CERTIFICATION

I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title: Los Alamos National Laboratory Permit Modification Request

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Environmental Cleanup Program

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Los Alamos National Laboratory Permit Modification Request

No Further Action Proposals

Volume I

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

Produced by the Regulatory Compliance Focus Area

EXECUTIVE SUMMARY

The Los Alamos National Laboratory (the Laboratory) is requesting from the New Mexico Environment Department (NMED) Hazardous Waste Bureau a Class III permit modification for removal of 25 solid waste management units (SWMUs) from Module VIII of the Laboratory's Hazardous Waste Facility Permit.

The Laboratory ER Project has proposed 9 of these 25 SWMUs previously via a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) work plan, RFI report, or a voluntary corrective action completion report. The remaining 16 SWMUs (marked with an asterisk [*]) are being proposed for the first time in this request for permit modification as an attempt by NMED Hazardous Waste Bureau and Laboratory ER Project personnel to make the permit modification process more efficient.

SWMUs are proposed for removal from Module VIII based on one of the following five no further action (NFA) criteria. The SWMUs currently being requested for removal from Module VIII are listed after their respective criterion.

NFA Criterion 1. The site does not exist; is a duplicate of another site; cannot be located, or is located within another site, and has been or will be investigated as part of that site.

SWMU 01-001(m), a septic tank (nonexistent)

NFA Criterion 2. The site was never used for the management (that is, generation, treatment, storage or disposal) of RCRA solid or hazardous wastes and/or constituents.

SWMU 03-046, an active aboveground wastewater treatment tank

SWMU 15-010(c), an active storm drainline and outfall

SWMU 16-026(a2)*, an active storm outfall and associated drainline

SWMUs 16-026(d2, e2, f2, g2, h, k, x)* and 16-030(b, e, f)*, ten outfalls and their associated drainlines

SWMU 16-026(t)*, an active storm outfall and associated drainline

SWMU 20-003(a), a former firing site control building

NFA Criterion 3. The site is not known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment. The term "release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment.

SWMU 08-005, a former incubator used for growing crystals

SWMU C-08-010, the site of a former drum storage area

SWMUs 16-025(e2, f2, h2)*, three areas of potential soil contamination from three former high-explosives storage buildings

NFA Criterion 4. The site is regulated under another state and/or federal authority. If the site is known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment, it has been or will be investigated and/or remediated in accordance with the applicable state and/or federal regulations.

SWMU 15-014(l), an active National Pollutant Discharge Elimination System (NPDES)-permitted outfall

NFA Criterion 5. The site was characterized or remediated in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

SWMUs 00-011(a,e), two former mortar impact areas

SWMU 14-003*, a former burn area for high explosive debris

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1.0 INTRODUCTION

The Los Alamos National Laboratory (the Laboratory) is requesting from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) (formerly the Hazardous and Radioactive Materials Bureau [HRMB]) a Class III permit modification for the removal of 25 solid waste management units (SWMUs) from Module VIII of the Laboratory's Hazardous Waste Facility Permit. The proposals for the removal of these 25 units are based on field investigations, archival investigations, and/or site cleanups performed by the Laboratory's Environmental Restoration (ER) Project.

The definition of a solid waste management unit used in this request for permit modification is from Module VIII, "Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA," of the Laboratory's Hazardous Waste Facility Permit. This definition conforms to the SWMU definition presented in proposed Subpart S of the Resource Conservation and Recovery Act (RCRA) regulations in 40 CFR Part 264 (Federal Register, Vol. 55, No. 145, July 27, 1990) and was used to define SWMUs at the Laboratory. Thus, SWMUs are "any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at or around a facility at which solid wastes have been routinely and systematically released."

Each SWMU proposed in this request for permit modification has been evaluated for potential risks to human health and the ecosystem. Additionally, an assessment has been made of applicable regulations and standards that may be appropriate to each site. Applicable regulations and standards investigated include surface water standards, groundwater standards, air emissions requirements, polychlorinated biphenyl (PCB) management requirements, and underground storage tank (UST) regulations (when applicable). The Laboratory's ER Project has determined that each of the no further action (NFA) proposals for permit modification presented in this request is valid based on human health and ecological evaluations, as well as all other applicable regulations and standards. Documentation supporting each proposed modification is attached.

The ER Project has proposed 9 of the 25 SWMUs in this request previously via a RCRA facility investigation (RFI) work plan, RFI report, or a voluntary corrective action (VCA) completion report. Those 9 SWMUs are 00-011(a,e), 01-001(m), 03-046, 08-005, C-08-010, 15-010(c), 15-014(l), and 20-003(a). The remaining 16 SWMUs are being proposed for the first time in this request for permit modification as an attempt by HWB and Laboratory ER Project personnel to make the permit modification process more efficient. The 16 SWMUs are 14-003, 16-025(e2, f2, h2), 16-026(a2), 16-026(d2, e2, f2, g2, h, k, x), 16-030(b, e, f), and 16-026(t).

1.1 NFA Criteria

Within the Laboratory's ER Project, there are five criteria for proposing NFA for SWMUs. The NMED-HWB and the Laboratory have agreed upon these criteria for determining NFA. The five NFA criteria are listed below.

NFA Criterion 1. The site does not exist; is a duplicate of another site; cannot be located, or is located within another site, and has been or will be investigated as part of that site.

NFA Criterion 2. The site was never used for the management (that is, generation, treatment, storage or disposal) of RCRA solid or hazardous wastes and/or constituents.

NFA Criterion 3. The site is not known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment. The term "release" means any spilling, leaking, pouring,

emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment.

NFA Criterion 4. The site is regulated under another state and/or federal authority. If the site is known or suspected of releasing RCRA solid or hazardous wastes and/or constituents to the environment, it has been or will be investigated and/or remediated in accordance with the applicable state and/or federal regulations.

NFA Criterion 5. The site was characterized or remediated in accordance with applicable state and/or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

An administrative NFA proposal based on Criteria 1 through 3 is supported by acceptable knowledge of process and/or documented information that indicates that there has not been a release at the site, thus precluding the need for characterization and/or remediation.

An NFA proposal based on Criterion 4 is supported by acceptable knowledge of process and/or documented information that confirms that if there was a release, the site was adequately characterized and/or remediated in accordance with a regulatory authority other than that which oversees RCRA corrective action. NFA Criterion 4 is based on the fact that cleanup levels prescribed under other regulatory authorities, such as the EPA Toxic Substances Control Act (TSCA) or NMED UST regulations, were developed to incorporate human health and ecological risk considerations. Therefore, SWMUs managed in accordance with other regulatory programs normally do not require subsequent action under RCRA corrective action. However, any of the above five criteria may be supported with confirmatory sampling when necessary.

An NFA proposal based on Criterion 5 is supported by data and acceptable knowledge of process and/or documented information that confirms that the site was adequately characterized and/or remediated in accordance with the Hazardous and Solid Waste Amendments of 1984 (HSWA) corrective action process.

1.2 Applicability of the Evaluation of Human Health Risk, Ecological Risk, and Other Applicable Regulations and Standards to NFA Criteria 1 Through 4

NFA proposals based on administrative NFA Criteria 1 through 3 require adequate supporting documentation to establish justification for NFA. In certain cases, Criteria 1, 2, and 3 NFA proposals may require verification samples. However, Criteria 1, 2, and 3 NFA proposals generally do not require evaluations for risks to human health or the ecosystem, or an evaluation of the applicability of other regulations and standards.

An NFA proposal based on Criterion 4 (the site was remediated in accordance with another state and/or federal authority) indicates that these SWMUs are/were characterized and managed in accordance with the requirements specified in other applicable regulations and/or standards. Other applicable regulations and standards include surface water standards, groundwater standards, air emission standards, UST regulations, and PCB regulations. Human health and ecological risk evaluations are inherent in (or addressed by) the cleanup levels established by other regulatory authorities, such as TSCA requirements or NMED UST Bureau regulations. Such requirements or regulations specify the human health and ecologically based cleanup levels that must be met (in the event of a release) to achieve NFA. Criterion 4 SWMUs with a confirmed release require documentation confirming that the release was cleaned to the requirements and/or standards of the applicable regulatory authority.

1.3 Variation from the Outline for HSWA Permit Modification Request Provided in Section II.B.4.a(4)(a) of the March 3, 1998, HRMB Document, RCRA Permits Management Program Document Requirement Guide

As discussed in Section 1.2, environmental sampling and analyses and site assessments (human health, ecological, and other applicable assessments such as surface water, groundwater, UST, etc.) do not apply to SWMUs being proposed for NFA under Criteria 1 through 4. Therefore, on May 4, 1999, the ER Project negotiated an agreement with the NMED-HWB to vary from the outline for a HSWA Permit Modification Request provided in Section II.B.4a(4)(a) of the March 1998 HRMB document, RCRA Permits Management Program Document Requirement Guide (NMED 1998, 57897). Documentation of the negotiation and the revised outline for Criteria 1 through 4 SWMUs being requested for release from Module VIII of the Laboratory's Hazardous Waste Facility Permit are included as Appendix E of this document.

1.4 Organization of this Request

Text for each SWMU in this permit modification request is separated by an indexed tab labeled with its SWMU number. Section X.1 is a brief summary of the SWMU. Section X.2 contains a description of the SWMU (including site maps, if applicable) and its operational history. The text for each SWMU is based on an RFI work plan, RFI report, or VCA completion report, as applicable to that SWMU. The current and future land use of each SWMU is contained in Section X.3. Section X.4 (X.7 for Criterion 5 SWMUs) summarizes the justification for the NFA decision and states the specific NFA criterion under which each SWMU is being proposed for permit modification. The supporting documentation for each SWMU is listed in Section X.5 (X.8 for Criterion 5 SWMUs) and attached at the end of each SWMU write-up. (In order to avoid unnecessary duplication, attachments that are common to more than one SWMU are included in Appendix D.) For some attachments, the information applicable to support NFA has been highlighted or otherwise marked to point the reader to the exact location that was referenced in the SWMU discussion. When only a small portion of a document is applicable, only the relevant pages have been included.

Section X.6 (X.9 for Criterion 5 SWMUs) provides the reference(s) on which the text of the request for permit modification for a particular SWMU is based. Lastly, Section X.7 (X.10 for Criterion 5 SWMUs) provides a history of the regulatory deliverables for each SWMU.

For Criterion 5 SWMUs, Section X.4 provides a description of investigation activities for each SWMU; Section X.5 provides a description of the site conceptual model; and Section X.6 provides a description of the applicable site assessments, such as human health or ecological screening assessments, conducted for the SWMU.

Appendix A includes a list of acronyms and a glossary of terms used in this request. Appendix B includes the Laboratory's requested modifications to Tables A, B, and C of Module VIII of the Laboratory's Hazardous Waste Facility Permit. The date of the permit modification request is indicated next to the number of the unit proposed for modification. Appendix C includes the Proposed Tables A, B, and C of Module VIII. These tables represent Module VIII upon final approval of all NFA requests to date. Records pertaining to this modification request are kept on file at the ER Project's Records Processing Facility. Appendix D contains attachments common to more than one SWMU. Appendix E contains the supporting documentation for varying from the outline for HSWA Permit Modification Request provided in Section II.B.4.a(4)(a) of the March 1998 HRMB document, RCRA Permits Management Program Document Requirement Guide (NMED 1998, 57897).

REFERENCE

NMED (New Mexico Environment Department), 1998. "RPMP Document Requirement Guide," Hazardous and Radioactive Materials Bureau, RCRA Permits Management Program, Santa Fe, New Mexico. (NMED 1998, 57897)

2.0 SWMUs 00-011(a,e)
FORMER MORTAR IMPACT AREAS

2.1 Summary

SWMUs 00-011(a,e) are former mortar impact areas located in Rendija Canyon within a DOE land parcel slated for transfer to Los Alamos County by November of 2007. The RFI for these SWMUs included remediation and confirmatory sampling by the ER Project. Remediation activities were conducted in accordance with applicable state/federal regulations. Confirmatory sampling verified that residual contamination is at concentrations that do not pose an unacceptable level of risk under current and projected future land use. The US Environmental Protection Agency (EPA) Region 6 RCRA Permits Branch approved the March 30, 1994, RFI phase report for these SWMUs in a letter dated December 9, 1994. SWMUs 00-011(a,e) are being proposed for NFA under Criterion 5 (the sites were remediated in accordance with state and/or federal regulations).

2.2 Description and Operational History

2.2.1 Site Description

SWMU 00-011(a)

The former site of SWMU 00-011(a) is located in Rendija Canyon, approximately 0.4 mi east of the Sportsmen's Club firing range (Figure 2.2-1). Before the RFI began, the SWMU was limited to a 7-acre area within an existing barbed-wire fence marked at frequent intervals with "no trespassing" signs. However, explosives ordnance disposal surveys conducted during 1993 found that the impact area extended south and east, well beyond the fence (Figure 2.2-2), increasing the area of the SWMU to approximately 28.5 acres. This site lies entirely within US Department of Energy (DOE) property.

SWMU 00-011(e)

The former site of SWMU 00-011(e) is located in Thirty-Seven-Millimeter Canyon, a tributary of Rendija Canyon, approximately 0.4 mi north-northeast of the Sportsmen's Club firing range (Figure 2.2-1). This site, which includes approximately 14 acres, extends along Thirty-Seven-Millimeter Canyon to the top of a cliff face formed from Bandelier Tuff. Most of this site is located on US Forest Service Property with a small segment at its southern boundary located on DOE property (Figure 2.2-1).

2.2.2 Operational History

Little archival information exists on the operational history of the mortar impact areas in Rendija Canyon. Rendija Canyon and its tributary, Thirty-Seven-Millimeter Canyon, were two of the six Los Alamos area canyons used by the US Army for military "activities" (i.e., training) from 1944 to 1948 (DOE 1987, 08660)(Attachment A). Additionally, Thirty-Seven-Millimeter Canyon may have been used for 37-mm tank target practice by the Laboratory's Protective Force (Lojek 1991, 01905) (Attachment B). Due to the presence of unexploded ordnance, fences posted with warning signs were placed around both SWMUs in the early 1960s.

Materials recovered during the 1993 ordnance sweep of SWMU 00-011(a) included various sizes of mortar rounds (including two live rounds that were destroyed). Materials recovered during the sweep of SWMU 00-011(e) included 20- and 37-mm rounds, armor-piercing rounds, and bullet fragments.

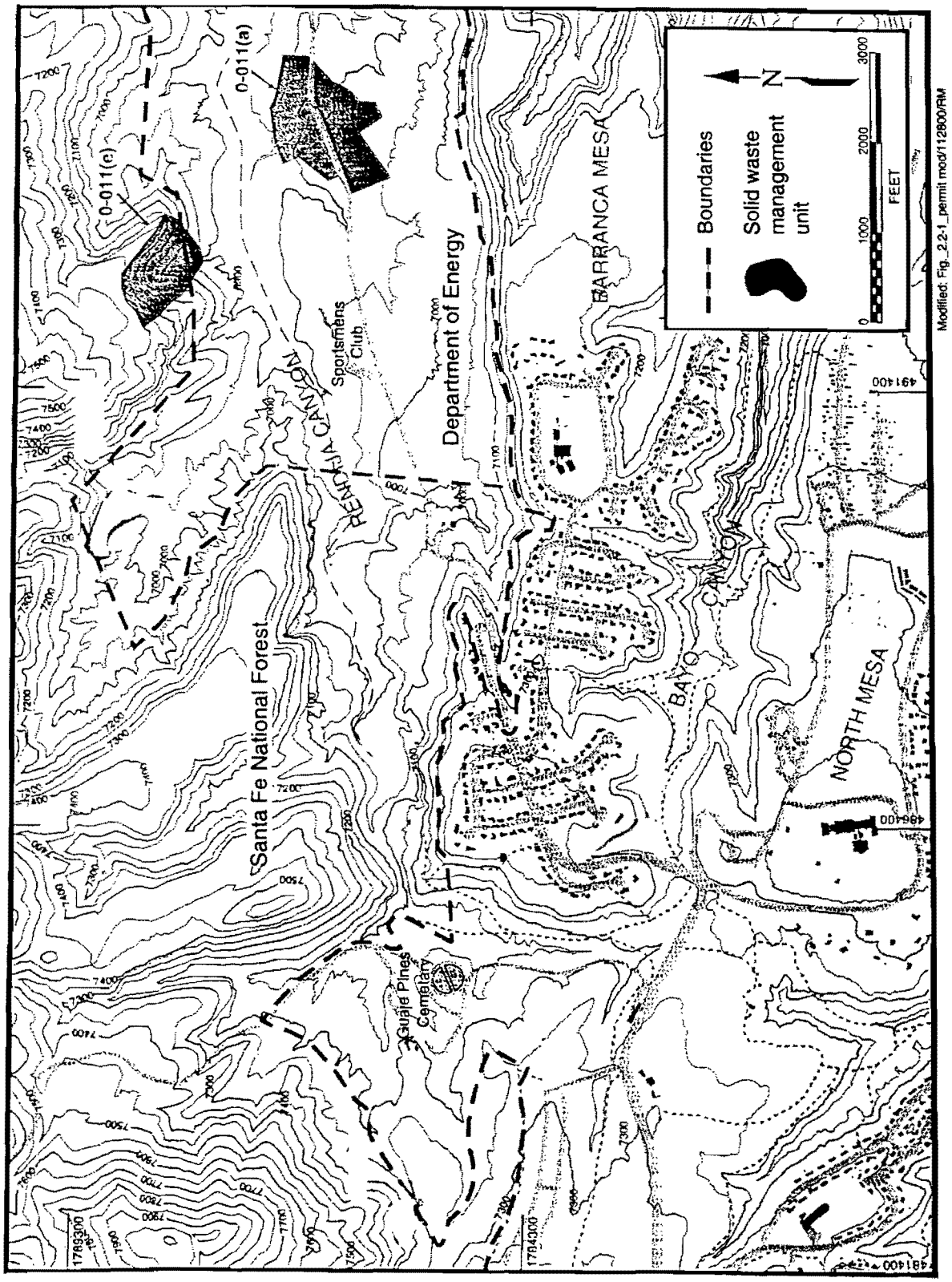

Figure 2.2-1. Locations of SWMUs 00-011(a,e)

