Los Alamos Environmental Restoration Records Processing Facility

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LOS ALAMOS NATIONAL LABORATORY
ENVIRONMENTAL RESTORATION
Records Processing Facility
ER Records Index Form

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THIS FORM IS SUBJECT TO CHANGE. CONTACT THE RPF FOR LATEST VERSION. (JUNE 1997)

(12)

F.Y.I.
Matt

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 1071, SWMU AGGREGATE 0-D
MORTAR IMPACT AREAS
WASTE MANAGEMENT PLAN

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

February 1993

ENVIRONMENTAL RESTORATION PROGRAM
LOS ALAMOS NATIONAL LABORATORY

REVISION 1

Received by ER-RPF
JAN 20 1998
DIC

LANL WASTE MANAGEMENT PLAN REVIEW AND APPROVAL
ER PROGRAM, OU 1071, SWMU AGGREGATE 0-D
FIELD WORK, 1993

Pat Schanley EM-8	Signature	3-19-93 Date
Robert Weeks EM-7	Signature	3-2-93 Date
Lawrence Stretz WX-3	Signature	3-31-93 Date
James Aldrich OU 1071 Project Leader	Signature	26 Feb 93 Date
Robert Vocke EM-13 Group Leader	Signature	4/21/93 Date
Tom Gundersen EM-DO Division Leader	Signature N/A	Date

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ATTACHMENT A: MAP OF AGGREGATE 0-D, MORTAR IMPACT AREAS

PROCEDURE FOR THE HANDLING OF WASTE GENERATED AT SWMU AGGREGATE 0-D DURING FIELD WORK IN SUMMER 1993

1.0 INTRODUCTION

This procedure applies only to waste generated during Operable Unit 1071, 1993 field work at SWMU Aggregate 0-D, Mortar Impact Areas. Field work for Operable Unit 1071 in 1993 will include the characterization and remediation of three Solid Waste Management Units (SWMUs) and one Area of Concern (AOC). These four sites are SWMU 0-011(a), SWMU 0-011(b,e), SWMU 0-011(c), and AOC C-0-020. These SWMUs are classified as part of SWMU Aggregate 0-D (Mortar Impact Areas), and are located to the north of Los Alamos townsite (see Figure 1).

The sites are former army firing ranges used in the 1940s. Records indicate that the sites were used only for the firing of conventional ordnance, and there is no indication of other use that would generate hazardous chemical or radioactive materials. Characterization and remediation activities at SWMU 0-011(d), Barranca Mesa Mortar Impact Area, conducted in the fall of 1992, recovered only inert ordnance fragments from the World War II era. If any additional work is added or the scope of work changes to include unanticipated waste streams (e.g., hazardous chemicals or radionuclides), this procedure will be amended and submitted to EM-8 for approval.

2.0 WASTES GENERATED

There are expected to be two types of wastes generated during the field work at SWMU Aggregate 0-D:

- debris collected during the ordnance sweep and clearance, and
- a small amount of sanitary waste and protective clothing (e.g., gloves, etc.) generated during the subsequent field work at each site.

The estimated amounts, characteristics, and methods for handling and disposal of these two waste streams are discussed below.

2.1 DEBRIS ASSOCIATED WITH ORDNANCE SWEEP AND CLEARANCE

During the course of the ordnance sweep and clearance at SWMU Aggregate 0-D, Mortar Impact Areas, debris will be removed from the surface and near subsurface of each site. The debris is expected to be composed of non-explosive metallic fragments derived from military ordnance, various metallic objects deposited on the site over time,

and miscellaneous trash collected during the ordnance sweep and removal. This waste management plan does not include the disposal of any potentially live ordnance that may be found at the site.

As debris is collected, it will be sorted into two categories: fragments derived from ordnance, and non-ordnance related debris. Metal fragments derived from ordnance and any other material that could contain explosive residue will be packaged on site, transported to TA-16 for flashing at a permitted open burn site, and sent to TA-54 for burial. Group WX-3 will assist in the packaging and transportation of the ordnance related debris.

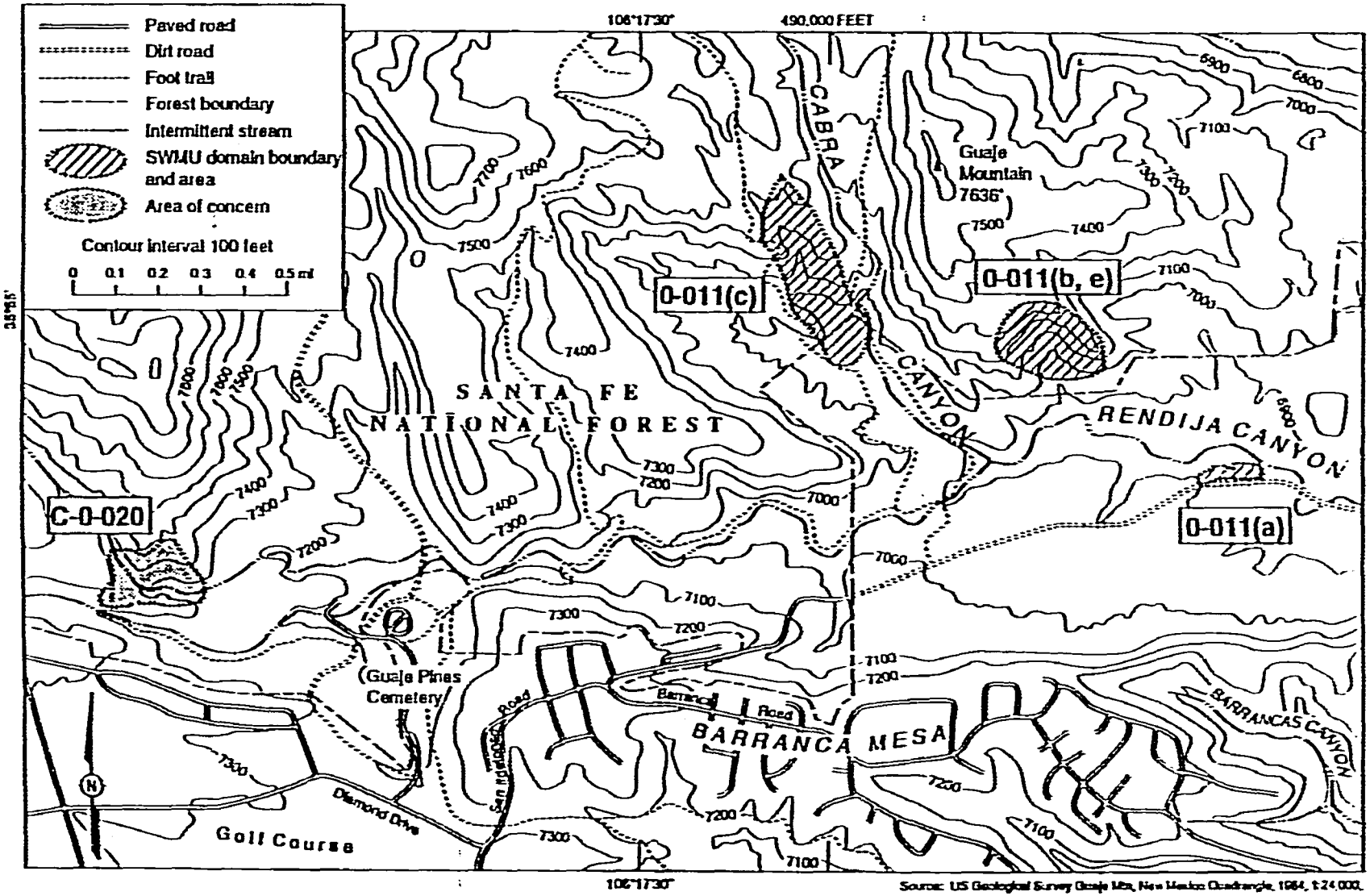
The non-ordnance related debris will be stored at each site in an industrial dumpster or clearly labeled trash can for storage until transport and disposal. Before any receptacle is completely full, a waste profile request will be completed and approved by EM-8. A running inventory of the types of waste material stored in each dumpster or trash can will be kept. It is expected that the waste profile will be non-hazardous and the contents will be transported to the LANL administrative landfill.

