G
	TC99	1.21E-10 TBq	3.27E-09 Ci	9.01E-04 nCi/G
	U234	2.42E-10 TBq	6.54E-09 Ci	1.80E-03 nCi/G
	U238	2.15E-09 TBq	5.81E-08 Ci	1.60E-02 nCi/G
TOTAL:		4.64E-09 TBq	1.25E-07 Ci	3.45E-02 nCi/G

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)	APPROVER SIGNATURE	DATE APPROVED
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HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	. E +/-	. E +/-
BETA-GAMMA CONT.(DPM/100CM2)	. E +/-	. E +/-
GAMMA DOSE RATE(MREM/H)	. E +/-	. E +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME		
SIGNATURE		
DATE		

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

COPY**WASTE DATA FORM**

Container #: C91021713 <i>pr Dm # PDC-1-0 #3</i> WDR #: 1000736 <i>(30 GAL)</i> DIS/TRE #:		WMC : FUEHRER MANDY Z# : 084661 Phone : 54591 TA : 16 Building : 243 Room : 122	
WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA: NO			
Shipping Name: NON-REGULATED SOLID			
Hazard Class : 99		DOT ID# :	
Secondary Label :		Packing Group : NONE	
Technical Name :			
Additional Desc :			
Haz Substance :		ERG# :	
		LSA/SCO Group :	
Waste Code : M1 - CHEMICAL/RAD WASTE Storage Code : GF RGN # : 24		Other Con # : Container Type : DM Volume : 30G Container Gross Wgt: 48p Net Wgt: 18p	
Treat/Disp Loc : Transported By : Other Document : AreaG/J Loc : Treat/Disp By : Treat/Disp Date : TSDF Date : Destruction # : Destruction Date :		Reviewed By : 090019 Data Entry By : 111093 DOT Check By : Picked Up By/Date&Time: 088896 / 01-OCT-91 00:00 Load Check By/Date: 109152 / 01-OCT-91 Pickup Update Check By : Off-Site Check By/Date : Update By/Date : Final Update Check By :	

Item 2522 : TRASH W/U238,BARIUM NITRATE

Generator : HORAK HENRY LOUIS

WPN : 359

Phy_state: S

Group : WX1

Phone : 75768

RAD Code: U238

4.85E-09

TBq

1.31E-07 Ci

1.60E-02 nCi/G

U234

5.44E-10

TBq

1.47E-08 Ci

1.80E-03 nCi/G

H3

4.77E-09

TBq

1.29E-07 Ci

1.58E-02 nCi/G

TC99

2.72E-10

TBq

7.35E-09 Ci

9.00E-04 nCi/G

CONTAINER SUMMARY

C91021713

P: 2

RAD Code :	H3	4.77E-09 TBq	1.29E-07 Ci	1.58E-02 nCi/G
	TC99	2.72E-10 TBq	7.35E-09 Ci	9.00E-04 nCi/G
	U234	5.44E-10 TBq	1.47E-08 Ci	1.80E-03 nCi/G
	U238	4.85E-09 TBq	1.31E-07 Ci	1.60E-02 nCi/G
TOTAL:		1.04E-08 TBq	2.82E-07 Ci	3.45E-02 nCi/G

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)	APPROVER SIGNATURE	DATE APPROVED

HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	. E +/-	. E +/-
BETA-GAMMA CONT.(DPM/100CM2)	. E +/-	. E +/-
GAMMA DOSE RATE(MREM/H)	. E +/-	. E +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME		
SIGNATURE		
DATE		

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

WASTE DATA FORM

COPY

Container #: C92025887 WDR #: Multiple DIS/TRE #:	WMC: Multiple WDRS Z#: Phone: TA: 54 Building: Room: Area L
--	--

WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA: YES

Shipping Name: NON-REGULATED SOLID	
Hazard Class: 99	DOT ID#:
Secondary Label:	Packing Group: NONE
Technical Name:	ERG#:
Additional Desc:	LSA/SCO Group:
Haz Substance:	

Waste Code: M1 - CHEMICAL/RAD WASTE	Other Con #:
Storage Code: GF	Container Type: DM
RG# : 24	Volume: 55G
Treat/Disp Loc:	Container Gross Wgt: 178p
Transported By:	Net Wgt: 228p
Other Document:	Reviewed By: 095169
AreaG/I Loc:	Data Entry By: 111093
Treat/Disp By:	DOT Check By:
Treat/Disp Date:	Picked Up By/Date&Time: 093697 / 19-MAY-92 00:00
TSD# Date:	Load Check By/Date: 109141 / 19-MAY-92
Destruction #:	Pickup Update Check By:
Destruction Date:	Off-Site Check By/Date:
	Update By/Date:
	Final Update Check By:

Item 8308 : SCRAP METAL W/U235,U238,CR,PB,HG,NI

Generator: HOLLAND REDUS F.

WPN: 1907

Phy_state: S

Group: CLS4

Phone: 76753

RAD Code: U235

2.78E-08 TBq

Volume: 55 G

Weight: 100 P

3.50E-01 grams

1.66E-02 nCi/G

U238

6.20E-07 TBq

5.00E+01 grams

3.69E-01 nCi/G

Item 25325 : METAL & SOLDER

Generator: HOLLAND REDUS F.