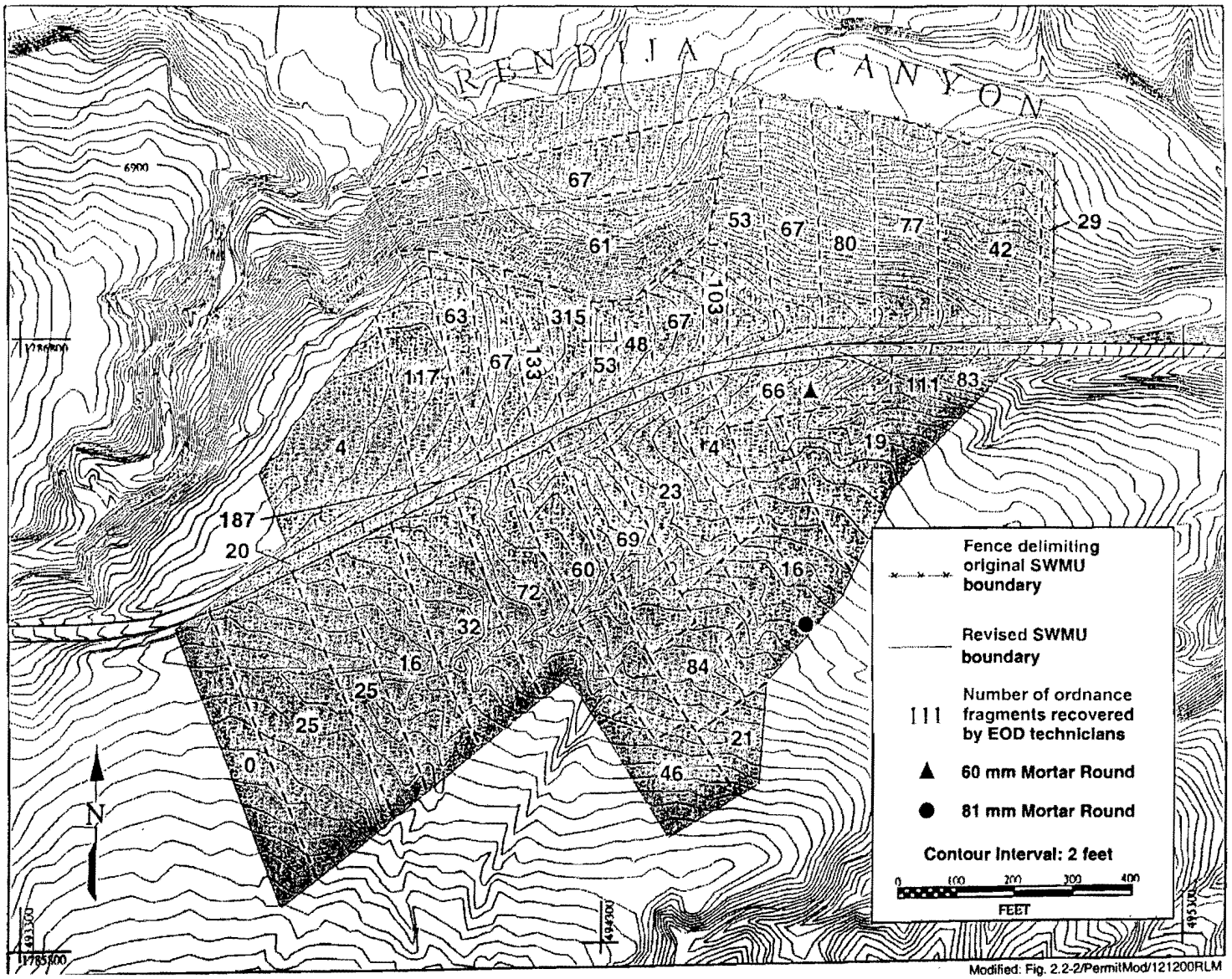

Figure 2.2-2. Map of SWMU 00-011(a) showing the original (fenced) boundary and final boundary after ordance search was completed. Dashed line delineates EOD team area subdivisions.

2.3 Land Use

2.3.1 Current

SWMU 00-011(a) is located on undeveloped DOE land in Rendija Canyon (Figure 2.2-1), bordered on the north and east by the Santa Fe National Forest, which is used for a variety of recreational purposes. SWMU 00-011(e) is located mainly on US Forest Service land (Santa Fe National Forest) with a small portion of the site located on DOE property (Figure 2.2-1).

Public access is not restricted to either of these SWMUs and visitors to the area use Rendija Canyon for a variety of recreational activities. Due to the presence of unexploded ordnance, fences approximately 4 ft in height and posted with warning signs were placed around both SWMUs in the early 1960s. Although the posted fencing discouraged trespassing, it could not prevent intruders from trespassing into the posted and fenced areas. The fence designating DOE property at SWMU 00-011(a) is still in place; however, it has been cut at one location to allow vehicle access. Only remnants of the fence at SWMU 00-011(e) remain.

2.3.2 Future/Proposed

SWMUs 00-011(a,e) are included as part of the Rendija Canyon Parcel, one of the ten land parcels slated for transfer (by November 2007) from the DOE to the County of Los Alamos or to the Secretary of the Interior in trust for the Pueblo of San Ildefonso. The Rendija Canyon Parcel, consisting of approximately 910 acres, will be transferred to Los Alamos County. The county anticipates using the Rendija Canyon Parcel for cultural and environmental preservation or for residential use, but has not yet determined which of the two uses will be selected for the specific acreage that includes SWMUs 00-011(a,e). (LANL 1999, 63037, p. 42)(Attachment C).

2.4 Investigation Activities

2.4.1 Summary

A complete and detailed discussion of all investigation activities conducted for SWMUs 00-011(a,e) is presented in the RFI phase report for Operable Unit (OU) 1071 ordnance impact areas (Environmental Restoration Project 1994, 38621), submitted to EPA Region 6 on March 30, 1994, and approved on December 9, 1994. A summary of those investigation activities is presented in Sections 2.4.1 through 2.4.3 of this request for permit modification.

2.4.2 Investigation #1: RFI Investigation of SWMU 00-011(a,e)

The RFI for SWMUs 00-011(a,e) was completed in September 1993. It was designed to ensure that all unexploded ordnance (UXO) and ordnance fragments were located and removed and to determine if any residual contamination from the ordnance remained in the area encompassed by the SWMUs. A team of certified master explosive ordnance disposal (EOD) technicians conducted a detailed surface and subsurface sweep at each SWMU (inside and outside the fenced areas). The sites were systematically scanned with ordnance detection equipment following standard military ordnance clearance procedures. The number of ordnance fragments found in each area of each SWMU was recorded to develop a data set on the distribution and density of the fragments.

Following the EOD sweep, licensed land surveyors marked a 100-ft square grid on the ground surface at each SWMU. The grid provided location reference points for the subsequent geophysical survey of each SWMU. The surveyors also mapped the boundaries of each SWMU.

Following the land survey, a team of geophysicists conducted a survey of each SWMU using magnetic and electromagnetic survey instruments. The geophysical surveys identified several additional ordnance fragments and provided a quality control that ensured that the SWMUs were cleared of all UXO and ordnance fragments (1 in. or more in diameter). Additionally, the EOD team investigated each geophysical anomaly identified in each geophysical survey.

Once all UXO and ordnance fragments were removed, a site map was prepared showing surface soils, drainage channels within the sites, and locations from which ordnance fragments were removed. The maps were used to identify areas where any residual contaminants from the ordnance most likely would be concentrated and to select topographically biased sampling locations with the highest likelihood of contaminant occurrence (if present). After the field team identified these areas, the surveyors precisely located sample collection points.

All samples were collected following ER Project procedures for the collection of surface soil samples. Detailed information on the type and characteristics of the soil was also gathered.

2.4.2.1 Ordnance Detection

The duties of the EOD team were to detect, excavate, and remove all UXO and, within the detection capability of their equipment, to remove all ordnance fragments 1 in. in diameter or larger to a depth of 1 m. The depth was selected based on the types of ordnance at each site, their known maximum depths of penetration in sediments and soils, and the surface geologic processes (burial and erosion) at the impact sites over the past 50 years. It was determined that a depth of 1 m would represent a highly conservative estimate of the maximum depth at which UXO or ordnance fragments would occur at these sites. (The fact that no fragments were found at either site below a depth of 0.5 m substantiates this estimation.)

The EOD team consisted of UXO-trained personnel, including personnel certified as master EOD technicians under the requirements of the US Army Corps of Engineers and the US Army Toxic and Hazardous Materials Agency.

At each site, lanes were delineated with parallel ropes. Lane orientation was determined by terrain, with lanes oriented to allow EOD personnel to perform work in the safest and most efficient manner. The last lane of a series was marked with flags so that no confusion would exist between areas that had been swept and those that were not. Lanes were swept up one side and down the other in 5-ft overlapping arcs. Lane layout and instrument movement paths were designed to ensure that every square foot of each SWMU was surveyed.

Magnetometers (with the capability of readily locating UXO at the 1-m target depth) and metal detectors were moved across each lane to completely sweep the entire ground surface. Within each lane, the number of recovered pieces of ordnance was recorded. No UXO or ordnance fragments were found at either site below a depth of approximately 0.5 m.

The surveys were complicated by the discovery that sizeable portions of Bandelier Tuff have significant magnetic properties. Thus, buried cobbles and boulders frequently gave false positive readings for magnetic anomalies. Nonetheless, each anomaly was checked to verify the presence or absence of ordnance.

Upon completion of the EOD sweep and initial clearance of ordnance, a geophysical survey was conducted to verify that all buried UXO and ordnance fragments had been located. EOD personnel subsequently investigated all geophysical anomalies identified by geophysics personnel to distinguish actual ordinance fragments from rocks or other anomalies.

SWMU 00-011(a)

Because ordnance fragments were found outside the southwest corner of the fence at SWMU 00-011(a), the ordnance search was expanded beyond the fence (Figure 2.2-2). To determine the new SWMU boundary, now lanes were added until no ordnance fragments were found in the outermost lane and no ordnance fragments were found within 50 ft in all directions of the fragments farthest out. The innermost edge of the outermost lane in which no ordnance fragments were found was considered the final boundary. This procedure added approximately 21.5 acres to the 7 acres that originally defined the SWMU. The land survey team subsequently surveyed the expanded acreage to accurately determine coordinates.

Two live HE mortar rounds were found and detonated. Detonation followed EOD and Laboratory standard procedures and occurred without incident. The ordnance fragments resulting from the detonations were recovered and removed from the site. Other materials recovered during the ordnance sweep of SWMU 00-011(a) included approximately 2400 ordnance fragments and approximately 3 times as much scrap material. The locations of the recovered fragments indicated that there had been more than one firing point and that the firing points were located on the south side of the canyon floor.

SWMU 00-011(e)

The area within the fence at SWMU 00-011(e), the cliff, and the mesa top to a line approximately 100 m from the cliff edge were surveyed for UXO and ordnance fragments. Lanes were laid out to guide the survey, except for the cliff face where complete coverage was visually controlled by features on the cliff face. Because of the rough terrain, the EOD team had to rappel down the cliff face to conduct the ordnance sweep of the cliff.

No live HE mortar rounds were found at this site. Materials recovered were primarily fragments from 37-mm rounds (nose cones and fusings). Fragments of armor-piercing rounds, 20-mm rounds, and expended bullets (small caliber, both military and civilian) were also recovered. A total of 350 pieces of ordnance were recovered.

2.4.2.2 Nonsampling Data Collection

Nonsampling data collection consisted of field screening and geographical survey results. All samples at both SWMUs were screened for gross alpha and beta activity using a Berthold low-level counter and for gamma activity using a deep-well counter. All screening results were uniformly below detection limits.

Geophysical Survey

Geophysical surveys are not typically conducted as part of the cleanup of ordnance impact areas at US Department of Defense facilities. However, to ensure that all UXO and ordnance fragments 1 in. in diameter or larger had been located, the ER Project conducted magnetic geophysical surveys at each SWMU. The investigating field team added this measure to ensure that all UXO and ordnance fragments had been located.

The magnetic geophysical surveys consisted of two parts: (1) collecting discrete data points on a 5-ft grid spacing and (2) slowly and continuously sweeping an area to locate smaller objects. The discrete data points resulted in a single gradient value recorded for each position.

A land survey team defined a coordinate system marked on 100-ft increments. The markers placed in the field served as registration points for data collection. To ensure complete coverage of the sites, each 100-ft by 100-ft segment was subdivided into a series of 10-ft-wide lanes marked by ropes. Each rope was 100 ft

in length with flags marking every 10-ft increment (Figure 2.4-1). A continuous digital sweep designed to bring the sensor within 1 ft of all surface positions was conducted simultaneously with digital data acquisition on a 5-ft interval. Working within a lane, the operator walked perpendicular to the long axis of the lane, sweeping the instrument back and forth. Additional digital data points were recorded at 5-ft intervals within the lane.

The geophysics team did not survey areas of rock outcrop and cliff. For areas where the rope grid could not be used (including ditches, steep terrain, and site borders), the survey was visually controlled. All geophysical anomalies were flagged for future investigation by the EOD team.

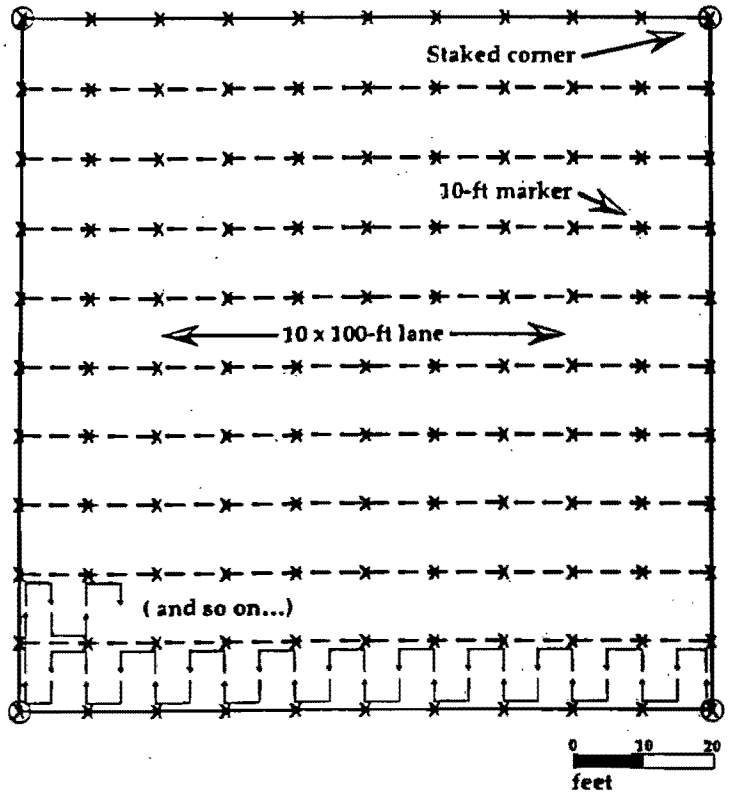

Figure 2.4-1. Geophysics team ordnance search pattern

SWMU 00-011(a)

The geophysical survey for SWMU 00-011(a) identified 640 anomalies below ground surface, all of which were investigated by the EOD team. Of the 640 anomalies, 132 were found to be ordnance fragments.

SWMU 00-011(e)

The geophysical survey for SWMU 00-011(e) identified 48 anomalies below ground surface, all of which were investigated by the EOD team. Of the 48 anomalies, 27 were found to be ordnance fragments.

2.4.2.3 Sampling Data and Collection

Nineteen soil/sediment samples were collected from SWMU 00-011(a) on September 23, 1993, and nine soil/sediment samples were collected from SWMU 00-011(e) on September 24, 1993. Sample locations

were selected from sediment retention locations within the drainage channels that drained the areas of high fragment concentration [SWMU 00-011(a): Figure 2.4-2; SWMU 00-011(e): Figure 2.4-3].

Samples were collected from surface (0–6 in.) depths using the spade and scoop technique. All samples were screened for radiological contamination as described in Section 2.4.2.2 of this request. The radiological screening yielded results at or below background levels.