In the unlikely event that any potentially hazardous wastes are found, these wastes will be segregated and stored following LANL procedures appropriate to the type of waste found. This plan will be used on an interim basis until changes to this plan concerning the management of hazardous waste can be reviewed and approved by EM-8.

While it is difficult to predict the volume of debris that will be generated during the ordnance sweep and disposal, it is expected that less than five cubic yards of waste will be generated and require disposal.

2.2 DEBRIS ASSOCIATED WITH OTHER FIELD WORK AT SWMU AGGREGATE 0-D

In addition to the ordnance sweep and clearance at SWMU Aggregate 0-D, the field work will include a geophysical survey, geomorphological mapping, soil sampling, and an engineering survey at each site. It is expected that these operations will generate a small amount (less than 10 garbage bags) of uncontaminated trash and uncontaminated protective clothing (e.g., work gloves, etc.). This material will be placed in separate on-site plastic garbage cans for storage until transportation and disposal. Decontamination of sampling equipment will follow ER Program guidelines. Once field work is completed, a waste profile request will be completed and then approved by EM-8, and the material transported for disposal.



ATTACHMENT A. Area map showing locations of PRSs 0-011(a, b, c, e) and C-0-020.

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 1071, SWMU 0-016

WASHING OF LEAD-CONTAMINATED SOIL AT INACTIVE FIRING RANGE

WASTE MANAGEMENT PLAN

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

September 1993

REVISION 2

LANL WASTE MANAGEMENT PLAN REVIEW
ER PROGRAM, OU 1071, SWMU 0-016
1993 FIELD WORK

Pat Shanley EM-13	Signature	9.30.93 Date
Robert Weeks EM-7	Signature EM-7	10-5-93 Date
Robert Gonzales EM-13	For Signature	10-1-93 Date
Jim Aldrich OU 1071 Programmatic Project Leader	Signature	30 SEP 93 Date
Robert Vocke EM-13 Group Leader	Signature	9-30-93 Date

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FIGURE 2: Site Map of SWMU 0-016	

PLAN FOR THE HANDLING OF WASTE GENERATED AT SWMU 0-016 DURING FALL 1993 FIELD WORK

1.0 INTRODUCTION

This plan applies only to waste generated as a result of 1993 remediation field work at Solid Waste Management Unit (SWMU) 0-016, Inactive Firing Range. This SWMU is located within TA-0, which is a part of Operable Unit (OU) 1071. SWMU 0-016 is located west of Guaje Pines Cemetery (Figures 1 and 2).

The inactive firing range was used for small-arms target practice from the late 1940s until the 1960s. Lead bullets, shot, and casings have not been removed from the site, and lead projectiles are embedded in the earthen berms. The extent of the soil contamination is unknown. This plan addresses wastes associated with the soil washing field activities at SWMU 0-016. The objectives of the field work planned at SWMU 0-016 are to wash the soil that contains lead bullets and shot remaining in the berms and to recover and recycle the lead materials found. All excavated soils will be scanned after washing for possible contamination using a portable field X-ray fluorescence (XRF) detector, and appropriate quality assurance samples will be analyzed by an EPA-certified laboratory.

Lead-contaminated soil at SWMU 0-016 will be cleaned of all cartridges and lead bullets and lead particles to a maximum concentration of 500 ppm for any given volume of soil. The lead will be removed through a soil washing process that is done by a modified sand and gravel plant. Heavy equipment will be used to move the soil into and out of the soil washing apparatus. The soil washing task will be completed by Sierra Rock, Inc., an environmental contractor based in Reno, Nevada.

The plant operates on the principle that most soil particles have average densities in the range of 3 to 4 g/cc while lead is 11.4 g/cc. The plant setup includes two circulation ponds which are lined with impermeable liners. Because all previous small-arms range cleanups performed with this system have resulted in final lead concentrations considerably below 500 ppm, the soil cleaned at this SWMU will also probably fall well below this level. The soil washing machinery and the twin settling ponds form a closed system. All lead washed from the soil is output to 55-gallon storage drums from the soil washing machinery. All lead generated during the soil washing process will be sent to a recycling center by Johnson Controls, Inc. (JCI).

Soil will be sampled and analyzed on-site by X-ray fluorescence (XRF) methods. Soil samples will be collected throughout the course of the project. An initial phase of sampling will be done to compare background lead levels to those of the berms and to delineate any areas of elevated lead concentrations.

During processing, the cleaned soil will be sampled every 30 to 90 minutes, depending on the rate soil is moving through the system, and analyzed to ensure that it meets specifications. To confirm that all lead-contaminated soil has been removed, the range floor and locations of the former berms will be sampled judgmentally to confirm that the remaining soil is below 500 ppm lead. If the confirmation sampling reveals any location that exceeds the 500 ppm level, the soil in the area of the elevated lead level will be processed and additional confirmation samples taken. This will be repeated until all confirmation samples show levels below 500 ppm.

Soil from the circulation ponds will be gathered and analyzed on a daily basis to ensure that lead levels are below the cleanup levels. Previous experience with this plant has shown that little, if any, lead is released into the recirculating ponds.

For additional information about site background, the soil washing process, and the sampling and analysis strategy, see the attached Voluntary Corrective Action Plan.

2.0 WASTES GENERATED

Up to four types of wastes may be generated during the field work at SWMU 0-016:

lead bullets and shot embedded in the berms;

plastic sheeting used in the containment of recirculating ponds;

protective clothing (e.g., gloves, dust masks) worn during the soil washing operations;

non-hazardous and sanitary waste generated during the field activities.

2.1 Lead Bullets

Excavation of the berms will result in the recovery of spent bullet fragments that are likely to include lead bullets and lead shot. The materials that are recovered will be collected and stored in 55-gallon drums before being sent to a recycling center by JCI.

The volume of lead requiring recycling is unknown.

2.2 Plastic Sheeting

The circulation ponds will be lined with 30-mil continuous plastic sheeting to form an impermeable barrier. The two circulation ponds will be 200 ft x 43 ft x 6 ft and will be lined with approximately 20,000 sq ft of plastic. The plastic sheeting will be disposed according to the type of waste that it contacted. If the field monitoring shows no hazardous constituents are present on the plastic sheeting, it will be treated as non-hazardous waste (see Section 2.4). If necessary, a Waste Profile Request (WPR) form will be completed to identify the waste. The WPR form will be submitted to EM-8 to characterize the waste materials. If the materials are contaminated, a Chemical Waste Disposal Request form will be prepared and submitted to EM-7 for review before any material is shipped.

As appropriate, a Hazardous Materials Transfer form will be completed for MAT-2 approval prior to shipment of materials. Shipping arrangements will be made through MAT-2.

2.3 Protective Clothing

The type of disposal for personnel protective equipment will be dictated by the type of waste generated. If necessary a WPR form will be submitted to EM-8 to characterize the waste materials. If necessary a Chemical Waste Disposal Request form will be prepared and submitted to EM-7 for completeness and correctness review before any material is shipped.

If hazardous constituents are present, a Hazardous Material Transfer form will be completed for MAT-2 approval prior to shipment of materials. Shipping arrangements will be made through MAT-2.

The volume of used protective clothing and disposable sampling equipment that might be generated is unknown. For purposes of planning, it is assumed that one 55-gallon container should be sufficient to contain protective clothing and related material.

2.4 Non-Hazardous Waste

All material known to be uncontaminated, such as lunch wrappers, cans, office paper, coffee grounds, and other waste generated by personnel not engaged in the excavation activities, will be placed in separate on-site waste receptacles and properly disposed.

For purposes of planning, four large trash cans should be sufficient to contain the non-hazardous waste generated during the field activity.