WPN: 5889

Phy_state: S

Group: CLS4

Phone: 76753

RAD Code: U238

6.03E-09 TBq

Volume: 2 F

Weight: 128 P

1.63E-07 Ci

2.81E-03 nCi/G

U234

7.95E-09 TBq

2.15E-07 Ci

3.70E-03 nCi/G

TC99

3.23E-09 TBq

8.72E-08 Ci

1.50E-03 nCi/G

*NOTE: Item(s) Added From Other Container(s) Into This Container

Item: 25325 Container: C93035959 WDR#: 1005001

CONTAINER SUMMARY

C92025887

P. 2

RAD Code :	TC99	3.23E-09 TBq	8.72E-08 Ci	8.43E-04 nCi/G
	U234	7.95E-09 TBq	2.15E-07 Ci	2.08E-03 nCi/G
	U235	2.78E-08 TBq	3.50E-01 grams	7.28E-03 nCi/G
	U238	6.03E-09 TBq	1.63E-07 Ci	1.58E-03 nCi/G
	U238	6.20E-07 TBq	5.00E+01 grams	1.62E-01 nCi/G
TOTAL:		1.72E-08 TBq	4.65E-07 Ci	4.50E-03 nCi/G
TOTAL:	1.75E-05 Ci	6.48E-07 TBq	5.03E+01 grams	1.69E-01 nCi/G

017
mCi

1.69E-07 mCi/gm

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)	APPROVER SIGNATURE	DATE APPROVED
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HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	[E] +/-	[E] +/-
BETA-GAMMA CONT.(DPM/100CM2)	[E] +/-	[E] +/-
GAMMA DOSE RATE(MREM/H)	[E] +/-	[E] +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME	
SIGNATURE	
DATE	

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

WASTE DATA FORM

COPY

Container #: 908229 <i>PF Dm #</i> <i>PDC-1-0 #5</i> WDR #: 19901016133457 <i>(SS 9mL)</i> DIS/TRE #:	WMC: FUEHRER MANDY Z #: 084661 Phone: 54591 TA: 21 Building: 209 Room: 125
---	---

WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA:

Shipping Name: NON-REGULATED SOLID	
Hazard Class: 99	DOT ID#
Secondary Label:	Packing Group: NONE
Technical Name:	
Additional Desc:	
Haz Substance:	ERG#:
	LSA/SCO Group:

Waste Code: M1 - CHEMICAL/RAD WASTE Storage Code: G6 RGN #:	Other Con #: Container Type: OT Volume: 55G Container Gross Wgt: 126p Net Wgt: 76p
Treat/Disp Loc: Transported By: Other Document: AreaG/J Loc: Treat/Disp By: Treat/Disp Date: TSDF Date: Destruction #: Destruction Date:	Reviewed By: 107905 Data Entry By: 111093 DOT Check By: Picked Up By/Date&Time: 088896 / 23-OCT-90 00:00 Load Check By/Date: Pickup Update Check By: Off-Site Check By/Date: Update By/Date: Final Update Check By:

Item 1010795: TRASH MIXED WASTE/URANIUM, ARSENIC, PHOSPHORUS

Generator: VAUGHAN LARRY LEE

Group: MEE9

Phone: 76285

WPN:

Phy_state: S

Volume: .2082 M

Weight: 76 P

RAD Code: U238

2.55E-10 TBq

6.90E-09 Ci

2.00E-04 nCi/G

TH234

1.24E-08 TBq

3.35E-07 Ci

9.72E-03 nCi/G

CONTAINER SUMMARY

908229

P: 2

RAD Code : TH234	1.24E-08 TBq	3.35E-07 Ci	9.72E-03 nCi/G
U238	2.55E-10 TBq	6.90E-09 Ci	2.00E-04 nCi/G
TOTAL:	1.27E-08 TBq	3.42E-07 Ci	9.92E-03 nCi/G

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)	APPROVER SIGNATURE	DATE APPROVED
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HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	E +/-	E +/-
BETA-GAMMA CONT.(DPM/100CM2)	E +/-	E +/-
GAMMA DOSE RATE(MREM/H)	E +/-	E +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME		
SIGNATURE		
DATE		

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

COPY

WASTE DATA FORM

Container #: 89367800 <i>PF # PDC-1-0 #6</i> WDR #: 3792 <i>(859m)</i> DIS/TRE #:	WMC: FUEHRER MANDY Z #: 084661 Phone: 54591 TA: 50 Building: 1 Room: 116
---	---

WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA: YES

Shipping Name: NON-REGULATED SOLID

Hazard Class.: 99	DOT ID#:	Packing Group: NONE
Secondary Label:		
Technical Name:		
Additional Desc:		
Haz Substance:	ERG#:	LSA/SCO Group:

Waste Code: M1 - CHEMICAL/RAD WASTE Storage Code: MW6 RGN #:	Other Con #: Container Type: OT Container Gross Wgt: 204p Volume: 85G Net Wgt: 84p
Treat/Disp Loc: Transported By: Other Document: AreaG/J Loc: Treat/Disp By: Treat/Disp Date: TSDF Date: Destruction #: Destruction Date:	Reviewed By: 113170 Data Entry By: 111093 DOT Check By: Picked Up By/Date&Time: 092156 / 09-AUG-89 00:00 Load Check By/Date: Pickup Update Check By: Off-Site Check By/Date: Update By/Date: Final Update Check By:

Item 1039563: *rags, plastic, and gloves JCK 12/17/97*
~~HAZARDOUS WASTE, SOLID, N.O.S (CHROMIUM)~~

Generator:	Group: HSE7	Phone:
WPN:	Volume: .0757 M	Weight: 84 P
RAD Code: H3	Phy_state: S	
PU239	4.81E-09 TBq	3.41E-03 nCi/G
AM241	2.40E-09 TBq	1.70E-03 nCi/G
	3.39E-09 TBq	2.40E-03 nCi/G