Samples were submitted to the Chemical Science and Technology group CST-9 [formerly Environmental Management (EM-9)] for inorganic analyses and to the International Technology Analytical Services, St. Louis, Missouri, for HE analyses. CST-9 followed SW 846 procedures for inductively coupled plasma emission spectroscopy (ICPES) (most inorganic chemicals), flame atomic absorption (silver), cold vaporization atomic absorption (mercury), and electrothermal vaporization atomic absorption (arsenic and selenium). International Technology Analytical Services, St. Louis, Missouri, used high-performance liquid chromatography, a modified SW 846 Method 8330 procedure. Analyses were conducted for the following compounds: 1,3-dinitrobenzene; 2,4-dinitrotoluene; 2, 6-dinitrotoluene; HMX (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine); nitrobenzene; m-nitrotoluene; o-nitrotoluene; p-nitrotoluene; RDX (cyclotrimethylenetrinitramine); tetryl (methy-2,4,5-trinitrophenylnitramine); 1,3,5-trinitobenzene; and 2,4,6-trinitrotoluene.

2.4.2.4 Data Gaps

No data gaps were associated with the RFI of SWMUs 00-011(a,e). Sufficient data were collected to adequately determine nature and extent of contamination.

2.4.2.5 Results and Conclusions

The analytical sampling results for SWMU 00-011(a) are provided in Table 2.4-1 and those for SWMU 00-011(e) are provided in Table 2.4-2.

The RFI found that all metals detected at both SWMUs either were detected below or had detection limits below 1994 maximum background concentrations. No high explosives (HE) (or HE byproduct) were detected in any sample at either SWMU.

Using current background values (BVs) for sediment, several inorganic chemicals were detected slightly above BVs at SWMU 00-011(a). Of 19 samples, barium is above its sediment BV of 127 mg/kg in 3 samples (1 of which is a duplicate); cobalt, above its sediment BV of 4.73 mg/kg in 15 samples; chromium, above its sediment BV of 10.5 mg/kg in 3 samples; iron, above its sediment BV of 13,800 mg/kg in 2 samples; lead, above its sediment BV of 19.7 mg/kg in 1 sample; manganese, above its sediment BV of 543 mg/kg in 1 sample; nickel, above its sediment BV of 9.38 mg/kg in 1 sample; selenium, above its sediment BV of 0.3 mg/kg in 14 samples; and vanadium, above its sediment BV of 19.7 mg/kg in 5 samples.

Using current BVs at SWMU 00-011(e), zinc is the only metal detected above its sediment BV of 60.2, at a frequency of 1 detection in 9 samples.

All inorganic chemicals detected above current BVs are well below Laboratory screening action levels (SALs) and are addressed in detail in the screening assessment Sections 2.6.2.1 (Human Health) and 2.6.2.2 (Ecological) of this request for permit modification.

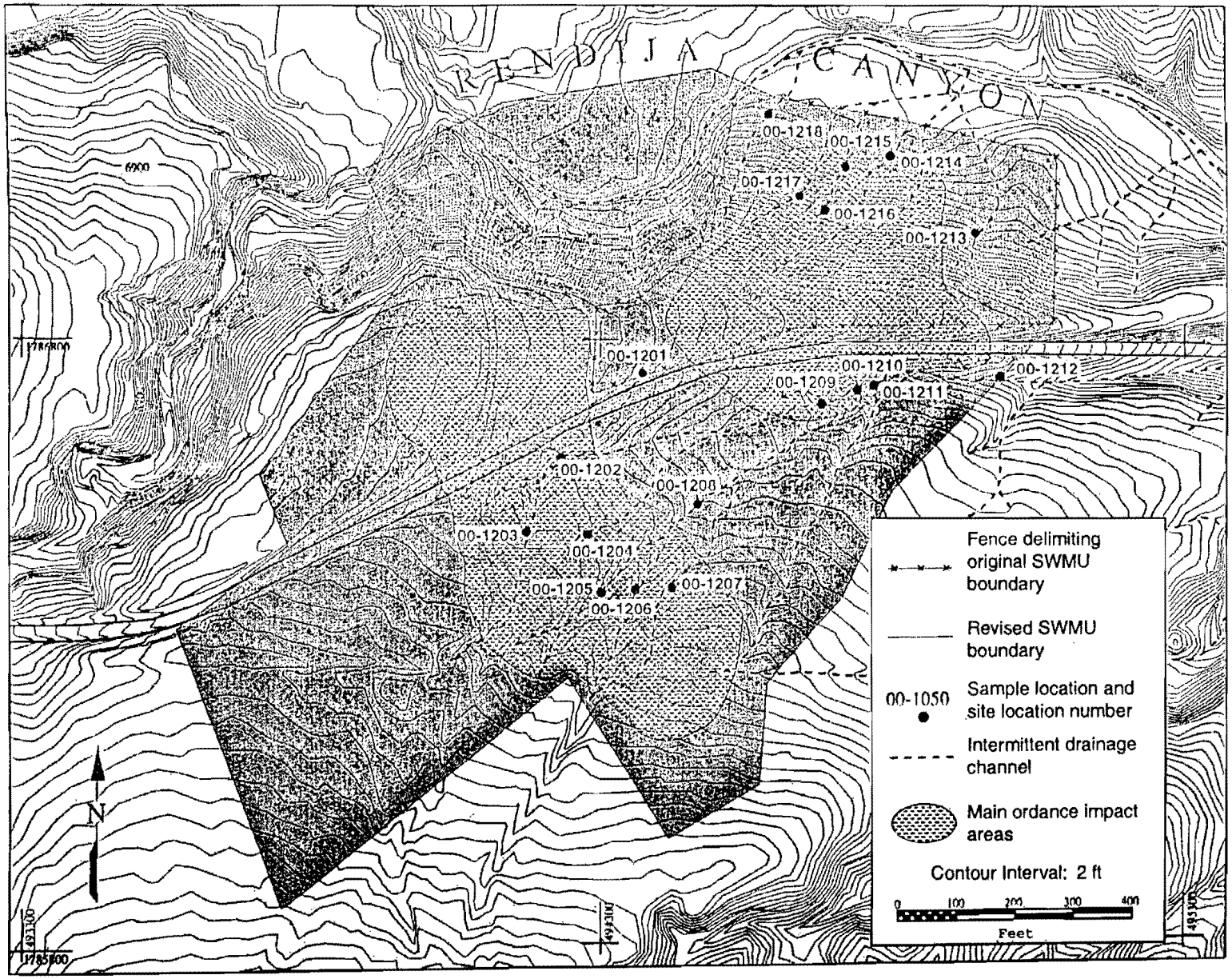

Figure 2.4-2. Map of SWMU 00-011(a) showing areas of greatest OEW concentrations, drainage pattern, and sample (site) locations.

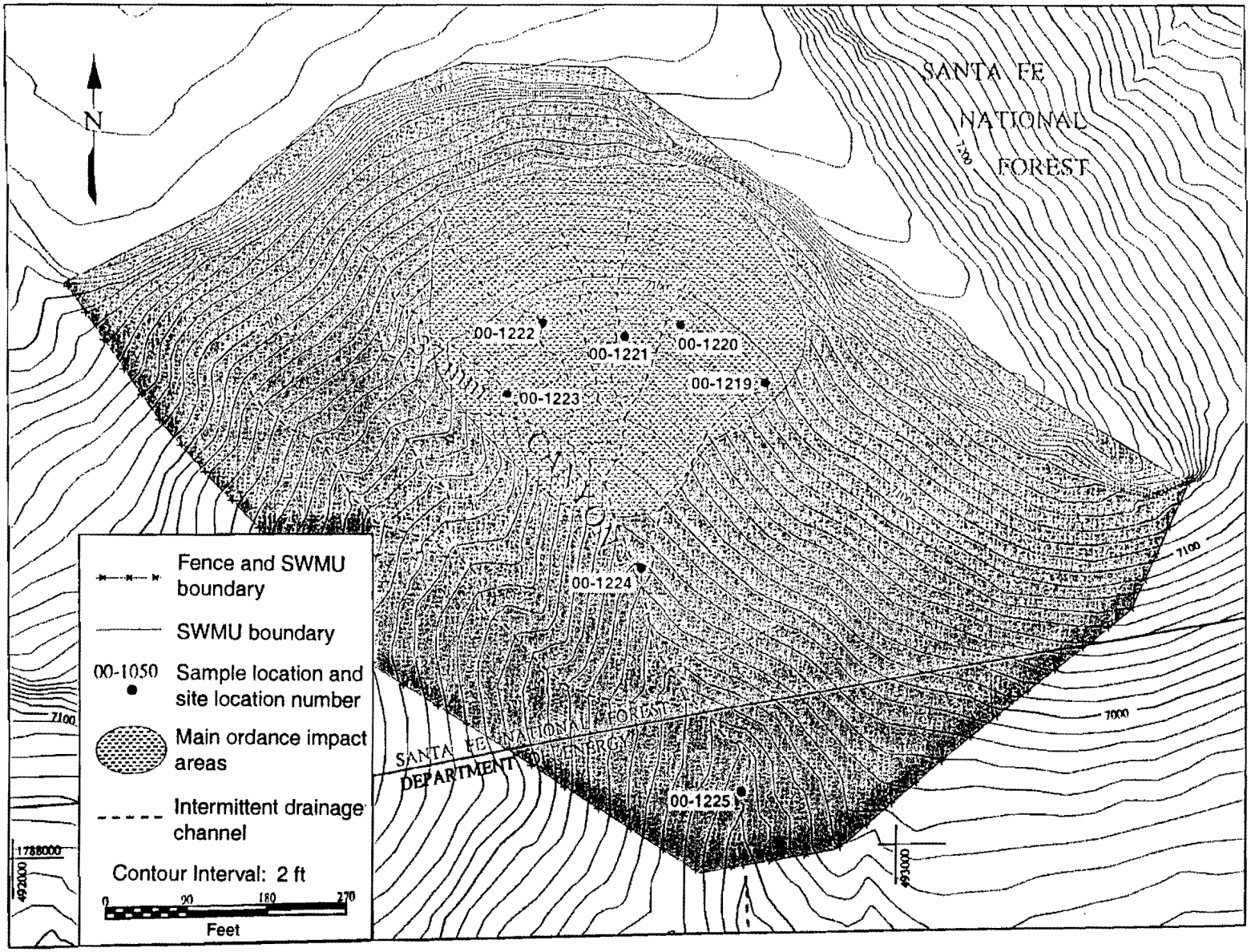

Figure 2.4-3. Map of SWMU 00-011(e) showing the main ordnance impact area, drainage pattern, and sample (site locations

Table 2.4-1
Results of Inorganic Analysis for SWMU 00-011(a) in ppm

		Al	Ag	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Tl	V	Zn
1994 Background Concentrations[a]		144,000	1.16	10.8	830	4.4	80,400	1.7	23	71	18	48,600	0.029	48,000	16,800	1600	36,300	19	44	1.6	26	0.9	113	146
1998 Sediment BVs[b]		15,400	1.0	3.98	127	1.31	4420	0.4	4.73	10.5	11.2	13,800	0.1	2690	2370	543	1470	9.38	19.7	0.83	0.3	0.73	19.7	60.2
1998 Soil BVs[b]		29,200	1.0	8.17	295	1.83	6120	0.4	8.64	19.3	14.7	21,500	0.1	3460	4610	671	915	15.4	22.3	0.83	1.52	0.73	39.6	48.8
Location ID	Sample #																							
00-1201	AAA6118	14,000	<1	3.9	120	1	2100	<0.4	6	11	6.8	12,000	<0.1	1900	2400	340	87	10	17	<0.1	0.3	0.3	22	34
00-1202	AAA6119	10,000	<1	2.5	110	0.7	1400	<0.4	6.3	7.9	4	9600	<0.1	1500	1600	430	92	6	17	<0.1	0.6	0.1	18	32
00-1203	AAA6134	10,000	<1	2.7	96	0.75	1500	<0.4	6	7.4	4.1	9800	<0.1	1500	1600	350	98	5	14	<0.1	0.5	0.1	17	30
00-1204	AAA6123	12,000	<1	3.6	130	1	2200	<0.4	6.6	10	5.6	13,000	<0.1	1600	2300	410	89	9	16	<0.1	0.3	0.3	23	34
00-1205	AAA6129	10,000	<1	3.3	120	0.91	1700	<0.4	6.8	8	5.6	11,000	<0.1	1700	1800	410	74	6	16	<0.1	0.4	0.3	18	30
00-1206	AAA6131	9400	<1	3	120	0.9	1800	<0.4	5.3	7	6	9900	<0.1	1700	1700	390	70	5	15	<0.1	0.3	0.3	16	32
00-1207	AAA6133	12,000	<1	3.2	120	0.88	1500	<0.4	5.3	8.5	5.8	11,000	<0.1	1900	1900	400	82	7.6	17	<0.1	0.4	0.1	20	33
00-1208	AAA6101	16,000	<1	3.5	180	1.2	2200	<0.4	8.8	11	7.9	14,000	<0.1	2500	2600	640	79	9	19	<0.1	0.6	0.3	24	40
00-1208	AAA6122	17,000	<1	3.7	150	1.2	2200	<0.4	5.9	12	8.2	14,000	<0.1	2500	2600	430	80	8	18	<0.1	<0.2	0.3	24	41
00-1209	AAA6125	10,000	<1	3.3	120	0.91	2000	<0.4	5	8.2	6	10,000	<0.1	2100	1800	360	70	6	29	<0.1	0.4	0.3	17	34
00 1210	AAA6126	12,000	<1	3.4	110	0.97	1900	<0.4	6	8.7	6.1	11,000	<0.1	1800	2000	330	74	9	17	<0.1	0.3	0.3	17	32
00-1211	AAA6120	11,000	<1	3.2	120	0.93	1900	<0.4	8	9	6	11,000	<0.1	1700	1900	460	84	9	18	<0.1	0.5	0.3	17	30
00-1212	AAA6099	11,000	<1	2.8	110	0.93	2000	<0.4	4.3	8.4	6.4	10,000	<0.1	1700	1900	300	77	7	18	<0.1	0.8	0.3	17	30
00-1213	AAA6127	5100	<1	2	44	0.41	750	<0.4	3	5	3.2	5800	<0.1	620	840	200	98	4	7	<0.1	0.6	<0.1	10	17
00-1214	AAA6115	5700	<1	2	59	0.44	910	<0.4	3.5	5.3	3.7	6300	<0.1	930	990	220	100	5	9	<0.1	0.5	<0.1	11	17
00-1215	AAA6103	9300	<1	2.2	94	0.73	1400	<0.4	5	8.7	4.2	9000	<0.1	1300	1500	310	81	7.6	10	<0.1	0.8	0.1	17	23
00-1216	AAA6128	9300	<1	3.3	110	0.82	1600	<0.4	5.4	7.4	4.8	9300	<0.1	1200	1600	340	70	6.4	14	<0.1	0.4	0.1	18	23
00-1217	AAA6113	6300	<1	3.6	83	0.64	1000	<0.4	6	5.3	4	8000	<0.1	940	1200	470	77	5	18	<0.1	0.8	0.1	17	18
00-1218	AAA6112	6900	<1	1.7	66	0.6	1200	<0.4	3.5	5	2.4	7100	<0.1	1000	1100	310	100	3.5	9	<0.1	0.7	0.1	10	24

Note: The RFI phase report inadvertently omitted the results for sample ID number AAA6112 in Table 1 of that report (from which the data for this table were derived). Subsequently, Analysis and Assessment Focus Area personnel pulled the data for the missing sample ID from the Laboratory's Facility for Information Management, Analysis, and Display (FIMAD) on October 2, 2000, and the missing data have been added to this table.

[a] Based on maximum concentrations in Environmental Restoration Project 1994, 38621.

[b] Based on background values in Environmental Restoration Project 1998, 59730.2.