3.0 WASTE MINIMIZATION

Steps to minimize the generation of waste will be taken by the field team. The use of disposable sampling equipment and personal protective equipment will be minimized throughout the remediation. The waste material will be segregated, whenever possible, to minimize the total volume of waste generated. Steps will be taken to avoid the generation of wastes, particularly those associated with the equipment decontamination procedure.

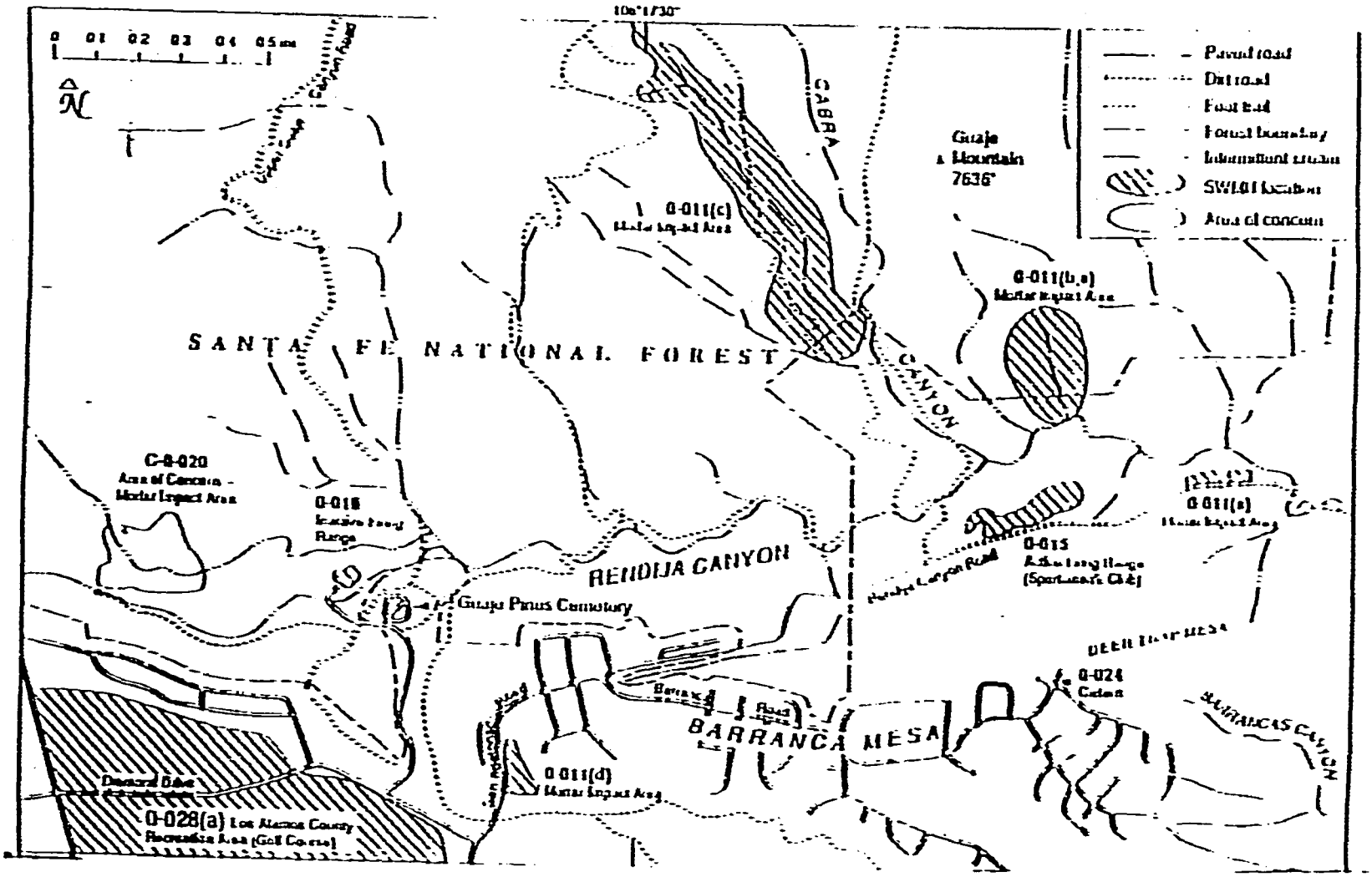

Figure 1. Location of SWMU 0-016 Inactive Firing Range

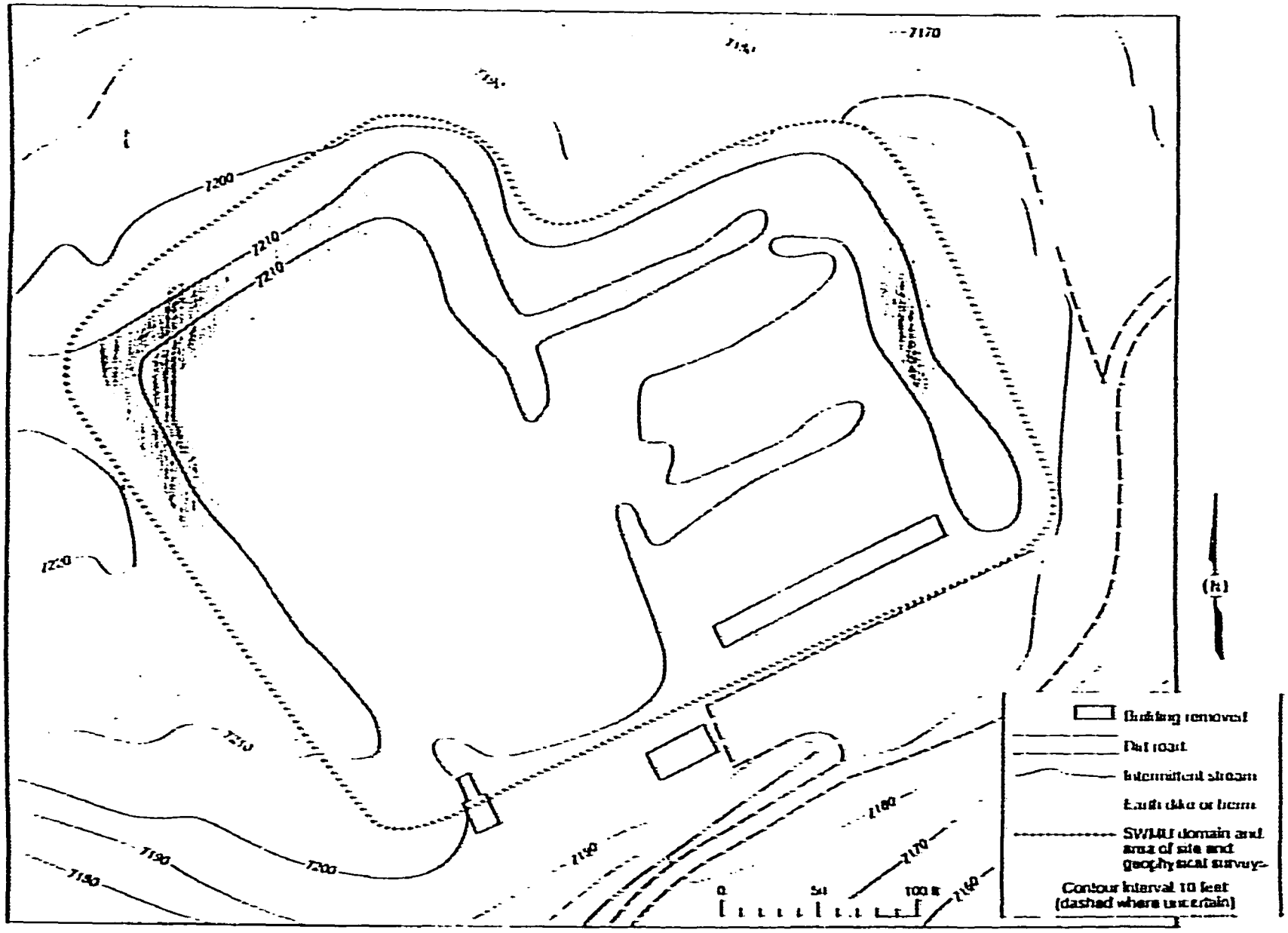

Figure 2. Site map for SWMU 0-016 Inactive Firing Range

ENVIRONMENTAL RESTORATION PROGRAM

OPERABLE UNIT 1071, SWMU 0-016

WASHING OF LEAD-CONTAMINATED SOIL AT INACTIVE FIRING RANGE

WASTE MANAGEMENT PLAN

LOS ALAMOS NATIONAL LABORATORY
LOS ALAMOS, NEW MEXICO

December 1993

REVISION 3

LANL WASTE MANAGEMENT PLAN REVIEW
ER PROGRAM, OU 1071, SWMU 0-016
1993 FIELD WORK

Pat Shanley EM-8	Signature	Date
Robert Weeks EM-7	Signature	Date
Robert Gonzales EM-13	Signature	Date
Jim Aldrich OU 1071 Programmatic Project Leader	Signature	Date
Robert Vocke EM-13 Group Leader	Signature	Date

