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

1993 OCT
RECEIVED
HAZARDOUS WASTE
PROGRAM

SEP 28 1993

Barbara Hoditschek
RCRA Permits Program Manager
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
1190 St. Francis Drive, P. O. Box 26110
Santa Fe, New Mexico 87502

Carl S
Steve S
Steve A

Dear Ms. Hoditschek:

Enclosed is the Voluntary Corrective Action Plan for the solid waste management unit (SWMU) 0-016 in operable unit (OU) 1071 at Los Alamos National Laboratory. Field work for the voluntary corrective action will begin in early October, 1993. If you require further information on this subject please contact me at 665-7203 or have your staff contact Paul Treat at 667-5808.

Sincerely,

Theodore Taylor
Program Manager
Environmental Restoration Program
Los Alamos Area Office
Department of Energy

Enclosure

cc w/ enclosure:
T. Taylor, ES&H, LAAO
P. Treat, ES&H, LAAO

cc w/o enclosure:
T. Gunderson, EM-DO, UC-LANL, MS J591
T. Shipley, EE-AETO, UC-LANL, MS F641
A. Tiedman, ADO, UC-LANL, MS A120
D. Sankey, FIN-18, UC-LANL, MS A107

6736

LANL ER PROGRAM

OPERABLE UNIT 1071

VOLUNTARY CORRECTIVE ACTION PLAN

SWMU 0-016, INACTIVE FIRING RANGE

September 1993

Revision 0

VOLUNTARY CORRECTIVE ACTION PLAN

SWMU 0-016, INACTIVE FIRING RANGE

1.0 Introduction

Solid Waste Management Unit (SWMU) 0-016 is a former small arms range located west of Guaje Pines Cemetery in Los Alamos, New Mexico. The site, which occupies about two acres, consisted of several small buildings and two earthen berms. At present, only concrete steps, pads, and the earthen berms remain. The target berms contain lead bullets, lead fragments, and particulate lead.

The site was used by Los Alamos National Laboratory (LANL) from the late 1940s to the 1960s for small arms target practice. The earthen berms are estimated to contain about 1800 cubic yards of soil. The soil cover is relatively thin at the site outside of the berms, and much of the SWMU 0-016 ground surface is formed by the Bandelier Tuff. This relatively thin soil cover will reduce the additional volume of soil for soil washing. The objective of this voluntary corrective action (VCA) plan is to reduce the level of lead in the earthen berms and associated soil to levels that would allow the site to be released for public use.

The United States Forest Service (USFS) and the County of Los Alamos have requested the cleanup of the range so that the land may be transferred from the USFS to a local developer, as part of a larger public-private land exchange. This VCA plan is being proposed, instead of following the RFI/CMS process as stated in the Operable Unit (OU) 1071 RFI Work Plan (LANL 1992), because of the time constraints placed on the Environmental Restoration (ER) Program by the pending land exchange.

This VCA plan proposes that the lead be removed from the berms using a soil washing process that has been successfully used at similar small arms firing range sites. This process has been shown to reduce the lead concentration in soils to well below the 500 ppm screening action level (e.g., Saracino and Parent, attached). Soil samples will be taken throughout the soil washing process to gauge its effectiveness and to ensure that no hazardous materials escape to the environment.

1.1 Previous Studies

The USFS conducted a study of the area in 1991. At that time 11 of 21 samples taken from the SWMU failed the TCLP test for heavy metals. This was believed to be due to the presence of lead bullets and fragments within the earthen berms. The USFS stated that the TCLP test did not reproduce the essentially pH-neutral soil conditions at the site and that the lead-contaminated soil did not constitute a release of a hazardous substance under the Comprehensive Environmental Response, Liability, and Compensation Act. In addition, they stated that the lead in the earthen berms does not constitute a threat to the ground water in the area due to the great depth to water (approximately 1300 feet below ground surface). The results of this study were reported by the USFS to the U.S. Coast Guard National Response Center in a letter dated 13 April 1993 (attached).