Table 2.4-2
Results of Inorganic Analysis for SWMU 00-011(e) in ppm

		Al	Ag	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Na	Ni	Pb	Sb	Se	Tl	V	Zn
1994 Background Concentrations[a]		144,000	1.16	10.8	830	4.4	80,400	1.7	23	71	18	48,600	0.029	48,000	16,800	1600	36,300	19	44	1.6	26	0.9	113	146
1998 Sediment BVs[b]		15,400	1.0	3.98	127	1.31	4420	0.4	4.73	10.5	11.2	13,800	0.1	2690	2370	543	1470	9.38	19.7	0.83	0.3	0.73	19.7	60.2
1998 Soil BVs[b]		29,200	1.0	8.17	295	1.83	6120	0.4	8.64	19.3	14.7	21,500	0.1	3460	4610	671	915	15.4	22.3	0.83	1.52	0.73	39.6	48.8
Location ID	Sample #																							
00-1219	AAA6121	3100	<1	0.4	21	0.24	1100	<0.4	<0.5	1.7	2.7	3000	<0.1	550	710	90	430	<2	3.6	<0.2	<0.2	<0.2	4	80
00-1220	AAA6114	610	<1	0.4	8.5	0.23	290	<0.4	<0.5	0.7	0.5	2200	<0.1	320	160	100	58	<2	3.1	<0.2	<0.2	<0.2	<0.5	22
00-1221	AAA6109	1100	<1	0.6	17	0.39	700	<0.4	<0.5	<0.5	4.3	2700	<0.1	490	310	140	76	<2	6.4	<0.2	<0.2	<0.2	2.3	33
00-1221	AAA6108	1500	<1	0.7	18	0.45	800	<0.4	<0.5	0.9	4.6	4200	<0.1	430	370	200	100	<2	7	<0.2	<0.2	<0.2	3	28
00-1222	AAA6116	2600	<1	1.1	23	0.41	1000	<0.4	<0.5	1.8	2.4	3900	<0.1	610	570	160	98	<2	6	<0.2	<0.2	<0.2	4.5	32
00-1223	AAA6117	2500	<1	0.5	24	0.2	2200	<0.4	0.7	2.5	1.7	2600	<0.1	330	1000	67	430	<2	1.6	<0.2	<0.2	<0.2	4.1	18
00-1224	AAA6100	860	<1	<0.2	9.5	0.13	580	<0.4	<0.5	1.1	<0.5	2500	<0.1	<70	360	73	120	<2	1.7	<0.2	<0.2	<0.2	2.3	30
00-1225	AAA6130	840	<1	<0.2	7.3	0.09	610	<0.4	<0.5	1.5	<0.5	3800	<0.1	<70	440	130	67	<2	1.2	<0.2	<0.2	<0.2	2.5	41
00-1226	AAA6124	1500	<1	<0.2	14	0.2	530	<0.4	<0.5	1.7	1.3	2400	<0.1	360	390	81	100	<2	3.2	<0.2	<0.2	<0.2	3.4	22

[a] Based on maximum concentrations in Environmental Restoration Project 1994, 38621.

[b] Based on background values in Environmental Restoration Project 1998, 59730.2.

SWMU 00-011(a)

The holding times for the HE analyses were exceeded by two days. The samples were extracted within 7 days, but were not analyzed for 42 days (exceeding the 40-day limit). However, the data are still accurate because

(1) a report by the US Army Corps of Engineers entitled "Experimental Assessment of Analytical Holding Times for Nitroaromatic and Nitramine Explosives in Soil" demonstrates that exceeding holding times up to 56 days after extraction does not cause a loss of HE analytes, nitramines, and possibly nitroaromatics (US Army Corps of Engineers 1993, 68411 pp. 15–16)(Attachment D);

(2) HE sample results were below detection limits for all analytes; and

(3) no peaks were detected that could have been degradation products from any HE that may have biodegraded (per the analytical laboratory).

SWMU 00-011(e)

The holding times for the HE analyses were exceeded by six days. The samples were extracted within 7 days, but were not analyzed for 46 days (exceeding the 40-day limit). However, the data are still accurate for the same reasons as provided for SWMU 00-011(a).

2.4.3 Investigation #2

No investigations other than the RFI were required for SWMUs 00-011(a) or 00-011(e).

2.5 Site Conceptual Model

Both SWMUs 00-011(a,e) had the potential for HE and/or metal contamination resulting from the presence of both UXO and ordnance fragments. The primary release of contaminants would have been via ordnance explosion. The most significant hazard to human and ecological receptors would be from the potential presence of UXO. Once released to the surrounding soils, contaminants would have the potential to be transported via surface water runoff. Human receptors potentially could be exposed to these contaminants through incidental ingestion or dermal contact of soil. Ecological receptors potentially could be exposed to these contaminants through incidental ingestion or dermal contact of soil, root uptake, and foliar deposition.

2.5.1 Nature and Extent of Contamination

Prior to the RFI at SWMUs 00-011(a,e), any residual contamination was assumed to be largely confined to the fenced areas at each site. The debris was known to contain metals and may have been contaminated with HE. The EOD team determined that the deposition of ordnance was contained to a maximum depth of 0.5 m. This determination was based on the type of ordnance used at each firing range, the maximum depths of penetration of each type of ordnance in the sediments and soils of the impact area, and natural surface geological processes. During the RFI, the boundaries of SWMU 00-11(a) were expanded because the areas of debris deposition were found to extend beyond the fenced areas.

At SWMU 00-011(a), no inorganic chemicals were detected above 1994 background concentrations. However, using current BVs, several inorganic chemicals are detected above sediment BVs, including barium, cobalt, chromium, iron, lead, manganese, nickel, selenium, and vanadium. Samples collected from the downstream portions of the drainage reported concentrations below the sediment BV for all inorganic

chemicals, except selenium (which does not have a calculated sediment BV), thereby indicating that extent is defined for these chemicals (Figure 2.4-2). Selenium was detected at low-level concentrations similar to the nominal detection limit for selenium (0.3 mg/kg), which is used as the sediment BV. Additionally, selenium is not a contaminant associated with the operational activities that occurred at this SWMU (mortar target area containing unexploded ordnance and ordnance fragments). Therefore, the extent of contamination from operational activities at SWMU 00-011(a) is defined by the sampling data for all inorganic chemicals, including selenium.

In one of the nine samples collected at SWMU 00-011(e), zinc was detected at a concentration of 80 mg/kg, which is below the maximum 1994 background concentration of 146 mg/kg, but above its current sediment BV of 60.2 mg/kg. As sample locations progress down drainage from SWMU 00-011(e), zinc concentrations decrease to below background (Figure 2.4-3). The elevated zinc therefore is localized and the extent of zinc above background is defined.

2.5.2 Environmental Fate

The physiochemical properties of metals cause them to bind to soil and potentially move via transport of soil particles by water as opposed to moving in water as dissolved chemicals or moving in air from volatilization. Because both sites are well vegetated, movement of particles via wind dispersion is very unlikely. HE compounds are susceptible to bio- and photolytic degradation. Based on these factors, it is unlikely that any residual contamination present at SWMU 00-011(a) or 00-011(e) would have the potential for off-site migration.

2.6 Site Assessments

2.6.1 Summary

A discussion of the human health screening assessments for SWMUs 00-011(a,e) is presented in the RFI phase report for OU 1071 ordnance impact areas (Environmental Restoration Project 1994, 38621), submitted to EPA Region 6 on March 30, 1994, and approved by EPA Region 6 on December 9, 1994. A summary of the human health screening assessments is presented in Section 2.6.2.1 of this request for permit modification. A complete and detailed discussion of the ecological screening assessments for SWMUs 00-011(a,e) is presented in ecological screening evaluations for SWMUs 00-011(a,e) (Mirenda 2000, 68068) (Attachment E). A summary of the ecological screening assessments is presented in Section 2.6.2.2 of this request.

2.6.2 Screening Assessments

2.6.2.1 Human Health

The chemicals of potential concern (COPCs) identified in the data review for each SWMU were compared with Laboratory SALs to determine if the chemicals were detected at concentrations of potential concern to human health. The SALs used in these comparisons are values based on the methodology presented in Appendix C of the 2000 ER Project installation work plan (IWP) (LANL 2000, 66802). These SALs reflect a residential exposure scenario, which is the most conservative potential future land use for these SWMUs.

This human health risk screening evaluation follows the guidance provided by EPA Region 6 and NMED (EPA 1999, 64804; NMED 1998, 57761). SAL comparisons are conducted separately for carcinogens and noncarcinogens. The maximum concentration of each COPC is compared with the SALs for Class A, B1,

and B2 carcinogens; 10 times the SAL for Class C carcinogens; or one-tenth the SAL for noncarcinogens when there are more than 2 noncarcinogenic COPCs.

SWMU 00-011(a)

The following inorganic chemicals were retained as COPCs in the data review for SWMU 00-011(a): barium, chromium (total), cobalt, iron, lead, manganese, nickel, selenium, and vanadium. No organic COPCs were identified at this SWMU. Chromium was the only carcinogenic COPC (Class A carcinogen) detected above its current BV at this SWMU. The maximum detected concentration (12 mg/kg) was less than the SAL of 210 mg/kg for chromium. The remaining eight inorganic chemicals are noncarcinogenic COPCs and were compared with 0.1 SAL (Table 2.6-1). Barium, cobalt, lead, nickel, selenium, and vanadium were detected below 0.1 SAL, while iron and manganese were detected above 0.1 SAL.

A direct comparison with the SALs for iron (23,000 mg/kg) and manganese (3200 mg/kg) resulted in hazard quotients (HQs) of 0.6 and 0.2, respectively. Combining the HQs for iron and manganese resulted in a hazard index (HI) of 0.8. Adding the HQs for the other inorganic COPCs to this value, a total HI of approximately 1.0 was obtained. An HI of 1.0 or less indicates that exposure does not pose an unacceptable risk to human health (EPA 1989, 08021). Thus all COPCs identified in the data review for SWMU 00-011(a) were eliminated.

Table 2.6-1
SWMU 00-011(a)
Comparison of Noncarcinogenic COPCs with SALs

Analyte	Location ID	Sample ID	Maximum Concentration (mg/kg)	SAL (mg/kg)	0.1 SAL (mg/kg)
Barium	00-1208	AAA6101	180	5400	540
Cobalt	00-1208	AAA6101	8.8	3400	340
Iron	00-1208	AAA6101	14,000	23,000	2300
Lead	00-1209	AAA6125	29	400	40
Manganese	00-1208	AAA6101	640	3200	320
Nickel	00-1201	AAA6118	10	1600	160
Selenium	00-1212	AAA6099	0.8	390	39
Vanadium	00-1208	AAA6101	24	550	555

SWMU 00-011(e)

The data review for SWMU 00-011(e) indicated that zinc was greater than its sediment BV of 60.2 mg/kg in one of the nine samples (at a concentration of 80 mg/kg). Because the maximum concentration of zinc (80 mg/kg) is well below the SAL of 23,000 mg/kg for zinc, zinc was eliminated as a COPC.

2.6.2.2 Ecological

The purpose of an ecological screening evaluation is to identify chemicals of potential ecological concern (COPECs). The evaluation involves the calculation of HQs and HIs for all COPCs identified in the data review and all appropriate ecological screening receptors as described in "Screening Level Ecological Risk Assessment Methods" (Environmental Restoration Project 1999, 63303.2). The HQ analysis is based on the maximum detected concentration or detection limit for each COPC and is calculated by dividing these values by the soil ecological screening level (ESL) for the nine receptors. The derivation of ESLs is based on the approach presented in the ER Project's ecological risk assessment methodology document (Environmental Restoration Project 1999, 63303.2) and the June 1999 version of the ER Project's

ECORISK database (LANL 1999, 64161), which is part of LANL ER Records Package 186. The screening receptors for which ESLs have been derived include a plant, an invertebrate, deer mouse, vagrant shrew, desert cottontail, American robin, American kestrel, and the red fox. The rationale for using these receptors is presented in the ER Project's ecological risk assessment methodology document (Environmental Restoration Project 1999, 63303.2).

An HI is the sum of HQs across contaminants for a given screening receptor. An HQ or HI greater than 1.0 is an indicator of potential adverse impacts. Chemicals resulting in an HQ greater than 1.0 or that contribute more than 0.1 to an HI greater than 1.0 are identified as COPECs. An ecological assessment is designed to be conservative (i.e., some assumptions may not represent actual conditions) in order to minimize the possibility of eliminating an analyte that may pose a potential ecological risk.

SWMU 00-011(a)

At SWMU 00-011(a), several inorganic chemicals (all metals) were detected above sediment BVs, including barium (3 samples, 1 of which is a duplicate); cobalt (15 samples); chromium (3 samples); iron (2 samples); magnesium (3 samples); lead, manganese, and nickel (1 sample each); selenium (14 samples), and vanadium (5 samples). All of the detected values were less than twice the sediment BV, except for selenium, which was approximately 2.6 times the BV. (It should be noted that the BV for selenium is the nominal detection limit and not a calculated value.) In addition, with the exception of one lead and one cobalt concentration, all inorganic chemical concentrations are below sediment BVs. All other metals were either detected below background or had detection limits less than background. No HE was detected in any of the samples.

For the purposes of ecological screening, nonradionuclides are assumed to have a common toxicological effect. Although it is likely that this assumption is incorrect, the COPCs are grouped together in the comparison with ESLs. At SWMU 00-011(a), the HIs are greater than 1.0 for the plant, deer mouse, shrew, cottontail, robin, and kestrel and less than 1.0 for the earthworm and red fox. The HIs greater than 1.0 are driven by manganese and vanadium for the plant; by barium, cobalt, and manganese for the mouse; by barium and cobalt for the shrew; by cobalt and manganese for the cottontail; by barium, cobalt, and vanadium for the robin; and by barium and cobalt for the kestrel. All HQs for the earthworm and fox are 0.3 or less and the HIs are 0.5 and 0.2, respectively. Although iron and magnesium do not have ESLs, their respective maximum detected concentrations (14,000 and 2600 mg/kg) are similar to their respective BVs of 13,800 and 2370 mg/kg (Environmental Restoration Project 1998, 59730.2); while other detected concentrations of iron and magnesium are less than their BVs. Therefore, iron concentrations across the area encompassed by this SWMU are similar to background.

Most of the ESLs used in the comparison are below the sediment BVs. As a result, the HQs and subsequent HIs are elevated and overestimate the potential for risk to ecological receptors. As stated previously, the elevated concentrations of inorganic chemicals are similar to sediment background (i.e., generally less than twice the sediment BV) and equivalent to or slightly above soil BVs. Comparison of ESLs that are similar to or greater than sediment BVs with the maximum detected concentration of each inorganic chemical results in HQs of approximately 1.0 or less. For example, the maximum lead concentration (29 mg/kg) was approximately 1.5 times the sediment BV (19.7 mg/kg) (Environmental Restoration Project 1998, 59730.2) and had HQs ranging from 0.005 to 1.5. Because inorganic background levels are defined as naturally occurring concentrations of inorganic chemicals and are used to distinguish between contaminated and uncontaminated media, concentrations below, or similar to, background concentrations do not pose a potential risk to receptors. Therefore, it is the Laboratory's viewpoint that the elevated concentrations of inorganic chemicals in the sediments at SWMU 00-011(a) do not pose a potential for adverse impacts to ecological receptors.

The samples collected from the farthest downstream portion of the drainage channel (location ID 00-1212) resulted in concentrations below the sediment BV for all inorganic chemicals except selenium (which does not have a calculated sediment BV). Selenium was detected at concentrations ranging from 0.3 to 0.8 mg/kg at sample location IDs 00-1209, 00-1210, 00-1211, and 00-1212. These low-level detected concentrations are similar to the nominal detection limit for selenium (0.3 mg/kg), which is used as the sediment BV (Environmental Restoration Project 1998, 59730.2). Additionally, selenium is not a contaminant associated with the operational activities that occurred at this SWMU (mortar target area containing unexploded ordnance and ordnance fragments). Thus, the extent of contamination is defined.

SWMU 00-011(e)

At SWMU 00-011(e), zinc was detected at a concentration of 80 mg/kg, which is above its current sediment BV of 60.2 mg/kg. The zinc value was outside the range of background concentrations for zinc in sediment (9 to 56.2 mg/kg) (Environmental Restoration Project 1998, 59730.2). All other metals were either detected below background or had detection limits less than background. No HE was detected in any of the samples.

The maximum detected zinc concentration (80 mg/kg) at SWMU 00-011(e) was compared with the minimum ESL to determine if there was a potential for adverse impacts to ecological receptors. The minimum ESL for zinc is 10 mg/kg for the plant receptor and results in a maximum HQ for zinc of 8.0. The HQs for the other receptors are approximately 1 or less (ranging from 0.004 to 1.0). Zinc was detected only slightly above the range of background concentrations for current BVs and was detected in only one of nine samples collected from the SWMU. All other sediment concentrations were less than the sediment BV. Based on the comparison with ESLs, the low frequency of detection above background, and the fact that the site is well vegetated, it is the Laboratory's viewpoint that there is no potential for adverse impacts to ecological receptors from exposure to zinc. Therefore, zinc is not considered a COPEC at this site. In addition, zinc concentrations decreased to below background as sample locations progressed down-drainage. The elevated zinc therefore is localized and the extent of zinc above background is defined.

2.6.3 Risk Assessments

2.6.3.1 Human Health

Based on the elimination of all COPCs in the human health screening assessments for SWMUs 00-011(a,e), no human health risk assessment was necessary.

2.6.3.2 Ecological

Based on the elimination of all COPCs in the ecological screening assessment for SWMU 00-011(a,e), no ecological risk assessment was necessary.

2.6.4 Other Applicable Assessments

2.6.4.1 Surface Water

The ER Project has developed a procedure to assess sediment transport and erosion concerns at individual SWMUs. It provides a basis for prioritizing and scheduling actions to control the erosion of potentially contaminated soils at specific SWMUs. The procedure is a two-part evaluation. Part A is a compilation of existing analytical data for the SWMU, site maps, and knowledge-of-process information. Part B is an assessment of the erosion/sediment transport potential at a SWMU. Erosion potential is numerically rated from 1 to 100 using a matrix system. SWMUs that score below 40 have a low erosion

potential; those that score from 40 to 60 have a medium erosion potential; and those that score above 60 have a high erosion potential.