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ERM

ERM/Golder Los Alamos Project Team
2237 Trinity Drive, Building 2
Los Alamos, New Mexico 87544
Tel: (505) 662-3700
Fax: (505) 662-1398

Golder Associates

6 February, 1997

Mike Tomlinson
Los Alamos County Landfill
P.O. Box 30
Los Alamos, NM 87544

Dear Mr. Tomlinson:

During the week of February 10, approximately 10 tons of plastic sheeting and two pieces of automotive scrap metal will be brought to the Los Alamos County Landfill for disposal. This material was used during the Inactive Firing Range (PRS 0-016) cleanup operations, which involved removal of lead bullets from the soil. Based on process knowledge and site characterization sample data, there are no significant concentrations of lead in this material, and no other contaminants associated with this site. The attached Waste Profile Form indicates that the materials are non-hazardous municipal refuse.

If you have any questions or need further information, please contact me at 662-1338 or Greg Bayhurst at 665-6558.

Sincerely,

Andrew J. Crowder
Task Manager

Project No. 19450
Task No. C9450
File No. 6.3
Date Filed 4/14/97

attach: A/S
cc: Garry Allen, CST-18
Greg Bayhurst, EES-4
John Williams, ERM/Golder
Project File C9450.6.3

LOS ALAMOS NATIONAL LABORATORY
WASTE PROFILE SYSTEM
WPF #: 25383

Activation Date : 19-DEC-96 Expiration Date : 19-DEC-97
Generator : BAYHURST, GREGORY K MS : E525
WMC : BAYHURST, GREGORY K. MS : E525
From : WINCH, MARY JANE
Subject : WASTE PROFILE FORM (WPF)

The Customer Service Team has reviewed and logged the information you have provided on the attached WPF(s). Based on the information you provided, your waste is classified as:

MUNICIPAL REFUSE

You are required to keep a copy of the WPF(s) in your files for at least three years. This WPF(s) is valid for one year or as long as the composition of the waste you have characterized remains the same and the generator remains the same. Should your waste or generator change, please submit a new WPF to CST Customer Service, and attach a copy of the WPF which is being replaced.

PLEASE RETAIN THE ATTACHED WASTE PROFILE FORM FOR YOUR FILES.

LOS ALAMOS NATIONAL LABORATORY
WASTE PROFILE SYSTEM
WPF #: 25383

Generator :	BAYHURST, GREGORY K	MS :	E525	PH :	56558	Z#:	082766
WMC :	BAYHURST, GREGORY K.	MS :	E525	PH :	70010	Z#:	082766
CSR :	WINCH, MARY JANE	MS :	J593	PH :	75905	Z#:	114734
Status :	ACTIVE	Activation Date :	19-DEC-96		Expiration Date:		19-DEC-97

Group : EMER TA : 00 Bldg : 000016 Room: N/A

RMMA : N/A
Waste Accumu : N/A
Method of Char : KNOWLEDGE OF PROCESS (KOP)

Waste Type : PROCESS WASTE/SPENT CHEMICAL
Waste Classes: NON-RADIOACTIVE
ONE TIME GENERATION
Assoc Docum: N/A

Waste Category: NOT APPLICABLE

Waste Sources : REMEDIATION

Waste Matrix : SOLID

Matrix Type : HETEROGENEOUS

Waste/Proc Desc : SCRAP METAL AND PLASTIC SHEET FROM CLEAN UP AT PRS 0-016, INACTIVE FIRING RANGE. MATERIALS WERE USED WITH NON-HAZARDOUS MATERIAL AND CAN BE DISPOSED OF AT COUNTY LANDFILL.

Ignitability : NOT IGNITABLE

Corrosivity : NOT AQUEOUS

Reactivity : NON REACTIVE

Boiling Point : NOT APPLICABLE

Toxicity Characteristic Metals : N/A

Toxicity Characteristic Organic Compounds: N/A

Additional Chemical Constituents and Contaminants :

Constituent	CAS NO	MIN	MAX	UOM
SCRAP METAL		90	95	%
PLASTIC SHEET		5	10	%

Radiological Characteristics: N/A
Waste Water Contaminants: N/A

WASTE CHARACTERIZATION INFORMATION

Radioactivity Category : Non-rad Waste

RCRA Category : Non-hazardous Waste

Misc. Category : MUNICIPAL REFUSE

Waste Classification : MUNICIPAL REFUSE

EPA Hazardous Waste Code : N/A

Los Alamos
NATIONAL LABORATORY

WASTE PROFILE FORM

Account Information: 6E20 MAIV B050

For rapid processing, complete all sections in black or blue ink and mail this form to Waste Services Group at MS J579.

Reference Number:

Waste Generator's Name (Print)	Z Number	Waste Management Coordinator's Name (Print)	Z Number
Greg Bayhurst	082765	Greg Bayhurst	082765

Generator's Group	Generator's Telephone	Generator's Mail Stop	Waste Stream Technical Area	Building	Room
GES-4	5-6554	E525	TA-0	0-016	NA

Waste Accumulation
Check as many as apply.

- [ ] Satellite accumulation area --> site no.: ____
- [ ] Less-than-90-day accumulation area --> site no.: ____
- [ ] Radioactive Materials Management Area (RMMA) --> site no.: ____
- [x] None of the above

Method of Characterization
Check as many as apply.

- [x] Knowledge of Process (KOP)
- [x] Analysis attached --> sample/request no. 2204
- [ ] MSDS attached
- [ ] Request for analysis

Section 1 - Chemical and Physical Characteristics

For help in completing this section of the form, call 5-0223 or 5-1117.

Waste Type
Check only one.

- [ ] Unused/unspent chemical — Check Waste Classes & SOP's only.
- [x] Process waste/spent chemical — Complete all of section 1.

Waste Classes
Check as many as apply.

- [ ] On-going generation
- [x] One-time generation
- [ ] Radioactive (complete sec. 2)
- [x] Non-radioactive
- [ ] Wastewater (complete sec. 3)
- [ ] Classified

Associated Documentation
Check as many as apply.

- [ ] Process SOP --> no.: ____
- [ ] RMMA OP --> no.: ____
- [ ] WM SOP --> no.: ____
- [ ] Other --> ____
- [ ] None --> describe below

Waste Category
Check as many as apply.

- [ ] Solvent
- [ ] Degreaser
- [ ] Dioxin
- [ ] Electroplating
- [ ] Treated hazardous waste residue
- [ ] Explosive process waste
- [ ] Infectious/biological waste
- [ ] Beryllium
- [ ] Asbestos-friable
- [ ] Asbestos-nonfriable
- [ ] Empty containers
- [ ] PCB (<50 ppm)
  - [ ] PCB (50-500 ppm)
  - [ ] PCB (> 500 ppm)
  - Id. no.: ____
- [x] Not applicable --> describe below

Waste Sources
Check as many as apply.