CONTAINER SUMMARY

89367800

P: 2

RAD Code :	AM241	3.39E-09 TBq	9.15E-08 Ci	2.40E-03 nCi/G
	H3	4.81E-09 TBq	1.30E-07 Ci	3.41E-03 nCi/G
	PU239	2.40E-09 TBq	6.48E-08 Ci	1.70E-03 nCi/G
TOTAL:		1.06E-08 TBq	2.86E-07 Ci	7.51E-03 nCi/G

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)

APPROVER SIGNATURE

DATE APPROVED

HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	E +/-	E +/-
BETA-GAMMA CONT.(DPM/100CM2)	E +/-	E +/-
GAMMA DOSE RATE(MREM/H)	E +/-	E +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME		
SIGNATURE		
DATE		

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

WASTE DATA FORM

COPY

 Container #: C91021717 *PF dm #*
PDC-1-0 #7

WDR #: 1000736

DIS/TRE #:

 WMC : FUEHRER MANDY
 Z# : 084661
 Phone : 54591

 TA : 16
 Building: 243
 Room: 122

WASTE GENERATED OR ACCUMULATED IN A RADIOACTIVE MATERIALS MANAGEMENT AREA: NO

Shipping Name: NON-REGULATED SOLID

 Hazard Class : 99 DOT ID# : Packing Group : NONE
 Secondary Label :
 Technical Name :
 Additional Desc :
 Haz Substance :
 ERG# :
 LSA/SCO Group :

 Waste Code: M1 - CHEMICAL/RAD WASTE
 Storage Code: GF
 RGN #: 24

 Other Con #:
 Container Type: DM Volume : 40F
 Container Gross Wgt: 376p Net Wgt: 176p

 Treat/Disp Loc :
 Transported By :

 Reviewed By : 090019
 Data Entry By : 111093
 DOT Check By :

 Other Document :
 AreaG/J Loc :

 Picked Up By/Date&Time: 088896 / 01-OCT-91 00:00
 Load Check By/Date: 109152 / 01-OCT-91
 Pickup Update Check By :

 Treat/Disp By :
 Treat/Disp Date :

Off-Site Check By/Date :

 TSDF Date :
 Destruction # :
 Destruction Date :

 Update By/Date :
 Final Update Check By :

Item 2523 : TRASH W/U238, BARIUM NITRATE

Generator : HORAK HENRY LOUIS

WPN : 359

Phy_state: S

Group : WX1

Phone : 75768

RAD Code: U238

4.40E-07 TBq

1.19E-05 Ci

Weight : 176 P

1.49E-01 nCi/G

U234

4.96E-08 TBq

1.34E-06 Ci

1.68E-02 nCi/G

H3

4.33E-07 TBq

1.17E-05 Ci

1.47E-01 nCi/G

TC99

2.47E-08 TBq

6.68E-07 Ci

8.37E-03 nCi/G

CONTAINER SUMMARY

C91021717

P: 2

RAD Code : H3	4.33E-07 TBq	1.17E-05 Ci	1.47E-01 nCi/G
TC99	2.47E-08 TBq	6.68E-07 Ci	8.37E-03 nCi/G
U234	4.96E-08 TBq	1.34E-06 Ci	1.68E-02 nCi/G
U238	4.40E-07 TBq	1.19E-05 Ci	1.49E-01 nCi/G
TOTAL:	9.47E-07 TBq	2.56E-05 Ci	3.21E-01 nCi/G

EM-SWO APPROVAL

EM-SWO APPROVAL STATEMENT: MY SIGNATURE CERTIFIES THAT THE WASTE DESCRIBED ON THIS APPLICATION IS ACCEPTABLE, AS DESCRIBED, FOR STORAGE BY EM-SWO RADWASTE SECTION

EM-SWO APPROVER(PRINT OR STAMP)	APPROVER SIGNATURE	DATE APPROVED

HEALTH PHYSICS INFORMATION

SITE	GENERATOR SITE	RECEIVING SITE
ALPHA CONTAMINATION(DPM/100CM2)	. E +/-	. E +/-
BETA-GAMMA CONT.(DPM/100CM2)	. E +/-	. E +/-
GAMMA DOSE RATE(MREM/H)	. E +/-	. E +/-
SURVEY METER MODEL/PROPERTY NO.		

THE DATA IN THIS SECTION WERE COLLECTED AS PRESCRIBED IN APPROVED PROCEDURES

PRINTED NAME		
SIGNATURE		
DATE		

STORAGE LOCATION INFORMATION

STORAGE DATE	AREA	SHAFT	BLDG.	COLUMN	LAYER	ROW	PAD	POST(S)	LAYER	POSITION

CONTAINER RECEIVED BY:

CONTAINER STORED BY:

Appendix C

Waste Acceptance Criteria
for
Technical Area 54, Area G

LANL WAC

PLAN-WASTEMGMT-002. R.1
January 1997

5. LOW-LEVEL SOLID RADIOACTIVE WASTE

Low-level solid radioactive waste (LLW) is solid waste that contains radioactivity and is not classified as high-level waste, TRU waste, spent nuclear fuel, or tailings from the milling of uranium or thorium ore. LLW may include test specimens of fissionable material, if it was irradiated for research and development purposes, but not if it was used for producing power or plutonium, provided that the concentration of TRU radionuclides is less than 100 nCi of alpha activity per gram of waste at the time of assay.