Surface water assessments for SWMUs 00-011(a,e) were conducted on June 25, 1999. The assessment resulted in a determination that generating an erosion matrix score is not practical for sites (such as these) that consist of highly variable topography that extends over several acres. Although erosion may occur on various portions of each site, sampling within drainages has determined that the low levels of residual contamination remaining are not migrating from the sites.

There are no wetlands or springs in the vicinity of either SWMU.

2.6.4.2 Groundwater

SWMUs 00-011(a,e) present no potential pathway for contaminant release to groundwater. Ordnance and ordnance fragments were dispersed as large particles primarily on the surface soils of these sites. No fragments were found below 0.5 m. The regional aquifer is approximately 800–1000 ft below SWMUs 00-011(a,e). There are no active or inactive local water supplies, and no production wells in the vicinity of either SWMU.

2.6.4.3 Underground Storage Tank

This section is not applicable.

2.6.4.4 Other

This section is not applicable.

2.7 No Further Action Proposal

2.7.1 Rationale

RFI activities for SWMUs 00-011(a,e) included locating and removing all UXO and ordnance fragments (1 in. or more in diameter) from these sites and collecting samples to determine whether residual contamination (metals and/or HE) was present.

The Laboratory ER Project submitted to EPA Region 6 an RFI phase report for SWMUs 00-011(a,e), dated March 1994 (Environmental Restoration Project 1994, 38621). The RFI phase report

- documents all cleanup activities and sampling results;
- provides information confirming that the nature and extent of contamination for SWMUs 00-011(a,e) was defined;
- documents that sampling performed for residual metals and HE at SWMUs 00-011(a,e) demonstrates that there is no HE residual contamination at these SWMUs and that residual metal contamination is at concentrations that pose an acceptable level of human risk under current and projected future land use; and
- proposes that this SWMU be considered for NFA.

In a December 9, 1994, letter (EPA 1994, 62098) (Attachment F), EPA Region 6 approved the RFI phase report.

The 1999 ecological screening evaluations conducted for SWMUs 00-011(a,e)

- state that, based on comparisons with ESLs, low frequency of detection, and extensive vegetation, there is no potential for adverse impacts from SWMUs 00-011(a,e) to ecological receptors.

The Laboratory ER Project is proposing SWMUs 00-011(a,e) for NFA based on

- the demonstration that this SWMU has been successfully remediated and poses no risk to human health, as reported in the RFI phase report for SWMUs 00-011(a,e); and
- the demonstration that these SWMUs pose no potential adverse impacts to ecological receptors, as reported in the ecological screening evaluations for SWMUs 00-011(a,e), which were completed after the RFI phase report.

2.7.2 Criterion

Based on the information presented in Sections 2.2 through 2.7, SWMUs 00-011(a,e) are being proposed for NFA under Criterion 5.

2.8 Supporting Documentation Attached

Attachment A: DOE Comprehensive Environmental Assessment and Response Program document, Vol. 1 of 2, p. TA0-6. (DOE-AL 1987, 08860)

Attachment B: Lojek memorandum regarding Francis interview for OU 1071 work plan. (Lojek 1991, 01905)

Attachment C: ER Project Land Conveyance and Transfer document, p. 42. (LANL 1999, 63037)

Attachment D: Corps of Engineers document regarding holding times, pp.15-16. (US Army Corps of Engineers 1993, 68411)

Attachment E: Ecological screening assessments for SWMUs 00-011(a,e). (Mirenda 2000, 68068)

Attachment F: December 9, 1994, letter from EPA Region 6 approving the RFI phase report. (EPA 1994, 62098)

2.9 References Used for Text of the Request for Permit Modification for SWMUs 00-011(a,e)

Environmental Restoration Project, March 1994. "RFI Phase Report, Operable Unit 1071, SWMU Aggregate 0-D, Ordnance Impact Areas," Los Alamos National Laboratory report, Los Alamos, New Mexico. (Environmental Restoration Project 1994, 38621)

Mirenda, R., November 2000. "Ecological Screening Evaluation for PRSs 00-011(a,e)," Los Alamos National Laboratory, Los Alamos, New Mexico. (Mirenda 2000, 68068)

References Cited in Text

EPA (US Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)," Interim Final, EPA /540/1-89/002, Office of Emergency and Remedial Response, Washington DC, `http://www.epa.gov/superfund/programs/risk/ragsa/index.htm`. (EPA 1989, 08021)

EPA (US Environmental Protection Agency), July 14, 1999. "Human Health Medium Specific Screening Levels, EPA Region 6," US Environmental Protection Agency, Region 6, Dallas Texas. (EPA 1999, 64804)

Environmental Restoration Project, September 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediment, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory report LA-UR-98-4847, Los Alamos, New Mexico. (Environmental Restoration Project 1998, 59730.2)

Environmental Restoration Project, April 1999. "Screening Level Ecological Risk Assessment Methods," Los Alamos National Laboratory report LA-UR-99-1405, Los Alamos, New Mexico. (Environmental Restoration Project 1999, 63303.2)

LANL (Los Alamos National Laboratory), June 1999. "LANL ECORISK Database (DB)," Los Alamos National Laboratory zip diskette, LANL ER Records Package 186, Los Alamos, New Mexico. (LANL 1999, 64161)

LANL (Los Alamos National Laboratory), November 2000. "Installation Work Plan for Environmental Restoration Project," Revision 8, Draft (pending approval of administrative authority) Los Alamos National Laboratory report LA-UR-00-1336, Los Alamos, New Mexico. (LANL 2000, 66802)

2.10 History of Regulatory Deliverables

LANL, May 1992:	RFI Work Plan for OU 1071 submitted to EPA. (LANL 1992, 07667)
EPA, October 16, 1992:	NOD for OU 1071 RFI work plan. (EPA 1992, 11794). No NODs apply to SWMU 00-011(a) or 00-011(e).
LANL (via DOE-LAAO), November 16, 1992:	Response to NOD for OU 1071 RFI work plan submitted to EPA via DOE-LAAO. (DOE-LAAO 1992, 14694)
EPA, January 6, 1993:	Approvals of OU 1071 RFI work plan and LANL response to NOD. (EPA 1993, 58861. 209)
LANL (via DOE-LAAO), March 30, 1994:	RFI phase report for SWMUs 00-011(a,e) submitted to EPA Region 6 via DOE-LAAO. (ER Project 1994, 35136)
EPA, December 9, 1994:	Approval of RFI phase report for SWMUs 00-011(a,e). (EPA 1994, 62098)

2.10.1 References for Regulatory Deliverables

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1071," Los Alamos National Laboratory report LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992, 07667)

EPA (Environmental Protection Agency), October 16, 1992. "Re: RFI Work Plan for OU 1071 Los Alamos National Laboratory NM 890010515," EPA letter to J.L. Bellows (DOE-LAAO Area Manager) from W.K. Honker (EPA Region 6, RCRA Permits Branch Chief), Dallas, Texas. (EPA 1994, 11794)

DOE-LAAO (US Department of Energy- Los Alamos Area Office), November 16, 1992. Transmittal letter for LANL response to Notice of Deficiency on RFI work plan for OU 1071, DOE/LAAO letter (LESH:4SS-024) to W. Honker (EPA Region 6, RCRA Permits Branch Chief) from J. Vozella (DOE-LAAO, Acting Chief, ESH Branch), Los Alamos, New Mexico. (DOE/LAAO 1992, 14694)

EPA (Environmental Protection Agency), January 6, 1993. EPA approval letter for RFI work plan for OU 1071, EPA letter to J. Bellows (DOE-LAAO Area Manager) from A. Davis (EPA Region 6 Hazardous Waste Management Division Director), Dallas Texas. (EPA 1993, 58861.209)

DOE-LAAO (US Department of Energy-Los Alamos Area Office), March 30, 1994. Transmittal letter for "RFI Phase Report, Operable Unit 1071, SWMU Aggregate 0-D, Ordnance Impact Areas," DOE-LAAO letter (LESH:TT-026) to W. Honker (EPA Region 6 RCRA Permits Branch Chief) from T. Taylor (DOE-LAAO ER Program Manager), New Mexico. (DOE-LAAO 1994, 38621)

EPA (Environmental Protection Agency), December 9, 1994. Approval letter for "RFI Phase Report, Operable Unit 1071, SWMU Aggregate 0-D, Los Alamos National Laboratory, NM0890010515," EPA letter to J. Vozella (DOE-LAAO Assistant Area Manager) from W. Honker (EPA Region 6 RCRA Permits Branch Chief), Dallas, Texas. (EPA 1994, 62098)

00-011(a,e)

ATTACHMENTS

TA0-11-CA-I-HW (Impact areas from ordnance activities)

Background--Several impact areas exist in the Los Alamos area for firing various types of ordnance associated with military activities from 1944 to 1948. The areas resulted from Army activities on federal land during/after World War II. Engineering file 1757 lists the following areas: 1) Rendija Canyon, 2) Barranca area, 3) 37-mm Canyon, 4) TA-20, 5) TA-27, and 6) Pajarito Canyon.

During the 1986 field survey, three areas were located in Rendija Canyon. One fenced and marked area is to the east of the present Sportsmen's Club firing range and one fenced and marked area is to the north. Another area is marked only by the concrete that used to hold a warning sign and by two almost illegible signs that are near Rendija Canyon on the Guaje Mountain pass trail. In the field survey, the Barranca area was observed to be at the foot of Barranca Road. It is well fenced and marked. No information was obtained on 37-mm Canyon. An interviewee indicated that Sandia Canyon, TA-20, was used for tank practice in the war years. An area in the old TA-27 is also fenced and has signs. Upper Pajarito Canyon may also have been an impact zone. At least some of the impact areas have been surveyed and exposed munitions were picked up (McAndrew 1965). The Forest Service indicated that ordnance sweeps are presently conducted periodically at some of the areas.

CERCLA Finding--Uncertain for FFSDIF, PA, and PSI; there is not sufficient information to calculate a HRS Migration Mode Score.

Planned Future Action--Additional information will be gathered on the impact areas during supplemental Phase I.

TA0-12-L-I-RW/HW (DP Road, small disposal pits)

Background--An interviewee indicated that there might be small waste disposal pits north of DP Road in the vicinity of the present Knights of Columbus Hall. The concrete-covered pits would be about 30 by 30 ft in size, contain paper towels, chemical waste, and plastics from D building.

CERCLA Finding--Uncertain for FFSDIF, PA, and PSI; there is not sufficient information to calculate a HRS/MHRS Migration Mode Score.

Planned Future Action--Additional information will be gathered on this site during supplemental Phase I.

TA0-13-OL-I-RW/HW (East Jemez Road, small buildings)

Background--The 1948 topographic maps show some small buildings in the area across from the airport to the south. During the 1986 field survey, some mounds, concrete, and other debris were seen on the mesa near the canyon and in the canyon. The buildings are no longer standing.

CERCLA Finding--Uncertain for FFSDIF, PA, and PSI; there is not sufficient information to calculate a HRS/MHRS Migration Mode Score.

Planned Future Action--Additional information will be gathered on this site during supplemental Phase I.

Attachment B

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00-011 (a,e)

01905

INTERNATIONAL TECHNOLOGY CORPORATION

May 13, 1991

Project No. 301215.09

Dr. M. J. Aldrich, Project Leader
Los Alamos National Laboratory
EES-1 Division, Mail Stop D462
P.O. Box 1663
Los Alamos, New Mexico 87545

Record of Bill Francis Interview for OU 1071 Work Plan

Dear Dr. Aldrich:

Enclosed is a record of the interview which was conducted with former Zia Company employee Bill Francis from 8:30 AM to approximately 11:00 AM on Thursday, May 9, 1991.

Please note that the interview record is a compilation of handwritten notes taken by the IT representatives during the course of the meeting. As such, the interview record should not be considered as a complete or accurate transcript.

Sincerely,

Carole A. Lojek

Carole A. Lojek
Task Leader

cc: A. Adams, EES-1
C. Harrington, EES-1

Regional Office
555 Oppenheimer Road, Suite 103 • Los Alamos, New Mexico 87544 • 505-662-1200

RECORD OF BILL FRANCIS INTERVIEW FOR 1071 WORK PLAN

The following is a record of the interview which was conducted with former Zia Company employee Bill Francis from 8:30 AM to 11:00 AM on Thursday, May 9, 1991. The interview was conducted in order to obtain additional information on operations in, and potential wastes generated at Technical Areas (TAs) 0, 19, 26, 73, and 74 which are within Operable Unit (OU) 1071. Participants of the interview included: J. Aldrich, EES-1; C. Harrington, EES-1; C. Lojek, IT-Los Alamos; D. Filemyr, IT-Los Alamos; and K. Kaal, IT-Los Alamos.

At the beginning of the interview, Bill Francis mentioned that he worked at Los Alamos National Laboratory as a Zia Company employee from July 1947 until he retired in January 1983. During much of that time he was extensively involved in field work and therefore has a good knowledge of the entire site and he knew many people who worked at the Laboratory. The following represents Mr. Francis's response to specific questions about Solid Waste Manangement Units (SWMUs) located in OU 1071.

TECHNICAL AREA-0

Mortandad canyon surface impoundments (SWMU 0-001) - Mr. Francis remembered a concrete weir being built possibly in Mortandad Canyon. The weir was used for stream flow and not as settling basins which was the intent of the surface impoundments. He had no specific information on the location and date of construction of the impoundments.

Container storage area/6th Street Warehouse (SWMU 0-004) - Mr. Francis said that the Zia Company housed their own materials including construction and maintainence materials (i.e., asphalt), lubricants, pesticides, herbicides, and solvents. He said that Zia primarily stored raw chemicals and that all wastes were sent to the airport dump.

Mortandad Canyon landfill (SWMU 0-005) - Mr. Francis had no specific information on the location of the site or the contents of the 55-gallon drums stored there. He had no information on studies involving radionuclide uptake in vegetation conducted at this site.

Surface disposal near MDA-B (SWMU 0-010) - Mr. Francis had no specific information on the location of the site or the operations associated with visible trenches and mounded earth at the site. He did recall that the area was formerly a trailer park which was relocated due to potential health hazards caused by stack emmissions from TA-2. He also recommended contacting Mr. George Ponton who was formerly the operator of the contaminated laundry.

Mortar impact area at Barranca (SMWU 0-011d) - Mr. Francis had no specific information on the location or the operations of the site.

Mortar impact area at 37mm canyon (SWMU 011e) - Mr. Francis had no specific information on the location or the operations of the site. He mentioned that Mr. Carl Lyon

ordered 37mm tanks from Ft. Hood for the Protective Force (Pro Force). He noted that a 1964 letter from Ben Williams (Head of Laboratory Survey Department) suggested that 37mm canyon is an area that probably should be fenced. Since Mr. Robert Drake's name was in this letter, Mr. Francis felt that he may have more information on this site.

Mortar impact area near old firing range (possible new SWMU 0-011f) - With regard to this potential new SWMU located west of Guaje Pines Cemetary, Mr. Francis noted that ordnance (i.e., 40mm and 60mm) was fired by military artillery from Barranca Mesa into this area. He also mentioned that Mr. Robert Drake may know more about this activity.

Western steam plant (SWMU 0-012) - Mr. Francis said that potential waste materials at this site would include analytical chemicals used for testing water. He said that the diesel and settling tanks may still be in place.

Pueblo and Bayo wastewater treatment plants (SWMU 0-018) - Mr. Francis doubted that these plants would have received contaminated wastes from TA-43 (Medical Laboratory) because there were two separate sewer systems at the Laboratory; one was used for domestic sanitary wastes and the other was used for contaminated wastes.

Central wastewater treatment plant (SWMU 0-019) - Again, Mr. Francis doubted that this plant would have received contaminated wastes; it handled primarily sanitary waste. He reiterated that Laboratory personnel were instructed to dump waste chemicals into the acid sewer not the sanitary sewer. He also mentioned that a methane digester was in operation at the site, but he had no specific information on the settling tank or sludge drying bed operations. Mr. Francis did not know what operations were conducted in the building which remains at the site.

Tank mesa landfill (SWMU 0-025) - Mr. Francis had no specific information on the location or the operations of the site, however, he remembered earthen water storage tanks were located on top of this mesa which may be the reason it was called "tank mesa".

Gun mount landfill (SWMU 0-026) - Mr. Francis had no specific information on the location or the operations of the gun mount. He said that the North Mesa site was used for radio communications, and a directional antenna pointed at Ft. Sam Houston was constructed here. He described the radio poles at the site as being wooden poles over 100 feet tall which were installed in a rhombic array. The hutment at the site housed the generator; the generator was probably moved to a cement bunker behind Sigma building. A concrete building was constructed in this area for the telephone company. He also remembered that a cistern on North Mesa (not Barranca Mesa as described in SWMU 0-024) which was used to store discarded high explosive (HE) ordnance.

DP Road storage area (SWMU 0-027) - Mr. Francis had no specific information on the location or the operations of the drum storage area at this site, however, he remembered operations at the fuel oil storage tank area. Tankers off-loaded from the north side of DP

Road to several above-ground storage tanks. Fuel oil was diverted by gravity flow to smaller trucks for delivery to fill stations. He also recalled that a diesel fuel spill occurred at this tank farm. Although he had no recollection of drum storage at this location, Mr. Francis said that from 1945 until about eight years ago, a saw mill was located at the intersection of Trinity and DP Roads near the present Knights of Columbus. He also remembered that a chemical laboratory was located east of the DP laundry. Mr. Francis recalls that the laboratory had a tank approximately 10 feet in diameter and 10 feet high which might have held fuel.