- [ ] Research and development
- [ ] Maintenance
- [ ] Construction
- [ ] Material processing
- [ ] Decon/decom
- [ ] Investigation derived
- [x] Remediation
- [ ] UST - petroleum
- [ ] UST - non-petroleum
- [ ] Generator treatment
- [ ] Interim/permitted treatment
- [ ] Industrial sludge
- [ ] Sanitary sludge
- [ ] Abatement

Waste Matrix
Check only one.

Gas
- [ ] ≤ 1.5 Atmospheres
- [ ] > 1.5 Atmospheres

Liquid
- [ ] Aqueous
- [ ] Organic
- [ ] Inorganic

Solid
- [ ] Powder/ash
- [x] Solid
- [ ] Absorbed Liquid

Matrix Type
Check only one.

- [ ] Homogeneous
- [x] Heterogeneous --> describe below

Waste/Process Description

The material consists of waste plastic and adhered soil from SWMU 0-016. The site has no history of radioactive or chemical processes. The only contaminant of concern at this site is lead from bullets. A composite sample consisting of 5 grabs of soil adhered to the plastic was submitted for TCLP metals analysis. Lead was reported at less than 1 ppm (analysis attached).

Section 1-Chemical and Physical Characteristics (continued)

Ignitability (degrees F)
Check only one.

- ☐ < 73
- ☐ 73-99
- ☐ 100-139
- ☐ 140-200
- ☐ > 200
- ☐ Ignitable solid
- ☐ DOT oxidizer
- ☒ Not ignitable

Corrosivity (pH)
Check only one.

- ☐ ≤ 2.0
- ☐ 2.1-4.0
- ☐ 4.1-6.0
- ☐ 6.1-9.0
- ☐ 9.1-12.4
- ☐ ≥ 12.5
- ☐ Liquid corrosive to steel
- ☒ Not aqueous

Reactivity
Check as many as apply.

- ☐ Unstable
- ☐ Water reactive
- ☐ Pyrophoric
- ☐ Cyanide bearing
- ☐ Sulfide bearing
- ☐ Shock sensitive
- ☐ Explosive - class _____
- ☒ Non-reactive

Boiling Point (degrees F)
Check only one.

- ☐ ≤ 95
- ☐ > 95
- ☒ Not applicable

Identify presence of contaminants.			Minimum		Maximum	Unit (ppm or % only)	Analytical method	
Toxicity Characteristic Metals								
Arsenic	☐ None	☒ ≤ 5.0 ppm	1.0	to	1.0	ppm	☒ TCLP	☐ Total
Barium	☐ None	☒ ≤ 100.0 ppm	1.8	to	1.8	ppm	☒ TCLP	☐ Total
Cadmium	☐ None	☒ ≤ 1.0 ppm	0.1	to	1.0	ppm	☒ TCLP	☐ Total
Chromium	☐ None	☒ ≤ 5.0 ppm	0.2	to	0.2	ppm	☒ TCLP	☐ Total
Lead	☐ None	☒ ≤ 5.0 ppm	1.0	to	1.0	ppm	☒ TCLP	☐ Total
Mercury	☐ None	☒ ≤ 0.2 ppm	0.005	to	0.005	ppm	☒ TCLP	☐ Total
Selenium	☐ None	☒ ≤ 1.0 ppm	1.0	to	1.0	ppm	☒ TCLP	☐ Total
Silver	☐ None	☒ ≤ 5.0 ppm	0.1	to	0.1	ppm	☒ TCLP	☐ Total
Toxicity Characteristic Organic Compunds								
Benzene	☐ None	☐ ≤ 0.5 ppm		to			☐ TCLP	☐ Total
Carbon tetrachloride	☐ None	☐ ≤ 0.5 ppm		to			☐ TCLP	☐ Total
Chlorobenzene	☐ None	☐ ≤ 100.0 ppm		to			☐ TCLP	☐ Total
Chloroform	☐ None	☐ ≤ 6.0 ppm		to			☐ TCLP	☐ Total
Cresol	☐ None	☐ ≤ 200.0 ppm		to			☐ TCLP	☐ Total
1,4-Dichlorobenzene	☐ None	☐ ≤ 7.5 ppm		to			☐ TCLP	☐ Total
1,2-Dichloroethane	☐ None	☐ ≤ 0.5 ppm		to			☐ TCLP	☐ Total
1,1-Dichloroethylene	☐ None	☐ ≤ 0.7 ppm		to			☐ TCLP	☐ Total
2,4-Dinitrotoluene	☐ None	☐ ≤ 0.13 ppm		to			☐ TCLP	☐ Total
Hexachlorobenzene	☐ None	☐ ≤ 0.13 ppm		to			☐ TCLP	☐ Total
Hexachlorobutadiene	☐ None	☐ ≤ 0.5 ppm		to			☐ TCLP	☐ Total
Hexachloroethane	☐ None	☐ ≤ 3.0 ppm		to			☐ TCLP	☐ Total
Methyl ethyl ketone	☐ None	☐ ≤ 200.0 ppm		to			☐ TCLP	☐ Total
Nitrobenzene	☐ None	☐ ≤ 2.0 ppm		to			☐ TCLP	☐ Total
Pentachlorophenol	☐ None	☐ ≤ 100.0 ppm		to			☐ TCLP	☐ Total
Pyridine	☐ None	☐ ≤ 5.0 ppm		to			☐ TCLP	☐ Total
Perchloroethylene or tetrachloroethylene	☐ None	☐ ≤ 0.7 ppm		to			☐ TCLP	☐ Total
Trichloroethylene	☐ None	☐ ≤ 0.5 ppm		to			☐ TCLP	☐ Total
2,4,5-Trichlorophenol	☐ None	☐ ≤ 400.0 ppm		to			☐ TCLP	☐ Total
2,4,6-Trichlorophenol	☐ None	☐ ≤ 2.0 ppm		to			☐ TCLP	☐ Total
Vinyl chloride	☐ None	☐ ≤ 0.2 ppm		to			☐ TCLP	☐ Total

Additional Chemical Constituents and Contaminants (for hazardous constituents, see AR 10-3, Appendix A)
List all other constituents (including inerts) not identified above and attach applicable analyses.

Name of constituent	Cas no. (optional)	Minimum		Maximum	Unit (ppm or % only)
Plastic		75	to	85	%
Soil		15	to	25	%
			to		
			to		
			to		
			to		
			to		
			to		
			to		

Section 2- Radiological Characteristics

For help in completing this section of the form, call 5-WAST or 5-4000.

	Range minimum		maximum	Unit (Ci/g or Ci/l)
General				
☐ Alpha		to		
☐ Beta		to		
☐ Gamma		to		
TRU radionuclides				
☐ None present				
☐ Am-241		to		
☐ Am-243		to		
☐ Cf-249		to		
☐ Cf-251		to		
☐ Cm-243		to		
☐ Cm-245		to		
☐ Cm-247		to		
☐ Pu-238		to		
☐ Pu-239		to		
☐ Pu-240		to		
☐ Pu-242		to		
Fission products				
☐ None present				
☐ Ba-140		to		
☐ Ce-144		to		
☐ Cs-134		to		
☐ Cs-137		to		
☐ I-129		to		
☐ I-133		to		
☐ Kr-85		to		
☐ Nb-95		to		
☐ Ru-106		to		
☐ Sb-125		to		
☐ Sr-90		to		
☐ Tc-99		to		
☐ Zn-93		to		
☐ Zr-95		to		
Activation products				
☐ None present				
☐ As-74		to		
☐ Be-7		to		
☐ C-14		to		
☐ Co-56		to		
☐ Co-57		to		
☐ Co-58		to		
☐ Co-60		to		
☐ Cr-51		to		
☐ Eu-152		to		
☐ Mn-52		to		
☐ Mn-54		to		
☐ Nb-94		to		
☐ Ni-59		to		
☐ Ni-63		to		
☐ Rb-83		to		
☐ Rb-84		to		
☐ Se-75		to		
☐ Sr-82		to		
☐ Sr-85		to		
☐ V-48		to		
☐ Y-88		to		
☐ Zn-65		to		
☐ Zr-88		to		

	Range minimum		maximum	Unit (Ci/g or Ci/l)
Other				
☐ None present				
☐ Am-242		to		
☐ Bi-207		to		
☐ Bi-210		to		
☐ Cf-250		to		
☐ Cf-252		to		
☐ Cm-244		to		
☐ H-3		to		
☐ Pa-231		to		
☐ Pb-210		to		
☐ Po-210		to		
☐ Pu-236		to		
☐ Pu-241		to		
☐ Ra-226		to		
☐ Ra-228		to		
☐ Th-230		to		
☐ Th-232		to		
☐ U-232		to		
☐ U-233		to		
☐ U-234		to		
☐ U-235		to		
☐ U-236		to		
☐ U-238		to		
Add'l radionuclides				
☐ No additional radionuclides present				
		to		
		to		
		to		
		to		
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		to		
		to		

Contamination Type: *Check as many as apply.*

☐ Volume Contamination

☐ Surface Contamination

Section 3 - Wastewater Characteristics

For help in completing this section of the form, call 7-4301.