5.1 Container Requirements

All shipments of LLW destined for disposal having a radionuclide concentration in excess of 2 nCi/g must be packaged to comply with applicable DOT specifications in 49 CFR Part 173, Subpart H. WASTE ~ 85/g

5.1.1 General Requirements

Waste must be packaged such that it does not present a hazard during handling or disposal operations. Packages used for waste must meet the following requirements:

- Be made of a material that will not react with the waste
- Be of sufficient thickness that any deformation is within the design parameters
- Be in good condition, with no leaks, rusting, dents, bulges, or other structural defects that could impair the integrity or safe handling of the container
- Be filled to more than 90-percent capacity (have less than 10-percent void space)

The following sections describe the packaging requirements for routine LLW, followed by unique requirements for specific waste types.

5.1.2 Compactible LLW

The requirements for compactible LLW are in Chapter 6.

5.1.3 Noncompactible LLW

Noncompactible LLW may be packaged in either metal boxes, metal drums, or bulk packaging. Containers should be as full as possible with minimum void space. Generators should contact EM-SWO personnel for guidance if they find it difficult to package any noncompactible items and/or minimize the void space.

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Packages consisting mainly of the following items are considered to be noncompactible:

- Metal
- Wood
- Soil
- Concrete
- Items that have already undergone size-reduction

5.1.4 Dumpsters

Noncompactible waste may be placed in specially marked radioactive waste dumpsters. Waste placed in a dumpster must be packaged in any of the following:

- Plastic-lined cardboard boxes
- Plastic bags
- Plastic wrapping
- Plastic-lined cardboard drums less than 10 gallons

Items placed in the dumpster must not be so large as to interfere with unloading of the waste. Items placed in the dumpster must not include any of the following:

- Hazardous waste
- TRU waste
- Asbestos
- PCBs
- Beryllium
- Infectious/medical/biological waste
- Tritium waste greater than or equal to 20 mCi/m³ concentration
- Unpackaged waste
- Remote-handled waste (> 200 mrem/hr on contact with package)

Noncompactible waste must not be mixed with compactible waste in a dumpster.

5.1.5 Irradiation Sources

Many irradiation sources require special packaging because of their high activity concentration and/or their high external dose rates. For this reason, generators who wish to dispose of irradiation sources are asked to notify EM-SWO personnel before submitting the CWDR for approval.

5.1.6 Beryllium

Beryllium waste must be double-bagged and packaged in 30-gallon or 55-gallon, DOT-approved metal drums.

5.1.7 Uranium Chips and Turnings

Uranium chips and turnings packaged in diesel oil are no longer acceptable for storage. Contact EM-SWO for guidance on packaging this waste stream for disposal at Area G.

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5.2 Package Weight

Packages must not exceed the rated capacity of the container based on DOT-specified package certification tests for the contained material. The total weight limit for a dumpster of noncompactible waste is 2250 kg (5000 lb).

5.3 Package Content

General restrictions on radionuclide content relate to the following:

- The exclusion of TRU waste
- The exclusion of greater than Class C (GTCC) waste
- Criticality safety
- ALARA considerations for personnel exposure

Table S-1, developed by EM-SWO personnel, provides a description of radiological assay detection methods that are appropriate and recommended for identifying and quantifying radionuclides in low-level waste.

5.3.1 TRU Radionuclides

For waste to be classified as LLW, the concentration of alpha-emitting transuranium radionuclides with half-lives greater than 20 years must not exceed 100 nCi/g of waste. TRU-contaminated waste cannot be disposed of at TA-54, Area G, when the activity concentrations exceed 100 nCi/g. The WAC for TRU waste is in Chapter 4 of this document. TRU radionuclides that have been identified as limiting isotopes for the radiological performance assessment of TA-54, Area G are listed in Table S-2.

5.3.2 GTCC Radionuclides

Waste with GTCC concentrations of radionuclides, as described in 10 CFR § 61.55, will not be accepted for disposal at Area G. The Class C concentration limits for various radionuclides are listed in Table S-3.

5.3.3 Non-TRU Radionuclides

Non-TRU radionuclides that have been identified as the key limiting isotopes for the radiological performance assessment of TA-54, Area G, are listed in Table S-3. Generators must ask EM-SWO for special approval of their waste if it has non-TRU radionuclide concentrations exceeding the upper limits in Table S-4. It is important that EM-SWO receives accurate data on these high concentrations of radioactive waste; therefore, Table S-1 should be used to determine the preferred radiological assay method.

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TABLE 5-1

Radiological Assay Methods for Characterization of Low-Level Waste

Radiation Type	Typical Radionuclides	Contamination	Appropriate Detection Instrumentation
Alpha ^a	Isotopes of Am, Pu, U, Th, Ra, Po	Volume	Gas proportional (i.e. gross alpha/beta), liquid scintillation, alpha spectroscopy
Alpha	Isotopes of Am, Pu, U, Th, Ra, Po	Surface	Gas proportional, liquid scintillation, alpha spectroscopy, portable survey meter ^b , smear counter ^b , long range alpha detector (LRAD) ^c
Beta ^a	³ H, ¹⁴ C, ⁹⁰ Sr/Y, ⁹⁹ Tc, fission products	Volume	Liquid scintillation, gas proportional
Beta	³ H, ¹⁴ C, ⁹⁰ Sr/Y, ⁹⁹ Tc, fission products	Surface	Liquid scintillation, gas proportional, portable survey meter, smear counter
Gamma	Most activation and fission products, ²³⁵ U, ²³⁸ U, ²⁴¹ Am	Volume or Surface	Gamma spectroscopy (NaI, GeLi, HPGe)
Neutron	²³⁵ U, ²³⁸ U, ²³⁹ Pu, ²⁴¹ Pu, ²⁵² Cf	Volume or Surface	Passive/active neutron scanner

^a Many radionuclides that are primarily alpha or beta emitters will also emit gamma-rays and/or x-rays a significant fraction of the time, making gamma spectroscopy an appropriate assay method.