Golf course (SWMU 0-028) - Mr. Francis had no specific information on the irrigation of the golf course using effluent from Central and Pueblo Wastewater Treatment Plants. He estimated that the golf course was built in 1948 or 1949.

PCB transformers (SWMU 0-029) - Mr. Francis had no specific information on the locations of these PCB transformers. Dr. Aldrich mentioned he had a verbal confirmation from another source that they were located on San Ildefonso Pueblo land.

Septic systems (SWMU 0-030) - Mr. Francis had no specific information on the location, or buildings served by the septic systems. His opinion was that these systems received strictly sanitary waste, and that except for TA-32, most septic systems were located in areas where there were no laboratory operations. He recalled that there were two removal efforts for septic tanks, one was initiated in the late 1960s and the other in 1978. This activity was documented by Zia Company work orders; a microfiche of all work orders was supposedly sent to LANL archives.

Former Zia warehouses (SWMU 0-033) - Mr. Francis said that the Zia warehouses contained a sheet metal shop, and electric line shop, and various utilities shops. The cold storage plant had rooms which were lined with 3-inch cork. Mr. Francis does not know the original purpose of the plant, but he thought that ice was produced here. The plant went out of business in the late 50's or early 60's and several small businesses moved in later. The plant still exists as an office building. Mr. Francis said that operations at the Materials Testing Laboratory included: solvent use; asphalt leaching; destructive testing of concrete cylinders; and sieve tests of aggregates for road work specifications. Several tough sheds are now constructed on the laboratory foundation which remains in place.

TECHNICAL AREA-19

Septic tank(s) - Mr. Francis remembers that there were two septic tanks located at TA-19, one at the guard station and one at the laboratory building. He had no specific information on the removal of either tank.

Control, source, and calibration buildings - Mr. Francis thought that the source building was located at the long leg of the L-shaped laboratory building. In this building the source was raised up to irradiate animals. He had no specific information on the control and calibration buildings, but he remembers that a building may have been located in the

loop of the access road.

Physics Division operations - Mr. Francis had no specific information about types of operation or materials which were used by the Physics Division at TA-19 from 1945 to 1947.

Animal irradiation experiments - Mr. Francis believed that monkeys were used in animal irradiation experiments at TA-19. He had no specific information on the types of radiation used for these experiments.

D&D activities - Mr. Francis had no specific information as to how and when the buildings at TA-19 were decontaminated and decommissioned. He felt that Zia would have bulldozed the foundation into the canyon, but not the structures themselves-these would have gone to the contaminated dump.

Spills - Mr. Francis had no specific information on spills that may have occurred at TA-19. He felt that there was little chance for spills since only experiments with radiation were conducted here.

TECHNICAL AREA-26

Vault - Mr. Francis said that the vault stored radioactive sources, and that Zia Company later used it to store HE. (Storage of HE later occurred at the bunkers east of the airport runway.) Mr. Francis had no specific information as to whether chemicals were stored in the vault. He had no specific information as to whether equipment or radioactive material used in conjunction with the atomic bomb was stored at the vault. Mr. Francis was also not sure if Zia ever owned the vault.

D&D activities - Although he had no specific information as to how and when the buildings at TA-26 were decontaminated and decommissioned, Mr. Francis thought that one reason for decommissioning was that the vault was in a bad location security-wise and that it had too much visibility.

Equipment room - Mr. Francis had no specific information on the equipment room, but he thought it could refer to a utility room on the outside of the vault.

Spills - Mr. Francis had no specific information as to what was spilled in the vault in 1940's or the 1950's which could not be completely decontaminated. He explained that "Amercote" was a synthetic paint or varnish commonly used to stop alpha and beta radiation.

Septic system - Mr. Francis had no specific information as to how the septic lines and septic tank in TA-26 were decommissioned.

TECHNICAL AREA-73

Radioactive burial site - Mr. Francis had no specific information on the existence of a radioactive burial site in the vicinity of the airport. He said that the first radioactive burial site was DP-site.

Kappa site waste disposal - Mr. Francis had no specific information as to whether any wastes were disposed of in the airport landfill from Kappa firing site (TA-36).

Hot mix asphalt batch plant - Mr. Francis recalls that an asphalt plant, which was owned by Zia Company, was located west of the incinerator and north of Airport Road. He estimated the period of operation of the plant to be from the mid-forties to 1954 or 1955. In the fifties, the plant was moved from the airport site and taken to TA-3 which is its current location.

Source of animal carcasses - Mr. Francis had no specific information as to whether animal carcasses which were sent to the landfill were from the Laboratory or the townsite.

Waste oil pit - Mr. Francis had no specific information on operation of the waste oil pit, but felt that since the pit was used for disposal of automotive lubricants by the auto repair shops, PCBs were probably not placed in the pit.

Landfill trenching efforts - Mr. Francis remembers that at one time the ground was sinking at the hazardous cargo loading area. As a result, this area was subsequently torn out by excavating to the landfill, and a new loading area was built at the east end of the runway. He recalls hearing that the excavated landfill material was buried in two pits at the east end of the runway. He added that Mr. Don Gallegos may have additional information regarding the landfill excavation.

Incinerator operations - Mr. Francis indicated that the incinerator at TA-73 was used by the Pro Force to burn classified documents; nothing else was burned in the incinerator. He also remembered that the incinerator, which was built in the late 1950's, did not work very well and only operated for 5 or 6 years, or possibly for 10 years. Mr. Francis had no specific information as to how the incinerator was decommissioned.

Steam cleaning plant operations - Mr. Francis said that the garbage can, truck, and dumpster cleaning plant operations were strictly for residential and municipal use; no contaminated items would have been cleaned at the plant.

D&D activities for septic systems - Mr. Francis had no specific information as to how the septic lines and septic tanks in TA-73 were decommissioned.

Surface disposal - Mr. Francis had no specific information as to the origin of the surface disposal area on the mesa south of the airport. However, he recalled that at one time contractor warehouses had been scattered along the south side of East Road prior to the establishment of "contractor row".

Spills - Mr. Francis had no specific information on spills that may have occurred at TA-73.

TECHNICAL AREA-74

Plutonium contamination - Mr. Francis had no specific information as to the origin of plutonium contamination in the stream beds of Pueblo and Bayo Canyons in TA-74. However, based on his knowledge of laboratory operations he felt that the most likely source of plutonium in TA-74 would be from former TA-45 and not former TA-10.

00-011 (a,e)

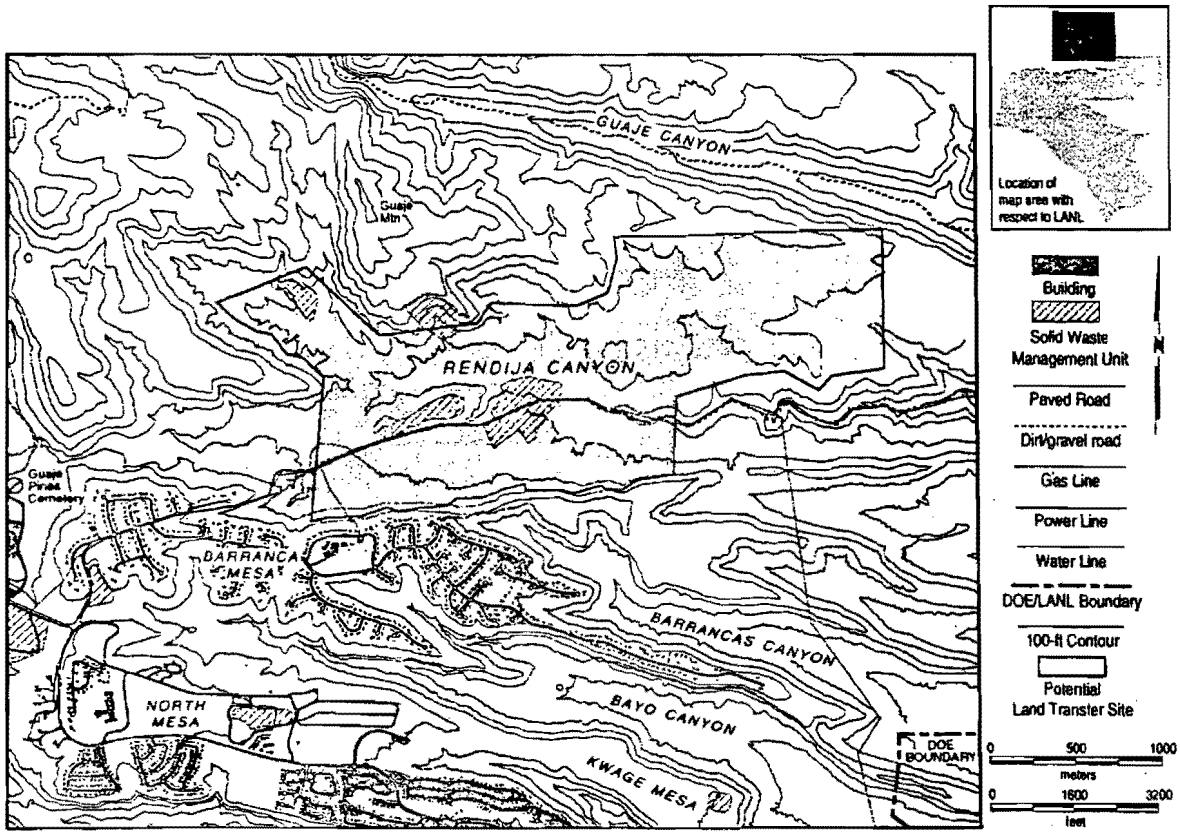

Figure 7.1 Rendija Canyon Site

7.0 Rendija Canyon Parcel

7.1 Introduction

The Rendija Canyon Parcel consists of approximately 910 acres and is located north of and below Los Alamos town site's Barranca Mesa residential subdivision. Figure 7.1 illustrates the location of this parcel with respect to the northernmost residential areas of the Los Alamos town site. An unpaved road extending from Barranca Road to the east divides the site. This site is undeveloped except for a shooting range that serves the local community; the shooting range is located on land that is currently under lease from the DOE to the Los Alamos Sportsman's Club.

The two proposed land uses by the potential recipients of the parcel are cultural and environmental preservation, and residential development.

Special Report 93-11

Attachment D

00-011(a,e)

US Army Corps of Engineers
Cold Regions Research & Engineering Laboratory

Experimental Assessment of Analytical Holding Times for Nitroaromatic and Nitramine Explosives in Soil

Clarence L. Grant, Thomas F. Jenkins and Susan M. Golden

June 1993

Prepared for
U.S. ARMY ENVIRONMENTAL CENTER
CETHA-TS-CR-93045

PREFACE

This report was prepared by Dr. Clarence L. Grant, Professor Emeritus, University of New Hampshire, and Dr. Thomas F. Jenkins, Research Chemist, Geological Sciences Branch, Research Division, U.S. Army Cold Regions Research and Engineering Laboratory, and Susan M. Golden, Chemist, Science and Technology Corporation. Funding was provided by the U.S. Army Environmental Center (formerly the U.S. Army Toxic and Hazardous Materials Agency), Aberdeen Proving Ground, Maryland, Martin H. Stutz, Project Monitor.

The authors gratefully acknowledge Marianne E. Walsh and Daniel C. Leggett, CRREL, for their technical review of this manuscript. The authors also acknowledge Patricia Schumacher, Lawrence Perry, and Ginger Boitnott for assistance in preparation of analytical standards, providing test soils and measurement of soil respiration, respectively. Karen Myers, U.S. Army Engineer Waterways Experiment Station, is acknowledged for supplying the field-contaminated test soil used in this work. Brandee Roemholt is acknowledged for her assistance in the laboratory.

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Experimental Assessment of Analytical Holding Times for Nitroaromatic and Nitramine Explosives in Soil

CLARENCE L. GRANT, THOMAS F. JENKINS AND SUSAN M. GOLDEN

INTRODUCTION

Several years ago, CRREL developed a laboratory method for the determination of nitroaromatic and nitramine explosives in soil (Jenkins et al. 1989). This method was collaboratively tested (Bauer et al. 1990) and subsequently accepted by the American Society for Testing and Materials (ASTM 1991), the Association of Official Analytical Chemists (AOAC 1990) and the Environmental Protection Agency (EPA 1992) as a standard laboratory method for this determination.

One criterion that was not experimentally evaluated during this method development process was an acceptable preextraction sample holding time. Lacking available experimental data, the EPA method established a preextraction holding time of seven days for soil in SW846 Method 8330 (EPA 1992). This holding time was chosen to be consistent with those for other organics in a soil matrix and for contractual compliance.

Subsequently, the U.S. Army Environmental Center (USAEC) (formerly the Toxic and Hazardous Materials Agency), the U.S. EPA and the U.S. Navy jointly funded Oak Ridge National Laboratory to conduct an experimental study to recommend appropriate maximum preextraction holding times (MHTs) for soils contaminated with nitroaromatic and nitramine explosives (Maskarinec et al. 1991). In this study replicate 2-g aliquots of three different soils were placed in 40-mL glass vials and, three days before fortification, the soils were wetted with 0.5 mL of reagent grade water. This was done to allow bacterial activity to come to a steady state prior to fortification with the explosives. On the day the study began, each subsample was spiked with a 0.5-mL aliquot of each individual explosive stock solution. These stock solutions were in an acetonitrile matrix (Maskarinec et al. 1991) and since four different analytes were studied, a total of 2 mL of acetonitrile was added to each 2-g portion of soil. The spiked soils were then vortex mixed for 30 seconds and stored at room temperature (+20°C), refrigerator temperature (+4°C) or freezer temperature (–20°C) for eight time periods ranging up to 365 days. Quadruplicate subsamples for each combination of soil type and storage temperature were analyzed at each time period and the resulting concentrations of each analyte plotted as a function of holding time. While the effect of this large amount of acetonitrile on the soil biota is unknown, storage of soils under acetonitrile does not mimic the manner in which normal soil samples are stored prior to analysis for nitroaromatics and nitramines. In fact, acetonitrile is the extraction solvent of choice for analysis of soils for these analytes (Jenkins et al. 1989). In summary, while the Maskarinec et al. (1991) study seems to be carefully done and the statistical treatment of the data is extensive, we feel it suffers a flaw because of the use of acetonitrile for fortification and the resulting MHT estimates may not be appropriate for customary soil sample storage procedures.

We also have concerns with the data treatment. MHTs were estimated using two definitions: a modified version of an ASTM procedure (1986) and one reported by Prentice et al. (1986). In ASTM, MHT is defined as the "maximum period of time during which a properly preserved sample can be stored before such degradation of the constituent of interest occurs or change in sample matrix occurs that the systematic error exceeds the 99% confidence interval (not to exceed 15%) of the test about the mean concentration found at zero time." The zero time mean concentration and standard deviation are estimated from an appropriate number of samples (usually 10) analyzed immediately after collection. If an analyte concentration is less than one order of magnitude higher than the crite-

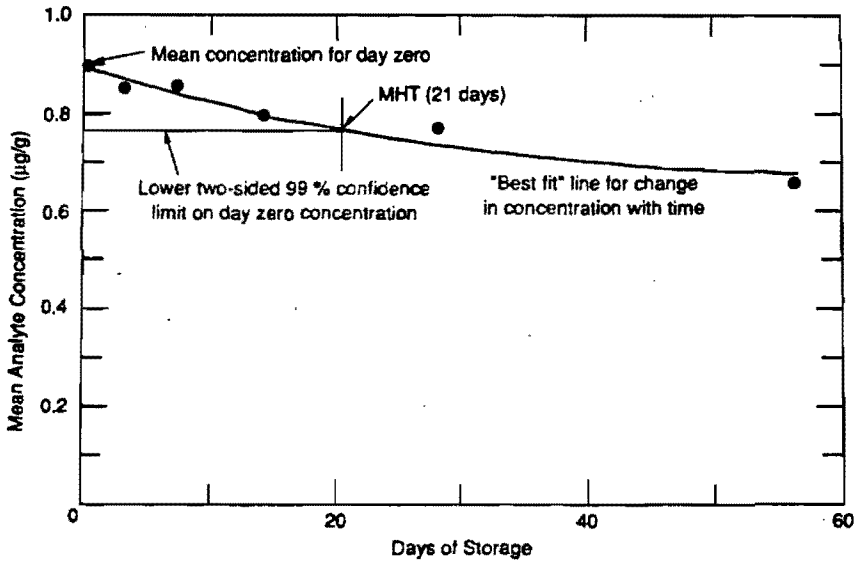

Figure 1. Illustration of ASTM method for estimating maximum holding time.

rion of detection, a bulk sample is fortified and the zero time mean and standard deviation are redetermined. Concentrations are then measured after various time intervals using a number of replicates calculated from the percent relative standard deviation (RSD) of the zero time results. The average concentration found at each analysis point is plotted vs. time on linear graph paper and the "best graphical fit" to the data points is drawn. A MHT is the point where the "best fit" line intersects the two-sided 99% confidence interval about the zero time mean. Figure 1 is an illustration of this definition using a hypothetical example. Note that the number of replicates used in the confidence interval calculation is the number used for each time interval measurement rather than the 10 replicates used to estimate the zero time mean.