Identify presence of contaminants			Minimum	Maximum	Unit (ppm or % only)	Analytical method
Aluminum	☐ None	☐ < 5.0 ppm	_____	to _____	_____	☐ TCLP ☐ Total
Boron	☐ None	☐ < 5.0 ppm	_____	to _____	_____	☐ TCLP ☐ Total
Cobalt	☐ None	☐ < 1.0 ppm	_____	to _____	_____	☐ TCLP ☐ Total
Copper	☐ None	☐ < 1.0 ppm	_____	to _____	_____	☐ TCLP ☐ Total
Vanadium	☐ None	☐ < 0.10 ppm	_____	to _____	_____	☐ TCLP ☐ Total
Zinc	☐ None	☐ < 95.4 ppm	_____	to _____	_____	☐ TCLP ☐ Total

Maximum daily flow when discharge occurs: _____ ☐ Gallons ☐ Liters

Average daily flow when discharge occurs: _____ ☐ Gallons ☐ Liters

Estimated number of days per year that discharge will occur: _____

Estimated total volume per year discharged to the Radioactive Liquid Waste Collection System at TA-50-1: _____ ☐ Gallons ☐ Liters

For TA-55 use only. Wastewater will be discharged through one of the following:

☐ Acid line ☐ Caustic line ☐ Industrial waste line

Section 4 - Additional Information

If additional information is available on the chemical, physical, or radiological character of the waste not covered on this form, provide it below:

WASTE GENERATOR CERTIFICATION: *Based on my knowledge of the waste and/or chemical/physical analysis, I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.*

Signature	Date
Greg Bayhurst	6-26-96

KEMRON Environmental Services
109 Starlite Park
Marietta, Ohio 45750

Phone: (614) 373-4071

KEMRON ENVIRONMENTAL SERVICES

17 JUN 1996 RECEIVED

Los Alamos Nat'l Laboratory
SMO, TA-3, Bldg. 271
MS H865, Drop Point O1U
Los Alamos, NM 87545
Attn: John Miglio

Order #: N6-06-001
Date: June 12, 1996 16:13
Work ID: 2204/MA1VB0500000
Date Received: 06/07/96
Date Completed: 06/12/96

Purchase Order: 7797L0014-8M

Client Code: LANL_295

SAMPLE IDENTIFICATION

Sample Number	Sample Description	Sample Number	Sample Description
01	0100-96-0876-01		

All results for soils/sludges are reported on a dry weight basis, where applicable, unless otherwise specified. This report shall not be reproduced, except in full, without the prior written approval of KEMRON.

Maren M Burchfield
Certified by
Maren M. Burchfield

FIELD COPY

Janet Newlin

6-19-96

June 06, 1996

Request Number: 2204

Los Alamos
NATIONAL LABORATORY

Maren Burchfield
KEMRON
109 STARLITE PARK
MARIETTA, OH 45750

Please analyze the enclosed samples according to the schedule below. These samples are on LANL request no: 2204 per agreement number 7797L0014-9S

7 DAY TURNAROUND, 3 DAY FAX PRELIMINARY, GA, 00-1071

Program fund code: MA1VB0500000

Analysis Type: INORGANIC ANALYSIS

Turn Around Time 7 Days

Screening: Not Required

Approx.Report Due Date: 14-JUN-96

Contact person at CST Adrianna Sparks Mail Stop: H865 Phone: (505) 665-6809

Signature: Adrianna Sparks

Total Containers: 1

Analysis Order Code	Analyte(s)	Sample id	Matrix	Date Sampled	Remarks
METTCLP	STD	0100-96-0876 01	Soil	06/06/96	

CASE NARRATIVE

Kemron Environmental Services
Lab ID #7797L0014-0M

CLIENT: Los Alamos National Laboratory

LANL Request No: 2204

SAMPLE MANAGEMENT:
One soil sample was received at Kemron Environmental Services on 06/07/96.

CLIENT ID:
0100-96-0876

Due to a computer software transition currently in progress at Kemron, sample 0100-96-0876 was analyzed under Kemron ID 96-06-132-01, this number will appear on all raw data. The sample was reported under Kemron ID N6-06-001-01, this number will appear on the summary report and electronic diskette deliverable.

QUALITY CONTROL:
TCLP Metals Analysis:

No technical difficulties were encountered in analysis of this sample set.

SHIPMENT CONDITIONS:
The sample was received intact. The cooler temperature was 21.0 C.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and in completeness, except as detailed in this QC Report.

Laboratory Manager

Date: 6-17-96

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Test Code: TC_ME
Sample Description: 0100-96-0876-01
Test Description: TCLP Metals

Lab No: 01A

Collected: 06/06/96
Category: SOIL

TCLP Extraction Date: 06/10/96
Units: mg/L
Verified: CLC

EPA HW#	CAS#	COMPOUND	RESULT	REGULATORY LIMIT
D004	7440-38-2	Arsenic	<1	5.0
D005	7440-39-3	Barium	1.8	100.0
D006	7440-43-9	Cadmium	<0.1	1.0
D007	7440-47-3	Chromium	<0.2	5.0
D008	7439-92-1	Lead	<1	5.0
D009	7439-97-6	Mercury	<0.005	0.2
D010	7782-49-2	Selenium	<1	1.0
D011	7440-22-4	Silver	<0.1	5.0

NOTES AND DEFINITIONS FOR THIS SAMPLE.
NA = NOT ANALYZED
ND = NOT DETECTED AT OR ABOVE THE METHOD DETECTION LIMIT (MDL)

LOS ALAMOS NATIONAL LABORATORY

WASTE PROFILE FORM

EM-8 USE ONLY
Reference Number

Complete both sides of this form using a black or blue pen. Incomplete forms will be rejected. Send form to ATTN: WPF, MS K490, K490

Division/Group	Telephone	Mail Stop	Technical Area	Building	Room
EES-3	7-8676	C 335	21	210	210

Method of Characterization
- [x] Knowledge of Process (KOP)
- [ ] MSDS attached (optional)
- • OR •
- [ ] Chemical/Physical Analysis (specify below)
- [ ] Request for analysis
- [ ] Analysis attached

Waste Categories *(Choose one or more of the categories below that most accurately describes your waste.)*

[ ] Flammable	[ ] Pesticide	[ ] Photographic	[ ] Spent coolant	[ ] Plastics
[x] Combustible	[ ] Beryllium	[ ] Sanitary	[ ] Aerosol cans	[ ] Filter media
[ ] High explosive	[ ] Asbestos	[ ] Radiochemistry	[ ] Motor oil	[ ] Vacuum filter media
[ ] DOT oxidizer	[ ] Solvent	[ ] Paint waste	[ ] Pump oil	[ ] Cement paste
[ ] Pyrophoric	[ ] Waste rags	[ ] Laboratory trash	[ ] Capacitor oil	[x] Nonsalvageable
[ ] Cyanide	[ ] Glass	[ ] Metallurgic	[ ] UST remediation	[ ] Nonrecyclable
[x] Heavy metal	[ ] Plating solution	[ ] Scrap metal	[ ] Contaminated soils	[ ] Building debris
[ ] Corrosive	[ ] Etchant	[ ] Medical/Biological	[x] Environmental/SWMU	[ ] Firing site debris