^b Portable survey meters and smear counters are designed for detecting radioactive contamination and not for quantifying activity. However, they can be used to *infer* the total activity when the waste stream has been well characterized by other methods. Direct surveys with portable meters and smear counters should be used to determine the activity in waste only when contamination levels are relatively low (i.e. below 10 nCi/g) and appropriate characterization methods are not readily available.

^c The LRAD is a new detection technology that can be used to determine the alpha activity of a surface-contaminated waste stream. New applications for the LRAD are being developed at the Laboratory by NIS-6, Advanced Nuclear Technology Group.

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TABLE S-2

Reportable TRU Radionuclides and Upper Limits

Radionuclide	Upper Limit (Ci/g)
^{237}Np	1.00E-11
^{238}Pu	1.00E-07
^{239}Pu	9.20E-08 1.7×10^{-12}
^{240}Pu	9.20E-08
^{241}Am	9.30E-08 2.4×10^{-12}
^{242}Pu	9.70E-08
^{243}Am	4.55E-08

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TABLE S-3

Class C Concentration Limits for Radionuclides in Volume-Contaminated Solid LLW

Radionuclide	Concentration (Ci/m ³)
¹⁴ C	8
¹⁴ C in activated metal	80
⁶³ Ni in activated metal	220
⁶³ Ni	700
⁶³ Ni in activated metal	7,000
⁹⁰ Sr	7,000
⁹⁴ Nb in activated metal	0.2
⁹⁹ Tc	3
¹²⁹ I	0.08
¹³⁷ Cs	4,600
Alpha-emitting TRU nuclides with half-life greater than 5 yr	100*
²⁴¹ Pu	3,500*
²⁴² Cm	20,000*

SOURCE: {10 CFR § 61.55}

*Units are nCi/g

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TABLE 5-4

Reportable Non-TRU Radionuclides and Upper Limits

Radionuclide	Upper Limit (Ci/g)
^3H	5.00E+00 1.58×10^{-11}
^{14}C	1.10E-08
^{26}Al	5.10E-09
^{36}Cl	9.70E-09
^{40}K	6.10E-08
^{44}Ti	2.90E-08
^{60}Co	3.00E-03
^{63}Ni	1.30E-04
^{76}Se	9.20E-06
^{81}Kr	1.20E-06
^{85}Kr	3.90E-03
^{90}Sr	5.20E-07
^{91}Nb	3.60E-01
^{92}Nb	8.60E-09
^{93}Mo	5.55E-06
^{93}Zr	3.70E-05
^{94}Nb	8.60E-09
^{97}Tc	3.90E-06
^{99}Tc	1.15E-07 1.5×10^{-12}
^{107}Pd	3.00E-04
^{108m}Ag	1.45E-08
^{113m}Cd	1.30E-05
^{129}I	6.20E-08
^{133}Ba	5.80E-04
^{135}Cs	8.50E-06
^{137}Cs	2.50E-07
^{137}La	4.40E-04

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TABLE 5-4

Reportable Non-TRU Radionuclides and Upper Limits

(continued)

Radionuclide	Upper Limit (Ci/g)
^{145}Pm	8.80E-05
^{145}Sm	1.60E-03
^{146}Sm	6.05E-07
^{148}Gd	4.50E-07
^{151}Sm	1.35E-03
^{152}Eu	3.05E-06
^{154}Eu	8.30E-07
^{157}Tb	1.80E-05
^{158}Tb	6.90E-05
^{182}Hf	1.30E-08
^{207}Bi	9.20E-08
^{210}Pb	5.50E-07
^{226}Ra	6.35E-09
^{227}Ac	1.80E-07
^{227}Th	2.90E-08
^{227}Pa	6.40E-09
^{231}Pa	6.10E-09
^{232}Th	4.80E-09
^{232}U	2.00E-08
^{233}U	2.10E-11
^{234}U	7.25E-08
^{235}U	2.35E-08
^{238}U	4.15E-07
^{239}Pu	2.55E-07
^{241}Pu	2.00E-06
^{242}Cf	3.15E-03

 3.7×10^{-12} 1.6×10^{-11}

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5.3.4 Fissile Radionuclides

The 233 and 235 isotopes of uranium are the only fissile isotopes common to the Laboratory with specific activities low enough to present criticality concerns at concentrations less than 100 nCi/g. Therefore, the quantities of ²³³U and ²³⁵U in LLW packages must be restricted to the values listed in Table 5-5.

NOTE: If more than 15 g of these isotopes are packaged together, they may constitute a fissile material under DOT regulations, and may not be acceptable for transport in a strong, tight container such as a cardboard box. (49 CFR § 173.451)

TABLE 5-5

Fissile Radionuclide Limits in LLW Packages

	²³³ U	²³⁵ U	Total
Noncompactible Packages < 55 G	30 grams	50 grams	30 grams
Noncompactible Packages ≥ 55 G	400 grams	700 grams	400 grams
Dumpsters - Total	400 grams	700 grams	400 grams
Individual Packages	30 grams	50 grams	30 grams

5.3.5 Radionuclide Reporting Requirements

Generators must report all radionuclides that meet the following criteria:

- comprise greater than one percent of the total activity
- are listed in either Table 5-2 or Table 5-4 and are present in quantities greater than one percent of the upper limit
- are required to be reported on a shipping paper in accordance with 49 CFR § 173.433 (f)

Daughter radionuclides known to be in equilibrium with a longer-lived parent at the time of assay are not reported. Other daughter radionuclides shall be reported if they meet the criteria above.