According to Maskarinec et al. (1991), their "working definition differed slightly from the exact ASTM definition...." We believe it differs greatly. Their data are fitted via least squares to linear zero-order or first-order kinetic models or, in some

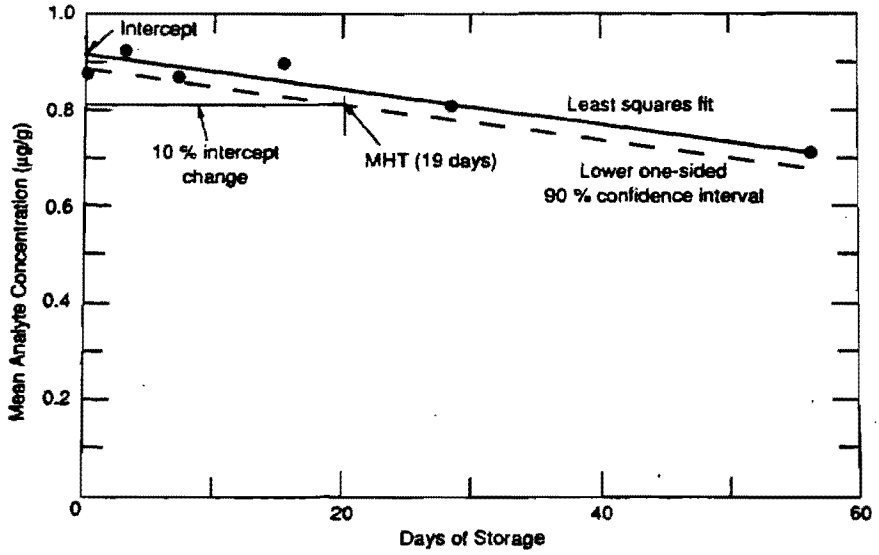

Figure 2. Illustration of ESE method for estimating maximum holding time.

cases, to other models such as a cubic spline. The zero time concentration is estimated as the intercept of the fitted model rather than the zero time mean, and the 99% confidence interval on the intercept is calculated using the standard deviation of the intercept. We are not passing judgment on the appropriateness of the Maskarinec et al. (1991) procedure, but it should be clearly understood that it differs markedly from the ASTM method. In some cases, the intercept differs substantially from the day zero mean and the standard deviation of the intercept differs greatly from the standard deviation of the day zero results.

The second method (ESE method) of estimating MHTs (after Prentice et al. 1986) is defined as the time when a one-sided 90% confidence interval on the concentration predicted by the least squares model selected to represent the concentration vs. time data falls below a 10% change in the intercept of the model. This definition is illustrated in Figure 2, again using a hypothetical example. When a linear model is used, the slope is tested to see if it differs significantly from zero. If it doesn't, the MHT is the longest time tested. Based on statistical considerations, Maskarinec et al. (1991) found that there was not much consistency in the pattern of models chosen. Often three different models were chosen for the same soil when tested at different storage temperatures but a given temperature pattern did not hold for other soils or even for the same soil at a different analyte concentration. For high concentrations of explosives in soils the Prentice et al. method gave MHT estimates that were always longer (up to 2.5 times longer) than corresponding estimates using the modified ASTM definition. However, for low explosives concentrations the modified ASTM definition sometimes gave longer estimates by as much as a factor of 6, although the trend was not consistent.

Because of these very large inconsistencies, Maskarinec et al. (1991) had to interpret their results very conservatively. Briefly, they recommended storage of RDX, HMX, and 2,4–DNT contaminated soils at 4°C (refrigerator) with a MHT of six weeks and TNT contaminated soils at –20°C (freezer) also with a MHT of six weeks.

In the following study, we re-examine the issue of MHTs for explosives-contaminated soils with emphasis on 1) avoidance of organic solvent addition during soil fortification, 2) alternative approaches to data analysis/interpretation, and 3) comparison of stability of fortified soils to a field-contaminated soil.

EXPERIMENTAL

Chemicals

All standards and test solutions were prepared from Standard Analytical Reference Materials (SARMs) obtained from the USAEC. Aqueous standards and test solutions were prepared in reagent grade water obtained from a Milli-Q Type I Reagent Grade Water System (Millipore Corp.). Methanol used in the preparation of HPLC eluent and acetonitrile used for soil extraction were HPLC grade from Alltech and Baker, respectively. Eluent was prepared by combining equal volumes of methanol and water and vacuum filtering through a nylon membrane (0.45 µm) to degas and remove particulate matter.

Analyte spiking solutions

All analyte spiking solutions were prepared in water. SARMs for 2,4,6–trinitrotoluene (TNT), 2,4–dinitrotoluene (2,4–DNT), 1,3,5–trinitrobenzene (TNB), 1,3,5–hexahydro–1,3,5–trinitrotriazine (RDX) and 1,3,5,7–octahydro–1,3,5,7–tetranitrotetrazocine (HMX) were placed in individual brown glass jugs, reagent grade water was added, and the contents were stirred at room temperature for a week. The solutions were then filtered through 0.45-µm nylon membranes into clean, brown glass jugs. No solvents, other than water, were used in the preparation of these solutions.

The concentration of analyte in each aqueous spike solution was determined against standards prepared in methanol or acetonitrile diluted 1:1 with reagent grade water prior to analysis (Jenkins et al. 1986, EPA 1992). A multianalyte spiking solution was prepared by combining appropriate volumes of these individual analyte solutions and filtering through a 0.2-µm nylon membrane. The combined analyte spike solution was stored in a brown glass bottle in the refrigerator until used.

Soils

Blank test soils were obtained locally from Vermont (Windsor), New Hampshire (Charlton) and New York (Ft. Edwards). These soils were air dried, ground with a mortar and pestle and passed through a 30-mesh sieve (590 µm). Some physical and chemical properties of these soils are presented in Table 1. Replicate 5.0 ± 0.1-g subsamples of each blank soil were placed in individual 20-mL glass scintillation vials.

A field-contaminated soil was obtained from the Rockeye site at the Naval Surface Warfare

Table 1. Physical and chemical properties of test soils.

Property	Soil: Ft. Edwards clay	Windsor sandy loam	Charlton silty loam
pH	8.4	6.2	6.0
TOC (%)*	0.5	1.1	1.8
Clay (%)	70	30	20
CEC (meq/100 g)**	>150	3.5	7.3

* Total organic carbon
** Cation exchange capacity

Center, Crane, Indiana, courtesy of Karen Myers from the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. This soil contained measurable concentrations of HMX, RDX, TNT, TNB, two isomeric microbiological transformation products of TNT (McCormick et al. 1976, Walsh 1990), 2–amino–4,6–dinitrotoluene (2–Am-DNT) and 4–amino–2,6–dinitrotoluene (4–Am-DNT) and 3,5–dinitroaniline (3,5–DNA), which is a microbiological transformation product of TNB. This bulk soil was air dried, ground with a mortar and pestle and sieved. Subsamples of this soil were weighed into separate glass scintillation vials in an identical manner as described above except that since less of this soil was available, only 2.00 ± 0.01 g subsamples were used.

Soil wetting and analyte spiking

Prior to the onset of the experiment, previously air-dried test soils were rewetted. Because the texture and water holding capacity of the various soils differed, the volume of water added to each soil was varied such that after spike additions were made, there was no evidence of free-standing water. For the three initially blank soils, 0.20 mL of reagent grade water was added to the Windsor sandy loam and 1.00 mL was added to the Ft. Edwards Clay and Charlton silty loam. For the field-contaminated soil from Crane, 0.50 mL of reagent grade water was added. After water addition, all soils were allowed to stand at room temperature in the dark for three days to allow microbiological activity to be reestablished (Maskarinec et al. 1991).

Fortification of the three initially blank soils was made by carefully adding 1.00 mL of a combined aqueous spiking solution with known concentrations of HMX, RDX, TNB, TNT and 2,4-DNT (Table 2) to each test vial. Except for the soils designated as "day zero exposure" and those to be stored frozen, the spiked soils were immediately placed in the appropriate storage temperature in the dark. The day zero samples and the samples to be frozen were permitted to stand for two hours after fortification to allow time for the analytes to interact with the soils prior to either extraction or freezing. The vials containing the field-contaminated soil were treated and stored in an identical manner as described above except that no fortification was made. An estimate of the initial analyte concentrations in the field-contaminated soil is also presented in Table 2.

Soil respiration

To ensure that the rewetted, fortified and field-contaminated soils had regained microbial activity, three vials of each soil were placed in separate 250-mL Erlenmeyer flasks enclosed with a two-hole rubber stopper. Air was slowly drawn through two aqueous NaOH scrubbers, through an Erlenmeyer containing a given soil and into a CO_2 collection tube containing standard aqueous NaOH. The CO_2 evolved from the soils was collected as carbonate over a period of two weeks and the carbonate level determined by back titration with 0.5 N HCl. The levels of CO_2 evolved are shown in Table 3.

Soil holding time test parameters

A summary of the test parameters used for the soil holding time study is presented in Table 4. For both the fortified and field-contaminated soils, three storage conditions were examined, room temperature (22 ± 2°C), refrigerator storage (2 ± 2°C) and

Table 2. Concentration of combined analyte spiking solution and initial analyte concentrations in test soils.

Analyte	Soil spiking Solution (mg/L)	Concentration Spiked Windsor, Ft. Edwards and Charlton (µg/g)*	Field contaminated Crane soil (µg/g)
HMX	1.48	0.30	2.60
RDX	6.68	1.33	0.44
TNB	4.92	0.98	0.83
TNT	5.06	1.01	2.32
2,4-DNT	4.13	0.83	—
4-Am-DNT	—	—	1.85
2-Am-DNT	—	—	1.18
3,5-DNA	—	—	0.67

*Calculated based on measured composition of spiking solution.

Table 3. Soil respiration measurements, 0–14 days at room temperature.

Soil	CO_2 evolved (mg evolved as C/g of soil)
Windsor sandy loam	0.93
Charlton silty loam	0.33
Ft. Edwards clay	0.48
Crane	0.31

Table 4. Experimental factors for soil holding time study.

Factors	No. of levels	Levels
		Fortified soils
Analytes	5	HMX,RDX,TNB,TNT,2,4-DNT
Soils	3	Ft. Edwards, Charlton, Windsor
Storage temp. (°C)	3	–15°, 2°, 22°
Storage time (days)	6	0,3,7,14,28,56
Replicates	3	a,b,c
		Field-contaminated soils
Analytes	7	HMX,RDX,TNB,TNT,2-Am-DNT,4-Am-DNT,3,5-DNA
Soils	1	Crane
Storage temp. (°C)	3	–15°, 2°, 22°
Storage time (days)	6	0,3,7,14,28,56
Replicates	3	a,b,c

freezer storage (–15 ± 2°C). Portions stored under these conditions were extracted after 0, 3, 7, 14, 28 and 56 days of storage and the analyte concentrations determined. Because of expected variability among subsamples, triplicate portions were analyzed for each storage temperature for each storage time.

Soil extraction

For soil extraction, the vials containing the soil were warmed to room temperature and 9.00 mL of acetonitrile added. The vials were vortex mixed for 1 minute and placed in a sonic bath for 18 hours. The temperature of the bath was maintained at less than 25°C with cooling water. The vials were then removed from the bath and allowed to stand undisturbed for 30 minutes. A 10.00-mL aliquot of aqueous $CaCl_2$ (5 g/L) was then added and the soil particles were allowed to flocculate for 30 minutes before a 5-mL aliquot of the supernatant was filtered through a 0.5 µm Millex SR filter.

This extraction procedure was based on the method developed by Jenkins et al. (1989) (SW846 Method 8330) with two differences. First the soils were not air dried prior to extraction, because it was judged that the time required to dry the soil in the vials at room temperature could result in analyte loss and confound the effect of the holding time temperatures. Second, a 5-g portion of soil was used for the fortified samples instead of the usual sample size of 2 g This was necessary because the solubility of HMX and RDX in the aqueous spiking solution is limited (4 mg/L and 42 mg/L, respectively) as was the moisture-holding capacity of the test soils. Thus to obtain sufficiently high extract concentrations of these analytes without exceeding the moisture-holding capacity of the soils, larger soil samples were required.

RP-HPLC analysis

All soil extracts were analyzed by reversed-phase high performance liquid chromatography (RP-HPLC). Analysis was conducted on a modular system composed of a Spectra-Physics Model SP8800 ternary HPLC pump, a Spectra-Physics Spectra 100 UV variable wavelength detector set at 254 nm (cell path 1 cm), a Dynatech Model LC 241 auto sampler equipped with a Rheodyne Model 7125 sample loop injector, a Hewlett-Packard 3393A digital integrator and a Linear strip chart recorder.

All extracts were analyzed on a 25-cm × 4.6-mm (5-µm) LC-18 column (Supelco) eluted with 1:1 methanol/water (v/v) at 1.5 mL/min (Jenkins et al. 1989). Samples were introduced by overfilling a 100-µL sampling loop. Retention times of the analytes of interest are shown in Table 5. Confirmation of identities of analytes and transformation products were obtained on a 25-cm × 4.6-mm (5-

Table 5. Retention times of test analytes and transformation products for two reversed-phase columns.

Compound	Retention time (min) LC–18	LC–CN
HMX	2.6	9.1
RDX	3.8	6.1
TNB	4.9	4.0
4-amino-2-nitrotoluene	5.1	3.7
2-amino-4-nitrotoluene	5.5	3.8
1,3-dinitrobenzene	6.0	3.9
3,5-dinitroaniline	6.8	5.0
TNT	7.8	4.9
4-amino-2,6-dinitrotoluene	8.7	5.3
2-amino-4,6-dinitrotoluene	9.0	5.6
2,4-DNT	9.4	4.7

μm) LC-CN column (Supelco) under the same operational conditions (Table 5).

Data analysis

The mean and standard deviation for each of 416 sets of triplicate measurements were calculated. Suspect individual measurements were flagged on the basis of extreme values of the % RSD (> 50%) and inconsistencies in the overall pattern for that compound. Each suspect value was checked for possible computation or transcription errors. Twelve individual extreme values (four for HMX, three for RDX, three for TNT and two for 2,4-DNT) with no assignable cause were arbitrarily excluded because they produced large distortions of both means and standard deviations. In no case was more than one datum excluded from a triplicate set. These exclusions amounted to less than 1% of the values.

A modified version of the ASTM procedure was used to estimate MHTs where appropriate. Due to time constraints and the small amount of field-contaminated soil available, triplicate measurements were used throughout. To gain degrees of freedom and to fairly represent precision for the entire experiment, pooled standard deviations were calculated for the six sets of triplicates for each soil/storage condition where rapid degradation was absent. This produced more degrees of freedom for the standard deviation than the nine that would have been obtained if we had been able to run ten replicates on day zero as suggested by ASTM. Where a 99% confidence interval exceeded ±15% of the day zero mean, the limits were set at ±15% as specified in the ASTM procedure. This procedure worked well for the fortified soils where standard deviations were small and the results should be very comparable to the standard ASTM procedure. For the field-contaminated soil, however, more replicates would have improved the results. The major weakness of this approach is the larger than desirable uncertainty in the day zero mean due to the small number of replicates.

Using the day zero values as true values, percent recoveries were calculated for each time period. Where substantial degradation was absent an estimate of the overall recovery was obtained by averaging across the five periods.

RESULTS AND DISCUSSION

Initial analyte concentrations

It is instructive to compare the day zero extractable analyte concentrations in the three fortified soils (Table 6) with the expected concentrations calculated from the multianalyte spiking solution (Table 2). Both HMX and RDX gave slightly higher extractable concentration estimates than expected in Windsor and Charlton soils, while the RDX value for Ft. Edwards was the expected one. The HMX concentration in Ft. Edwards soil could not be reliably estimated because of a large peak eluting very early that tails badly and causes serious quantitation problems for both HMX and RDX. We feel this peak results from a large number of colloidal particles in the extract of this high clay content soil. All three soils showed very similar 2,4–DNT concentrations, which were in good agreement with the expected value. The precision of these

Table 6. Initial concentration of nitroaromatics and nitramines in fortified and field-contaminated soils estimated by RP-HPLC. The fortified soils were extracted two hours after spiking solution was added.

	Mean soil concentration and relative standard deviation							
	Windsor		*Charlton*		*Ft. Edwards*		*Crane*	
Compound	$\bar{X}$ *(μg/g)*	*RSD (%)*	$\bar{X}$ *(μg/g)*	*RSD (%)*	$\bar{X}$ *(μg/g)*	*RSD (%)*	$\bar{X}$ *(μg/g)*	*RSD (%)*
HMX	0.37	0.7	0.39	2.6	a	a	2.60	37.4
RDX	1.50	0.5	1.62	2.4	1.33	6.4	0.44	12.4
TNB	0.91	0.4	0.82	1.8	0.57	26.1	0.83	26.9
TNT	0.97	0.5	0.98	2.1	0.60	15.0	2.32	15.1
4-Am-DNT	—	—	—	—	—	—	1.85	8.3
2-Am-DNT	—	—	—	—	—	—	1.18	8.7
2,4-DNT	0.85	0.3	0.86	2.4	0.88	1.5	—	—
3,5-DNA	—	—	—	—	—	—	0.67	12.3

a – Interference from colloidal particles from high clay content soil.