General Description *(Provide a general description of the waste and/or waste-generating process below.)*

Trash bags containing ponderosa forest litter (mostly pine needles & cones) and none to a few lead pistol bullets per bag. SWMU 0-016

Waste Description *(Check only one box in each column.)*

Form	Ignitability (F)	Corrosivity (pH)	Reactivity	PCBs
[x] Solid	[ ] < 100°	[ ] ≤ 2.0	[ ] Unstable	[ ] < 50 ppm
[ ] Semisolid/sludge	[ ] 100° to 139°	[ ] 2.1 to 12.4	[ ] Water reactive	[ ] 50 to 500 ppm
[ ] Absorbed liquid	[ ] 140° to 200°	[ ] ≥ 12.5	[ ] Cyanides	[ ] > 500 ppm
[ ] Liquid	[ ] > 200°	[x] Not aqueous	[ ] Sulfides	[x] None
[ ] Gas cylinder or vessel	[x] Not ignitable		[ ] Shock sensitive	
[ ] Multilayered			[ ] Class A or B explosive	
[ ] Suspended solids			[x] Nonreactive	
[ ] Powder or ash				

Waste Origination

A. Is this waste generated in a radiation controlled area? [ ] Yes [x] No

B. If yes, is the waste generated or accumulated in a properly defined, registered radioactive materials management area (RMMA)? (RMMA # _____) [ ] Yes [ ] No

C. If the answer to question A is yes and you have determined that your waste is nonradioactive, provide justification in the additional comments section on the reverse side of this form.

Radioactivity [x] Nonradioactive

[ ] Suspect [ ] Radioactive

Activity Measure	Radiation Type	
[ ] ≤2.0 nCi/g	[ ] alpha	[ ] gamma
[ ] >2.0 nCi/g	[ ] $t^{1/2}$ < 20 yr	[ ] tritium
[ ] >10.0 nCi/g	[ ] $t^{1/2}$ ≥ 20 yr	
[ ] >100.0 nCi/g	[ ] beta	

WASTE GENERATOR CERTIFICATION: *Based on my knowledge of the waste and/or chemical/physical analysis, I certify that the information on this form is correct. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.*

Waste Generator's Name (last, first, middle)	Z Number	Signature	Date
NEWTON, CARL A.	082102	Carl A. Newton	10-4-94

If your waste management coordinator is the custodian of your waste management documentation, provide the name and mail stop of this person (optional). ···>	Name (last, first, middle)	Mail Stop

Toxic Metals *(Indicate if any of the following toxic metals are present in your waste at the posted concentrations.)*

arsenic	☒ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other _____
barium	☒ None	☐ <100.0 ppm	☐ ≥100.0 ppm	☐ TCLP	☐ Other _____
cadmium	☒ None	☐ <1.0 ppm	☐ ≥1.0 ppm	☐ TCLP	☐ Other _____
chromium	☒ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other _____
lead	☐ None	☐ <5.0 ppm	☒ ≥5.0 ppm	☐ TCLP	☒ Other Total
mercury	☒ None	☐ <0.2 ppm	☐ ≥0.2 ppm	☐ TCLP	☐ Other _____
nickel	☒ None	☐ <134.0 ppm	☐ ≥134.0 ppm	☐ TCLP	☐ Other _____
selenium	☒ None	☐ <1.0 ppm	☐ ≥1.0 ppm	☐ TCLP	☐ Other _____
silver	☒ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other _____
thallium	☒ None	☐ <130.0 ppm	☐ ≥130.0 ppm	☐ TCLP	☐ Other _____

Organic Compounds *(Indicate if any of the following organic compounds are present in your waste at the posted concentrations.)*

benzene	☒ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other _____
carbon tetrachloride	☒ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other _____
chlorobenzene	☒ None	☐ <100.0 ppm	☐ ≥100.0 ppm	☐ TCLP	☐ Other _____
chloroform	☒ None	☐ <6.0 ppm	☐ ≥6.0 ppm	☐ TCLP	☐ Other _____
cresol	☒ None	☐ <200.0 ppm	☐ ≥200.0 ppm	☐ TCLP	☐ Other _____
1,4-dichlorobenzene	☒ None	☐ <7.5 ppm	☐ ≥7.5 ppm	☐ TCLP	☐ Other _____
1,2-dichloroethane	☒ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other _____
1,1-dichloroethylene	☒ None	☐ <0.7 ppm	☐ ≥0.7 ppm	☐ TCLP	☐ Other _____
2,4-dinitrotoluene	☒ None	☐ <0.13 ppm	☐ ≥0.13 ppm	☐ TCLP	☐ Other _____
hexachlorobenzene	☒ None	☐ <0.13 ppm	☐ ≥0.13 ppm	☐ TCLP	☐ Other _____
hexachlorobutadiene	☒ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other _____
hexachloroethane	☒ None	☐ <3.0 ppm	☐ ≥3.0 ppm	☐ TCLP	☐ Other _____
methyl ethyl ketone	☒ None	☐ <200.0 ppm	☐ ≥200.0 ppm	☐ TCLP	☐ Other _____
nitrobenzene	☒ None	☐ <2.0 ppm	☐ ≥2.0 ppm	☐ TCLP	☐ Other _____
pentachlorophenol	☒ None	☐ <100.0 ppm	☐ ≥100.0 ppm	☐ TCLP	☐ Other _____
pyridine	☒ None	☐ <5.0 ppm	☐ ≥5.0 ppm	☐ TCLP	☐ Other _____
tetrachloroethylene/perchloroethylene	☒ None	☐ <0.7 ppm	☐ ≥0.7 ppm	☐ TCLP	☐ Other _____
trichloroethylene	☒ None	☐ <0.5 ppm	☐ ≥0.5 ppm	☐ TCLP	☐ Other _____
2,4,5-trichlorophenol	☒ None	☐ <400.0 ppm	☐ ≥400.0 ppm	☐ TCLP	☐ Other _____
2,4,6-trichlorophenol	☒ None	☐ <2.0 ppm	☐ ≥2.0 ppm	☐ TCLP	☐ Other _____
vinyl chloride	☒ None	☐ <0.2 ppm	☐ ≥0.2 ppm	☐ TCLP	☐ Other _____

Hazardous Constituents *(Identify hazardous constituents for F- and K-listed wastes and substances causing waste to exhibit a characteristic.)*

_____ _____ _____

_____ _____ _____

_____ _____ _____

Additional Comments *(Provide comments regarding the chemical or radiological nature of the waste.)*

One 200 grain lead bullet in a bag of pine needles could have a total lead concentration of 1000 ppm. If the bullets is not crushed or divided into fine particles, there will be negligible release to the environment. Quantity of bags is estimated to be 200-300 bags.