If more than one of the radionuclides in Tables 5-2 and 5-4 are known to be in the waste, the sum-of-the-fractions rule applies. The generator should consult EM-SWO personnel if the following equation cannot be met:

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$$\sum_{i=1}^n \frac{C_i}{L_i} \leq 1$$

where

- i = radionuclide
- C_i = concentration (Ci/g)
- L_i = concentration limit from Table 5-2 or Table 5-4 (Ci/g)
- n = the total number of radionuclides present

See Table 5-1 for preferred radiological assay methods.

5.3.6 Thermal Power Limits

The amount of radioactive material in a waste package must be limited such that the heat generation through radiolysis will not compromise either the physical or chemical stability of the waste material.

5.3.7 Restrictions

The following waste types must not be packaged with solid LLW destined for disposal at Area G:

- Complexing and chelating agents (e.g., ethylenediaminetetraacetic acid [EDTA], diethylenetriaminepentaacetic acid [DTPA], citric acid, acetic acid) at concentrations greater than 1 percent by weight of the waste form
- Explosives
- Hazardous waste
- Pathogens, infectious wastes, or other etiologic agents as defined in 49 CFR § 173.386
- Pyrophorics

5.4 Waste Form

All LLW disposed of at TA-54, Area G, must be in solid form to minimize the potential for dispersion or migration into or through the environment. Free liquids and pressurized containers will not be accepted for disposal at Area G. Waste that complies with the following criteria meets this restriction. Powdered waste forms must be packaged to ensure safe handling.

5.4.1 Residual Liquids

Solid LLW containers must contain as little residual liquid as is reasonably achievable. Internal containers (cans, bottles, etc.) must be well drained, but may contain residual liquids. The total residual liquids must not exceed 1

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percent of the volume of the LLW container. Liquids present in quantities greater than 1 percent by volume must be absorbed or stabilized.

5.4.2 Powders and Particulates

LLW containing powders, ashes, and other particulates of respirable size must be packaged in such a manner that the particulate portion of the waste will not be a hazard if the container is breached during handling operations. HEPA filters are exempted from this criteria.

5.4.3 Pressurized Containers

LLW containing gases must be packaged at a pressure not exceeding 1.5 atmospheres at 20°C (68°F). Empty pressurized containers and gas cylinders can be disposed of if the container or cylinder is punctured or if the valve is open and has a wire inserted through it.

5.5 External Package Contamination/Dose Rate

Removable surface contamination must not exceed the limits established in Table 2-2 of the *LANL Radiological Control Manual*.

5.6 Package Marking and Labeling

All packages of LLW must be marked and labeled according to DOT requirements. In addition, each package must be marked with the following:

- "C" for compactible waste or "NC" for noncompactible waste
- NRC Waste Class as defined in 10 CFR § 61.55
- "CAUTION- RADIOACTIVE WASTE" tape
- Item identification number (barcode) provided by EM-SWO
- Technical area, building, and room number where the waste originated
- Package weight in kilograms
- Contact and 1-m exposure rates in mrem/hr, either written on the package or on a *Health Physics Radioactive Material Tag*
- Major radionuclides in the waste
- Waste generator's name

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NOTE: The label provided by EM-SWO contains all of the required information required except for the date sealed.

Beryllium waste must be marked with the following warning:

**BERYLLIUM - WARNING
INHALATION OF DUST MAY CAUSE LUNG DAMAGE
SUSPECT CARCINOGEN
MAY PREVENT HEALING OF OPEN WOUNDS**

5.7 Waste Handling

Area G has equipment available for the off-loading and handling of waste containers weighing 13,500 kg (15 Tons) or less. If the weight of the waste exceeds the capacity of the equipment listed above, the generator must provide the means to off-load the waste.

5.8 Additional Requirements

5.8.1 Scheduling

Generators must schedule shipments of LLW to TA-54, Area G at least 5 working days in advance. Shipments may be scheduled for receipt at Area G Monday through Thursday from 8:00 to 11:30 A.M. and 1:00 to 3:00 P.M. Contact S-WAST (S-9278) to schedule loads.

5.8.2 CWDRs

For LLW, a CWDR describes a shipment; therefore, a CWDR must not be split into multiple loads. A CWDR is only valid for six (6) months from the date of approval.

5.9 Exemptions/Exceptions

Instructions for applying for exemptions/exceptions to this WAC are in Chapter 21.

Appendix D

Radiation Work Permit

No. 30

RADIATION WORK PERMIT

1. Location R&D Quonset Hut, Nelson Building.
2. Date(s) February 10 - 24, 1998
3. Activity Treatability Study PDC-1-O-T
Solidification/Stabilization of contaminated PPE, plastic sheeting, paper, and scrap metal in accordance with Treatability Study Protocol #PDC-1-O-T, dated February 6, 1998.

Potential Hazards: Contamination from U-238, U-234, H-3, Tc-99, and Th-234.
Contamination from RCRA metals: Cr, Pb, Ba, Ag, Hg, Ni, As

4. Special Requirements:

PPE: Chemical resistant coveralls with hood, shoe covers, chemical resistant gloves, steel toed shoes/boots, full-face air purifying respirator with HEPA and organic vapor cartridges.

Disposal: Treated solids to be held in radioactive storage pending confirmation of regulatory status by analysis.