Studies conducted by the Naval Engineering Laboratory indicate that metallic (elemental) lead is the prime contaminant in small arms firing ranges (Heath *et al.*, attached). Other forms of lead, such as oxidized lead, are not commonly found in small arms ranges and would not be expected to be common in the arid environment found in Los Alamos.

All samples will be analyzed for lead. Ten percent of the samples collected will also be analyzed for compounds commonly found in small arms ranges. This list will include lead, copper, and zinc, the three most common contaminants found in small arms ranges (Heath *et al.*, attached). These additional analyses will serve to provide further evidence that any soil contamination from the small arms range has been remediated during the soil washing process.

1.2 Cleanup Levels

The LANL screening action level (SAL) for lead in soils is 500 ppm. This SAL is derived from a generic facility risk assessment based on the assumption that sites will be designated for residential use. This is also the lower cleanup level established by the U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response Directive 9355.4-02 and the New Mexico Environment Department's approved level for lead in soils. The level of 500 ppm will be used as an upper boundary for lead in soils for this VCA.

It is expected, based upon previous experience with this soil washing process, that cleanup levels well below the 500 ppm level for lead in soil will be achieved at SWMU 0-016.

2.0 Soil Washing Process

Lead will be removed from the earthen berms at SWMU 0-016 by a soil washing process that uses a modified sand and gravel plant to separate metallic lead from the soil. Soil will be transferred from the berms to the soil washing plant using front-end loaders. The soil will be sprayed with water if significant amounts of dust are created during this transfer.

All of the earthen berms at the site and up to one foot of soil from the floor of the firing range will be processed to remove lead. While lead is expected to be concentrated in the berms located at the rear of the small arms range (the backstop berms), this additional soil processing will help to ensure that no lead-contaminated soil will remain at the site.

This soil washing process operates on the principle that most soil particles have average densities of 3 to 4 grams per cubic centimeter (g/cc), while particulate lead has an average density of 11.4 g/cc. This difference in average densities is used to physically separate, concentrate, and remove the fine particulate lead from the soil. Larger lead fragments and bullets will be separated from the coarse fraction of the soil by automated sieves.

The soil washing plant consists of a hopper feeder above a jigging box that is used to sort out coarser material from the soil and to retain larger lead fragments and bullets. After the larger lead fragments and bullets are removed, the remaining soil is fed into two sand screws which, in turn, feed the soil into a series of stacked power hydro-screens with 3/4", 1/4", and 1/8" openings. High-pressure water sprays are used to force the soil through these screens. The finer material that passes through these screens is then sent through a 3-foot diameter centrifugal separator. The centrifugal separator uses water and the greater density of lead to separate out the fine particulate lead.

The washed soil and associated water then flows along a drag tank where most of the soil is removed. Next, the water flows into two large recirculating ponds (200 ft. by 50 ft. each) that are used to separate out the fine soil suspended in the water and to act as reservoirs to recirculate the water used during the soil washing process. The recirculating ponds will be excavated during site preparation. The two recirculating ponds will be lined to prevent the release of any water used in the soil washing process to the environment.

The lead removed from the screens and the centrifugal separator will be placed into 55-gallon drums. The lead will then be sent by Johnson Controls, Inc., to a recycling center.

3.0 Sampling and Analysis

Sampling and analysis will consist of a comprehensive series of field and laboratory analytical techniques. The soil will be sampled as it is processed throughout the course of the project to ensure that the soil washing procedure is effective and that no contaminants are released to the environment during or after the soil washing process. The soil analyses are summarized in Table 1.

Field analyses for lead will be conducted using a Sprectrace 9000 field portable X-ray fluorescence (XRF) instrument configured to detect lead in soils at low levels (below 100 ppm). The XRF and associated equipment will be housed in a portable field trailer set up at the site. A 120-volt power line will be run to the field laboratory to ensure a consistent and reliable source of electricity for the instrumentation.