Do not write in this box - EM-8 Use only

Waste Classification

☐ Non-RCRA waste	☐ RCRA-regulated solid waste	☐ RCRA-regulated hazardous waste	☐ Radioactive waste
☐ PCB ☐ non-PCB TSCA waste ☐ asbestos	☐ municipal refuse ☐ nonhazardous chemical waste ☐ administratively controlled waste ☐ sanitary/industrial sludges	☐ hazardous waste ☐ mixed low-level waste ☐ mixed transuranic waste	☐ low-level waste ☐ transuranic waste

RCRA Code 1	RCRA Code 2	RCRA Code 3	RCRA Code 4	RCRA Code 5	RCRA Code 6	RCRA Code 7	RCRA Code 8

EM-8 Reviewer's Signature	Date	Cost Center/Program Code for Analysis	Reference Number

Project No. 194500

Task No. 194500

File No. 6.3

Date Filed 11/13/96

ERM/Golder
Project File Records

Project Title: **Firing Range Soils Volume Reduction**

Facility Name: LANL ER Project

Project Manager Signature: Greg Bayhurst

Greg Bayhurst, FU/1 - Field Operations Manager

Division Funding Source: EM/ER

Location/Site: TA-0, Inactive Small Arms Firing Range

Cost Sharing: EM/ER - 33.5 %

Principal Investigator: Greg Bayhurst, (505) 667-3394

Project Type: Process Change

Project Risk: Low

Waste Type: Lead Contaminated Soil

Waste Quantity Reduced: 1,200 cubic Yards

Prepared by:

Troy Eshleman 662-1329, and Andy Crowder

Project Description:

Technical Scope:

The Los Alamos National Laboratory Environmental Restoration Project is engaged in the cleanup of an inactive small arms firing range. Operations to date have involved a physical separation of lead bullets from the fine and coarse soil fractions within the contaminated media. The current separation operation reduced the total volume of contaminated media from 6,000 cubic yards to 1,200 cubic yards. However, this method is no longer effective for further reducing the volume. In the current state, the lead recycle value of the material is too low and the percentage lead by mass must be increased to facilitate recycling. Current options for the material are to either dispose of the material within a RCRA Hazardous Waste Landfill (because analytical results indicate low leachable lead concentrations in the average soil sample, but high concentrations in samples containing bullets), implement a different physical separation method which will be effective in reducing the remaining materials and increasing the recyclable lead yield, or recycle the entire volume of material through a smelting operation if the silica content of the soil proves to be an appropriate feedstock for an identified vendor. Both the physical separation and smelting options are presented below. Smelting is preferred, however, smelting cost estimates vary based silica content of LANL soils and the value of the soil as a feedstock.

Option One

One proposed option is to mobilize the Segmented Gate System (SGS), a physical separation unit, which was successfully utilized last fiscal year to separate radioactive soils from those acceptable to remain onsite. The process feeds contaminated soils over a conveyor belt into an instrumentation chamber where small quantities of soil are screened for specified contaminants. Soil fractions are then separated into "clean" and contaminated streams. The unit currently contains radiation detection instrumentation which will be substituted with a metal detector for this particular site.

The remaining material currently has a low bullet to gravel ratio (an estimated two - three bullets per five gallon bucket). It is anticipated that a 95% reduction in volume will occur, resulting in a "clean" soil fraction and a concentrated lead and gravel fraction more desirable to recycling (smelting) facilities for the lead value. If implemented successfully, the majority of contaminated media will have been eliminated by segregation and recycling. The unit cost of recycling will also decrease due to increased lead concentrations.

Option Two

The second waste minimization option is to ship the entirety of the remaining material to a lead smelting operation. This is the preferred waste minimization option because both the lead and the soil material are feed stock for the recycling operation. The implementation of this option is based upon the smelting facility unit cost for processing the material. This cost is yet to be finalized, and will be a factor of silica value to the smelter rather than the lead recovery value. To implement this option, the smelting cost must be low ($50-60/ton) to offset higher transportation costs as compared to further physical separation.

Cost Worksheet:

Project Costs:

Costed below are the two most likely options which include stabilization and disposal; or separation and recycling. In both cases, the cost of onsite (within firing range boundaries) material handling, health and safety oversight, redistribution of clean soils are paid by the generator and are estimated at $80,000 in cost sharing.

No Further Separation - Disposal Option

If further separation is not implemented the 1,200 cubic yards of soil will be managed as hazardous waste shipped offsite for stabilization and disposal. The estimated costs of handling and disposal are as follows:

Characterization:	$ 8,000
Transportation:	$150,000
Disposal:	$144,000
Total Cost:	**$302,000**

Segmented Gate System Implementation and Recycling

The cost estimate to implement this system is based upon actual costs reported[1] during the FY1996 implementation of the system at TA-33. For some of the cost elements (mobilization and throughput) the lower end of the report results is utilized based upon an assumption of process instrumentation simplification in metal detectors versus radiological instrumentation. The estimated costs are:

Process Mobilization:	$ 70,000
Process Modification:	$ 20,000
Process Operation:	$ 60,000
Recycle Fraction Characterization:	$ 2,000
Recycle Fraction Transportation:	$ 6,000
Recycle Cost:	$ 1,000
Total Cost Estimate:	**$159,000**

Smelting the Remaining Material

Transportation:	$120,000
Smelting:	$ 48,000
Total Cost Estimate:	**$168,000**

Summary

Implementation of further separation or smelting will result in a savings of approximately **$140,000**. Both options are similar in cost and complexity, upon finalization of the smelting costs and vendor quotes the best option from a liability and cost standpoint would be implemented. The project will show a one time ROI of 40%, and a cost sharing of 33.5% by the generator.

[1] Remediation of Uranium Contaminated Soil Using the Segmented Gate System and Containerized Vat Leaching Techniques: A Cost Effectiveness Study, M. Cummings, LA-UR-96-2663.

Firing Range Soils Volume Reduction (29504)

Cost Worksheet 1. Itemized Operating and Maintenance Annual Recurring Costs

Expense Cost Items		Before		After
1 Equipment	$	-	$	-
2 Purchase raw materials and supplies (Boxes & Bags)	$	-	$	-
3 Process operation labor costs				
Utility costs	$	-	$	-
Labor costs			$	159,000.00
Routine maintenance costs for processes	$	-	$	-
4 PPE & related health/safety supply costs	$	-	$	-
5 Waste Management Costs				
Characterization	$	8,000.00	$	-
Transportation	$	150,000.00		
Disposal	$	144,000.00		
6 Recycling Costs				
Material collection/seperation/preparation costs				
a Materal and supply costs	$	-	$	-
b Operating and maintenance costs	$	-	$	-
Vendor costs for recycling	$	-	$	-
7 Administrative/Other costs			$	-
Total Annual Operating Costs, Before/After	$	302,000.00	$	159,000.00
Annual Cost Avoidance (B-A)	$	143,000.00		

Cost Worksheet 2. Itemized Project Funding Requirements

Initial Capital Investment			
1 Design			
2 Purchase	$	-	
3 Installation	$	-	
4 Other Capital Investments (explain)	$	-	
Subtotal: Capital Investment = C	$	-	
Installation Operating Expense			
1 Planning/Procedure Development	$	-	
2 Training	$	-	
3 Misc. supplies	$	-	
4 Startup/Testing	$	-	
5 Readiness review/Management assessments/Administrative costs	$	80,000.00	
6 Other installation operating expenses (vendor and smelting costs)	$	159,000.00	
Subtotal: Installation Operating Expense = E	$	239,000.00	
TOTAL PROJECT FUNDING REQUIREMENT = (C+E)	$	239,000.00	
Cost-Sharing by Implementing Organization	$	80,000.00	33.5%
Total Funding Requested for this Project	$	159,000.00	

Worksheet Summary

	Before Costs	After Cost	One-Time	Cost Savings
Total Project Funding Requirement = (C+E)			$ 239,000.00	
Itemized Operating and Maintenance Costs (annual recurring)				
1 Equipment	$ -	$ -		$ -
2 Purchase raw materials and supplies	$ -	$ -		$ -
3 Process operation labor costs	$ -	$ 159,000.00		$ (159,000.00)
4 PPE & related health/safety supply costs	$ -	$ -		$ -
5 Waste Management Costs	$ 302,000.00	$ -		$ 302,000.00
6 Recycling Costs	$ -	$ -		$ -
7 Administrative/Other costs	$ -	$ -		$ -
Totals	$ 302,000.00	$ 159,000.00	$239,000	$ (96,000.00)
	B	A	C+E	F
Estimated Project Termination/ Disassembly Cost (if applicable) = (D) (Only for projects where L <= 5 years; D = 0 if L> 5 years)	0			
Return on Investment Calculation	39.83%			
Project Implementation Time (months)	12 months			
Useful Project Life = (L)	5 years			