Other: Place waste packages in containment; place "RADIOACTIVE MATERIALS" sign on barricade; prevent unprotected access during operation. Ventilate work area during operation and discharge air through HEPA filter.

EMERGENCY: In the event of an emergency or any unusual activity, vacate the area and prevent access by others.

5. Handlers:

Tim Kimball

Tom Yarbrough

Maria Jones

Hones Brown

Carl Gordon

6. RSO's Certification:

RSO Signature

Appendix E

Table 1: Processing Sequence Summary

Table 1: Processing Sequence Summary

LANL Container No.	Perma-Fix Inventory No. (Incoming)	Date Received	Waste Stream	Net Mass (kg)	Total Activity (mCi)	Date Treated	Treated Waste Inventory No.	Date Repainted/ Renumbered	Perma-Fix Inventory No. (Outgoing)	Outgoing Net Mass (kg)	Percent Waste in Grout (% by wt)	Outgoing Activity (pCi/g)
89367800	PDC-1-O-6	12/22/97	#1	38.2	3.60E-004	02/13/98	PDC-1-O-6	02/17/98	PDC-1-O-12	86.8	44%	4.1
908229	PDC-1-O-5	12/22/97	#3	34.5	1.25E-004	02/12/98	PDC-1-O-3	02/17/98	PDC-1-O-11	165.9	21%	0.8
C91021710	PDC-1-O-1	12/22/97	#6	10.5	2.82E-004	02/11/98	PDC-1-O-8	02/17/98	PDC-1-O-8	336.8	5.5%	1.9
C91021706	PDC-1-O-2	12/22/97	#6	3.6	4.84E-004	02/11/98	PDC-1-O-9	02/17/98	PDC-1-O-9	319.1	26%	2.4
C91021713	PDC-1-O-3	12/22/97	#6	8.2	3.42E-004	02/11/98	PDC-1-O-8	02/17/98	PDC-1-O-8	Incl. above	Incl. above	Incl. above
C91021717	PDC-1-O-7	12/22/97	#6	80.0	2.86E-004	02/12/98	PDC-1-O-9	02/17/98	PDC-1-O-9	Incl. above	Incl. above	Incl. above
C92025887	PDC-1-O-4	12/22/97	#7	58.2	2.56E-004	02/12/98	PDC-1-O-1	02/17/98	PDC-1-O-10	214.5	27%	1.2

Note: Project generated PPE was solidified in drum PDC-1-O-2 on 2/13/98.

This drum was repainted on 2/17/98 and renumbered as PDC-1-O-13.

It has a net weight of 178.2 kg and an estimated outgoing activity of < 0.1 pCi/g.

Empty drums PDC-1-O-4 and PDC-1-O-5 were repainted on 2/17/98
and renumbered as PDC-1-O-14 and PDC-1-O-15 respectively.

Wooden box PDC-1-O-7 was emptied of waste and surveyed for activity.

Survey results indicate the box is releasable. It will be dismantled and disposed
as non-radioactive debris.

Outgoing specific activity was calculated based on total activity and net mass.

It accounts only for the waste activity, not any naturally occurring activity in the
solidification media.

Table 2: LANL Treatability Study Samples Analytical Results

Waste Stream	Waste Code	RCRA Metal	PAS ⁽¹⁾ TCLP Result (mg/L)	AEN ⁽²⁾ TCLP Result (mg/L)	LDR Limit (mg/L)
#1	D007	Chromium (Cr)	< 0.05	< 0.05	5.0
#3	D008	Lead (Pb)	0.21	< 0.05	5.0
#6	D005	Barium (Ba)	2.1	< 1.0	100.0
#7	D011	Silver (Ag)	< 0.05	< 0.05	5.0

⁽¹⁾ Perma-Fix Analytical Services

⁽²⁾ American Environmental Network (Note: Results reported in µg/L have been converted to mg/L for comparison.)

American Environmental Network

3000 Weston Parkway • Cary, NC 27513 • (919) 677-0090 • Fax (919) 677-0427 • 1-800-444-9919

April 1, 1998

Tom Yarborough
Perma-Fix
1940 NW 67th Street
Gainesville, FL 32653

IEA Project No.: 2403-002
IEA Reference No.: L10146
Client Project I.D.: PDC-1-0-T

Dear Mr. Yarborough:

Transmitted herewith are the results of analyses on four samples submitted to our laboratory.

The samples were received intact.

Analyses were performed according to approved methodologies and meet the requirements of the IEA Quality Assurance Program except where noted. Please see the enclosed reports for your results and a copy of the Chain of Custody documentation.

Thank you for selecting IEA for your sample analysis. Please do not hesitate to call me at 1-919-677-0090 or 1-800-444-9919 should you have any questions regarding this report. We look forward to serving you in the future.

Very truly yours,

IEA, Inc.