Soil samples gathered for analyses in an approved environmental laboratory will be sent to the LANL ER Program Sample Coordination Facility for shipment and analysis, as established in the approved procedures published by the ER Program.

All samples will be analyzed for lead. A minority of the samples collected (approximately 10%) will also be analyzed for compounds commonly found in small arms ranges. This list will include copper and zinc.

3.1 Background Sampling

Soil samples will be gathered from areas outside the SWMU boundary from soils similar in composition to those found in the earthen berms. Approximately 20 background soil samples will be collected. These background samples will be analyzed in the field and approximately five will be analyzed by an approved environmental laboratory. The background samples will provide information on natural levels of lead in the area of SWMU 0-016.

3.2 Sampling during Soil Washing

Soil samples will be gathered from the soil washing apparatus on a regular basis. Depending on the rate at which soil is processed by the apparatus, samples will be taken at regular intervals ranging from 30 to 90 minutes. These soil samples will be used to represent a given batch of washed soil and will be analyzed by XRF in the field. If any of these soil samples are not below the cleanup level of 500 ppm, that batch of soil will be reprocessed until the lead levels are within satisfactory limits. Based upon initial contractor estimates of soil processing rates, it is expected that approximately 150 to 200 soil samples will be analyzed in the field during the soil washing process.

Soil from the recirculating 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.

3.3 Airborne Lead Sampling

Airborne lead will be monitored at the site for health and safety reasons and to gauge and prevent any release of airborne lead to the environment. High-volume air samplers will be positioned both upwind and downwind of the site. Samples from the high-volume air samplers will be gathered and analyzed by XRF on a twice-daily basis. If detectable amounts of lead are found to be released during the soil washing process, engineering controls will be undertaken to prevent further airborne release of lead. Since the soil is wetted during the washing process and dry soil will be sprayed with water before handling, it is unlikely that significant amounts of lead will be released to the air. It is expected that approximately 60 to 90

samples will be gathered from the high-volume air samplers and analyzed in the field during the soil washing process.

3.4 Confirmation Sampling

Samples from the washed soil will be gathered after the soil washing process. These samples will be sent to an approved laboratory and used to confirm field analyses. One composite sample will be taken for about every 100 cubic yards of soil processed. Since the expected volume of soil is somewhat less than 2000 cubic yards, approximately 20 confirmation samples will be gathered and analyzed.

4.0 Material Disposition

Upon conclusion of the VCA, the site will contain approximately 2000 cubic yards of washed soil and the water contained in the two recirculating ponds. If the confirmation sampling shows the soil contains lead below the cleanup level, it will be left on-site for use by the new owner. The new owner will use the soil to raise the grade of the access road into the site and will then cover the road with asphalt.

The water in the two recirculating ponds will be allowed to evaporate to prevent discharge of liquid water to the environment. Recirculating pumps and sprays may be used to accelerate the evaporation.

REFERENCE CITED:

Los Alamos National Laboratory (LANL) 1992. "RFI Work Plan for Operable Unit 1071 - Environmental Restoration Program," Los Alamos National Laboratory Report LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992)

TABLE 1
Summary Table
Soil Analyses for SWMU 0-016 VCA

Sample Type	Analytical Method	Quantity	Analytes	Text Section
Background	XRF (field)	20	Pb	3.1
Background	Lab	5	Pb	3.1
Washed Soil	XRF (field)	150-200	Pb	3.2
Airborne Lead	XRF (field)	60-90	Pb	3.3
Confirmation	Lab	20	Pb	3.4
Confirmation	Lab	20	Cu, Zn	3.0

Notes:

All sample quantities are approximate and may vary slightly due to unforeseen field conditions.

A Sprectrace 9000 field portable X-ray fluorescence (XRF) instrument will be used to analyze for lead in soils.

"Lab" denotes samples to be analyzed by an approved environmental laboratory.