Barbara Trulick
Project Manager

IEA/AEN-NORTH CAROLINA CERTIFICATIONS

Certifying State	Program Type	Lab ID #
Alabama	DW	40210
Arizona	DW, WW (Radiolog. Only)	AZ0572
California	DW, WW, HW Radiolog.	1768
Connecticut	DW, WW, Radiolog.	PH-0135
Iowa	WW	352
Kansas	DW, HW, WW, Radiolog.	E-10158
Kentucky	DW	90049
Maryland	DW, Radiolog.	259
Massachusetts	DW, WW	M-NC039
New Jersey	DW, WW Radiolog.	67719 67681
New York	Radiolog.	11422
North Carolina	DW WW Radiolog.	DW 37720 WW 84 Rad 37720
South Carolina	DW, WW, HW	99021
Tennessee	DW UST App List	02914
Utah	Radiolog. RCRA	E-206 E-226
Virginia	DW, Radiolog.	00179
West Virginia	DW, Radiolog.	9908C
Wisconsin	WW	998051010

DW=Drinking Water WW=Wastewater HW=Hazardous Waste Radiolog.=Radiological

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 2403-002
IEA Sample #: L10146-001
Client Name: Perma-Fix
Client Proj. I.D.: PDC-1-0-T
Sample I.D.: PDC-6

Matrix: LEACHATE
Date Received: 03/17/98
Date Sampled: 03/13/98
TCLP Extraction: 03/24/98

Parameter	Method	N.C. Regulatory Quant Level Limit	Result (ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
BARIUM	SW846 6010	10000 1000	1060	03/26/98	03/31/98	SJ	R14810	03269802P

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 2403-002
IEA Sample #: L10146-002
Client Name: Perma-Fix
Client Proj. I.D.: PDC-1-0-T
Sample I.D.: PDC-1
Matrix: LEACHATE
Date Received: 03/17/98
Date Sampled: 03/13/98
TCLP Extraction: 03/24/98

Parameter	Method	N.C. Regulatory Level	Quant Limit	Result (ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
CHROMIUM	SW846 6010	500	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 2403-002
IEA Sample #: L10146-003
Client Name: Perma-Fix
Client Proj. I.D.: PDC-1-0-T
Sample I.D.: PDC-3

Matrix: LEACHATE
Date Received: 03/17/98
Date Sampled: 03/13/98
TCLP Extraction: 03/24/98

Parameter	Method	N.C. Regulatory Quant Level Limit	Result (ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
LEAD	SW846 6010	500 50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
TCLP METALS REGULATED

IEA Project #: 2403-002

IEA Sample #: L10146-004

Client Name: Perma-Fix

Client Proj. I.D.: PDC-1-0-T

Sample I.D.: PDC-7

Matrix: LEACHATE

Date Received: 03/17/98

Date Sampled: 03/13/98

TCLP Extraction: 03/24/98

N.C.

Regulatory Quant
Level Limit

Result Date
(ug/l) Prepared

Date

Analyzed Analyst

IEA

Run

Prep

Batch

Parameter	Method	500	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
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Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
PREPARATION BLANKS

IEA Project #: 2403-002
Matrix: LEACHATE
Client Name: Perma-Fix
Client Proj. I.D.: PDC-1-0-T
Sample Number: PBW 03269802P

Parameter	Method	Quant Limit	Result (ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
F RIUM	SW846 6010	1000	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
CHROMIUM	SW846 6010	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
LEAD	SW846 6010	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
S LVER	SW846 6010	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P

Corresponding Samples:

L10146-001, L10146-002, L10146-003, L10146-004, L10180-001, L10180-002,
L10181-001

Comments:

Industrial & Environmental Analysts, Inc. (IEA)

Level 2 Metals Results Report

PREPARATION BLANKS

IEA Project #: 2403-002

Matrix: LEACHATE

Client Name: Perma-Fix

Client Proj. I.D.: PDC-1-0-T

Sample Number: TB040 03269802P

Parameter	Method	Quant Limit	Result (ug/l)	Date Prepared	Date Analyzed	Analyst	IEA Run	Prep Batch
BARIUM	SW846 6010	1000	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
CHROMIUM	SW846 6010	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
LEAD	SW846 6010	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P
SILVER	SW846 6010	50.0	BQL	03/26/98	03/31/98	SJ	R14810	03269802P

Corresponding Samples:

L10146-001, L10146-002, L10146-003, L10146-004, L10180-001, L10180-002,
L10181-001

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
 Level 2 Metals Results Report
 LABORATORY CONTROL SAMPLE

IA Project #: 2403-002
 EA Sample #: LCSW 03269802P
 Matrix: LEACHATE

Parameter	Method	Results (ug/l)		Limits		% RCY	Date Analyzed	IEA Run	Prep Batch
		True	Found	Lower	Upper				
PARIUM	SW846 6010	5000	4920	4000	6000	98.5	03/31/98	R14810	03269802P
CELIUM	SW846 6010	5000	5030	4000	6000	101.	03/31/98	R14810	03269802P
LEAD	SW846 6010	5000	5000	4000	6000	100.	03/31/98	R14810	03269802P
SILVER	SW846 6010	500	480.	400	600	96.1	03/31/98	R14810	03269802P

Comments:

Industrial & Environmental Analysts, Inc. (IEA)
Level 2 Metals Results Report
MATRIX SPIKE RESULTS

IEA Project #: 2403-002
IEA Sample #: L10146-002
Matrix: LEACHATE

Matrix Spike Results (ug/l)

Parameter	Method	SA	SR	SSR	%RCY	Date Analyzed	Samp Run	Spike Run
BARIIUM	SW846 6010	100000	BQL	42900	42.9	03/31/98	R14810	R14810
CROMIUM	SW846 6010	5000	BQL	4010	80.2	03/31/98	R14810	R14810
LEAD	SW846 6010	5000	BQL	3730	74.6	03/31/98	R14810	R14810
SILVER	SW846 6010	1000	BQL	684.	68.4	03/31/98	R14810	R14810

$$\%R = ((SSR - SR) / SA) * 100$$

Corresponding Samples:

L10146-001, L10146-002, L10146-003, L10146-004, L10180-001, L10180-002,
L10181-001

Comments:

PAGE 1 OF 1

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Treatability Study
PDC-1-O-T
April 22, 1998

Appendix G

Returned Treatability Study Samples Shipping Manifest