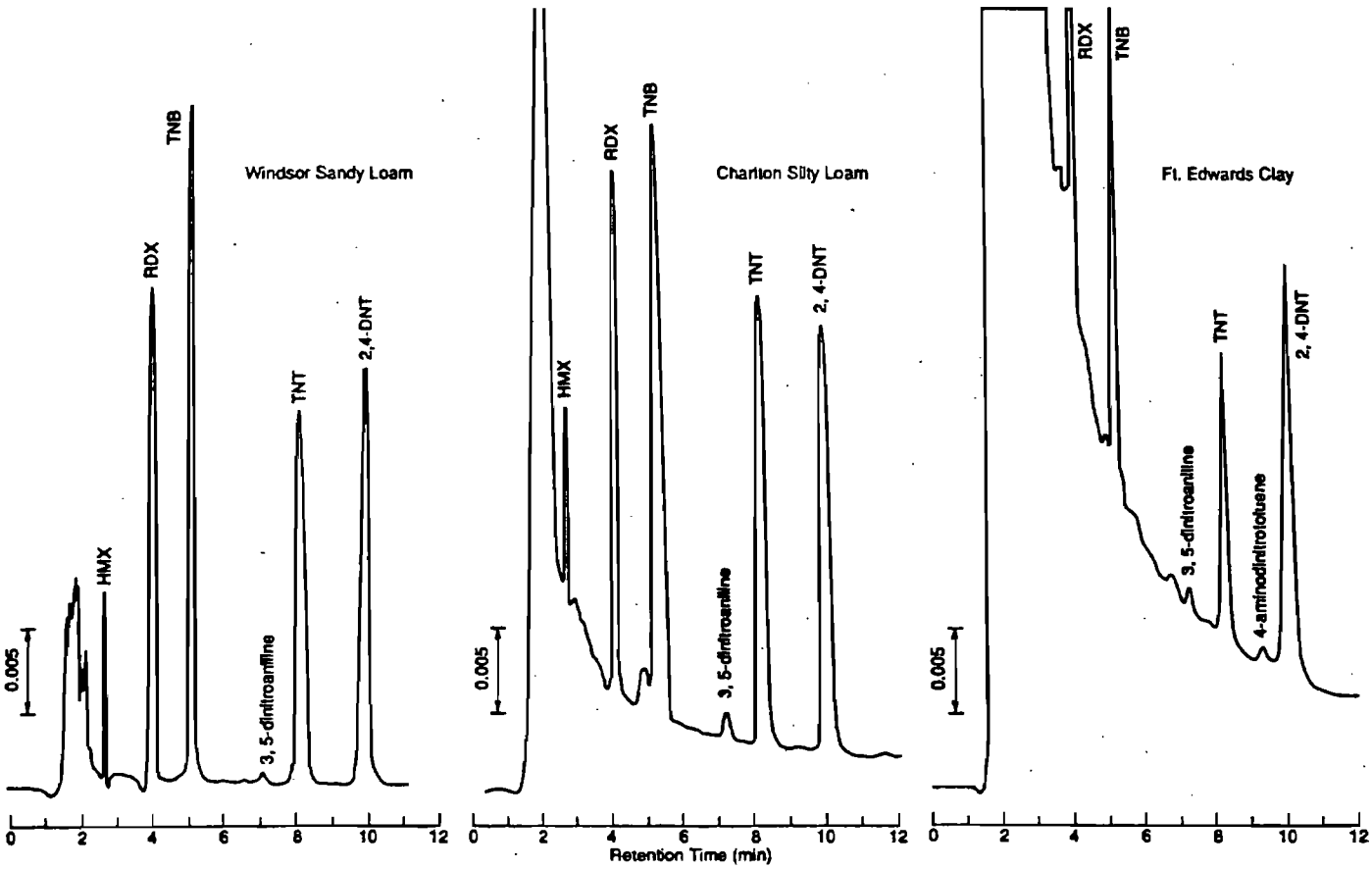

Figure 3. Chromatograms for soil extracts, day zero.

determinations was excellent; only RDX in Ft. Edwards soil had an RSD greater than 2.6%.

For TNB and TNT in Windsor and Charlton soils, the extractable concentration estimates were only moderately lower than the expected values and the RSDs were again very low. The Ft. Edwards soil, however, gave low recoveries of both TNB and TNT and the RSDs were much higher than for the other two soils. Two hypotheses that would explain low recoveries from Ft. Edwards soil are 1) TNB and TNT were bound in non-extractable forms during the two hours between spiking and extraction, and 2) TNB and TNT were partially degraded during that brief period. Experimental evidence indicates that the second hypothesis is the correct one. For the Windsor and Charlton soils (Fig. 3), no chromatographic peaks other than those for the five added analytes were observed in the day zero extracts except for a small peak corresponding to the retention time of 3,5–DNA and a background peak eluting just before TNB. This latter peak has often been observed in acetonitrile extracts of blank soils (Walsh et al. 1993). However, peaks corresponding to 4-Am-DNT and 2-Am-DNT are also present in day zero extracts from Ft. Edwards clay (Fig. 3) and the peak for 3,5-DNA is larger than observed for the Windsor and Charlton extracts. Since 3,5-DNA is a microbiological transformation product of TNB, and 4-Am-DNT and 2-Am-DNT are similarly derived from TNT, the most plausible explanation for their presence in the day zero extracts is as a consequence of TNB and TNT degradation during the two hours between spiking and extraction.

The concentrations of analytes in the Crane soil differ slightly from the fortified soils; HMX is a factor of seven higher, TNT is a factor of 2.5 higher, RDX is a factor of 3.5 lower, TNB is about the same, and concentrations of 3,5-DNA, 4-Am-DNT and 2-Am-DNT range from 0.64 to 1.85 µg/g. The concentration of 2,4-DNT in the Crane soil was too low to accurately quantify. Relative standard deviations for the analytes in the Crane soil range from 8.3% for 4-Am-DNT to 37.4% for HMX, indicating that attempts to homogenize the soil prior to subsampling were not completely successful. This

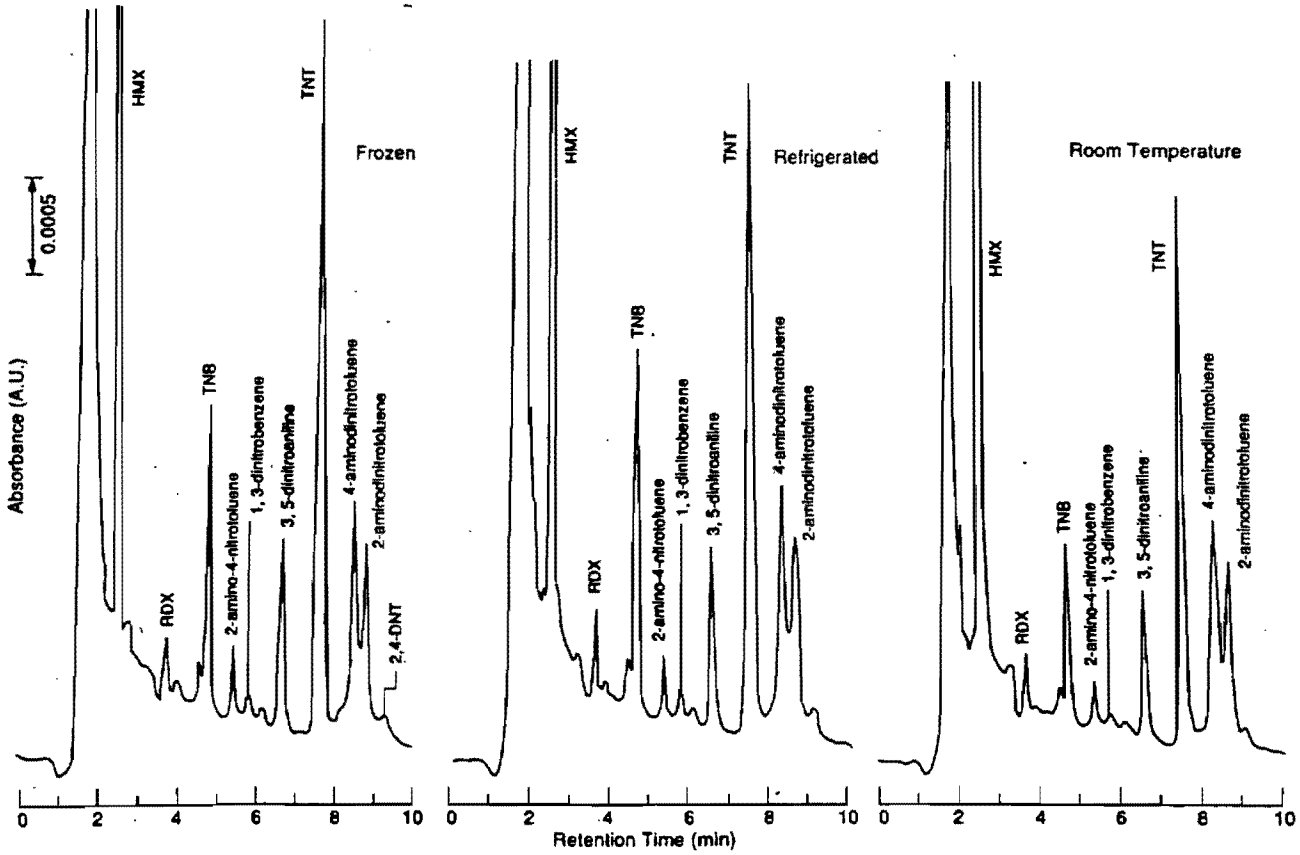

Figure 4. Chromatograms for extracts of Crane soil after seven days of soil storage at different temperatures.

condition is not unusual for field-contaminated soils. Further, the limited amount of soil available made it necessary to use 2.0-g test samples and this small size undoubtedly contributed to the poor precision by increasing the sampling error.

Chromatograms for the extracts from the Crane soil also reveal small peaks corresponding to the presence of 1,3-dinitrobenzene (1,3-DNB) and 2-amino-4-nitrotoluene (Fig. 4). The identification of this variety of nitroaromatics and nitramines in the field-contaminated soil from Crane is consistent with what has been reported elsewhere (Walsh and Jenkins 1992, Walsh et al. 1993) although the identification of 2-amino-4-nitrotoluene has not been previously reported. The reason for the presence of these compounds in soils initially contaminated with production grade TNT and RDX wastes is discussed elsewhere (Walsh 1990, Walsh and Jenkins 1992, Walsh et al. 1993).

Since the stability of these chemicals in the fortified soils and the field-contaminated soils was found to be quite different, the two cases are discussed separately.

Behavior of analytes in fortified soil as a function of holding time

The mean concentrations of the five fortified analytes and three transformation products are presented in Tables 7–9 as a function of holding time and storage condition for the Windsor, Charlton and Ft. Edwards soils, respectively. Of the five fortified analytes, TNB shows the most rapid rate of degradation. For all three soils TNB concentration rapidly decreases at room temperature with only an average of 6.5% remaining in these soils after three days. This result reinforces our conclusion that the low initial value found for TNB in the Ft. Edwards clay was due to degradation in the first two hours of exposure. For refrigerator storage, the rate of disappearance of TNB is slower than at room temperature, but even so, only an average of 15.3% remains after 7 days. Further reduction of TNB occurs by 14 days, and by 28 days the concentration of TNB is below its detection limit. This disappearance is accompanied by the appearance of an increased level of 3,5-DNA, the expected initial microbiological transformation (re-

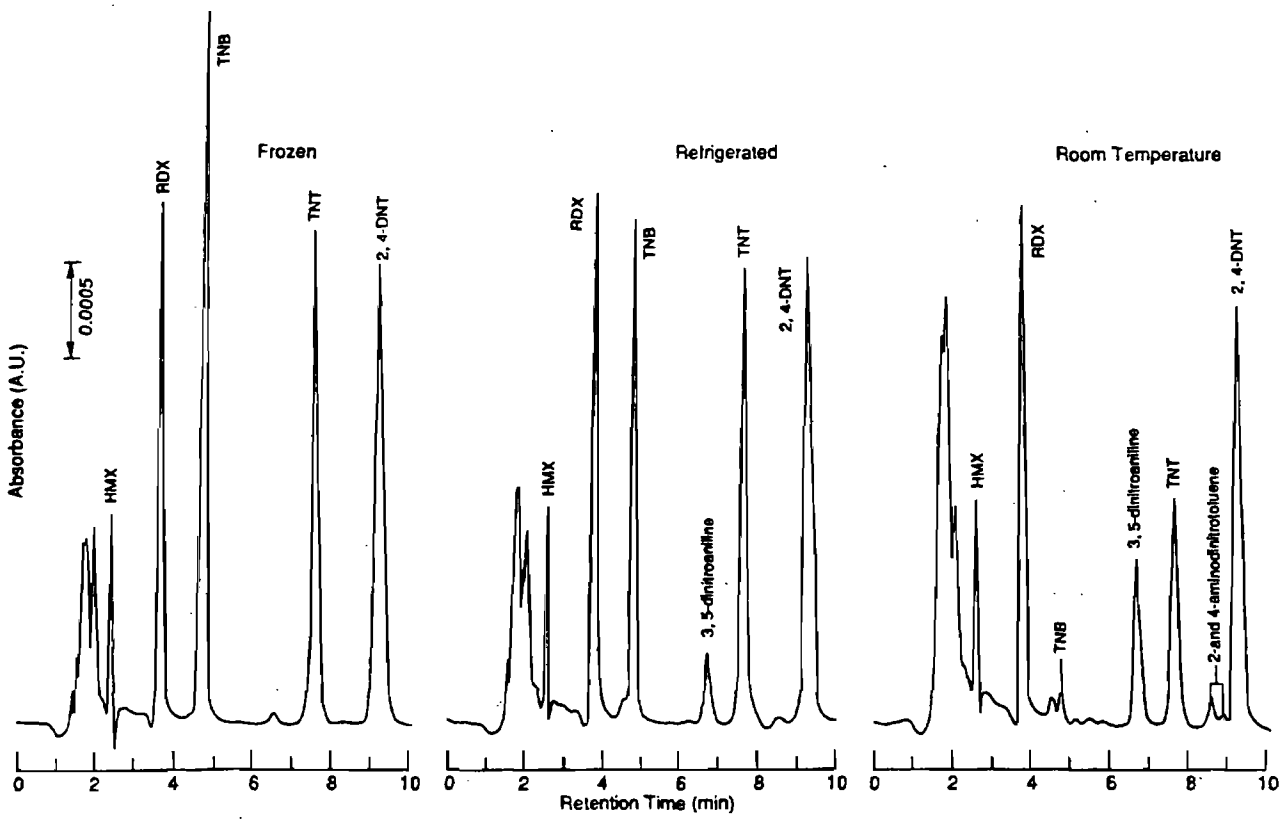

Figure 5. Chromatograms for extracts of Windsor soil after three days of soil storage at different temperatures.

duction) product (McCormick et al. 1976). These changes can be seen in four chromatograms for the Windsor soil (Fig. 5–8) and they are summarized for all three soils at refrigerator storage in Figure 9. On a molar basis, a maximum of 36%, 47% and 15% of the TNB lost could be accounted for as 3,5-DNA for the Windsor, Charlton and Ft. Edwards soils, respectively. It is also interesting to note the slow decrease in 3,5-DNA concentration in all three soils once the TNB precursor is gone. Clearly this is a very dynamic system even under refrigeration.

In contrast to the rapid degradation found at room temperature and under refrigeration, TNB is quite stable in the frozen soils (Tables 7–9). According to our modified ASTM test, TNB is stable for the entire 56-day test period in Windsor soil. In Charlton soil, TNB concentration does rise slightly above the upper 99% confidence interval after 14 days of storage. This finding is due to a very small pooled standard deviation for this data set, and it is of no practical importance because the concentration change is still only 7.6% after 56 days. The greatest change occurred in Ft. Edwards soil. After 28 days the concentration decreased to the lower 99% confidence interval representing a 15% decrease, but it was no lower after 56 days. When estimates from the five storage times were averaged and compared to day zero estimates, the mean percent recovery of TNB for freezer storage of the three fortified soils was 99.3% and the average for the 56-day test was 98.6%. Given the considerable variability in texture among these soils, and the unavoidable daily calibration error, the overall mean recovery is surprisingly close to 100%.

The behavior of TNT in these fortified soils parallels that of TNB except that the rate of disappearance is reduced. The expected transformation products, 2- and 4-Am-DNT (McCormick et al. 1976), are observed to increase as TNT concentrations decline. The rate of loss of TNT varies from soil to soil in the following order: Ft. Edwards > Charlton > Windsor, the same order that was found for TNB. However, the difference between Charlton and Windsor was very small. The rapid loss of TNT for the room temperature storage condition parallels that observed by Maskarinec et al. (1991), in

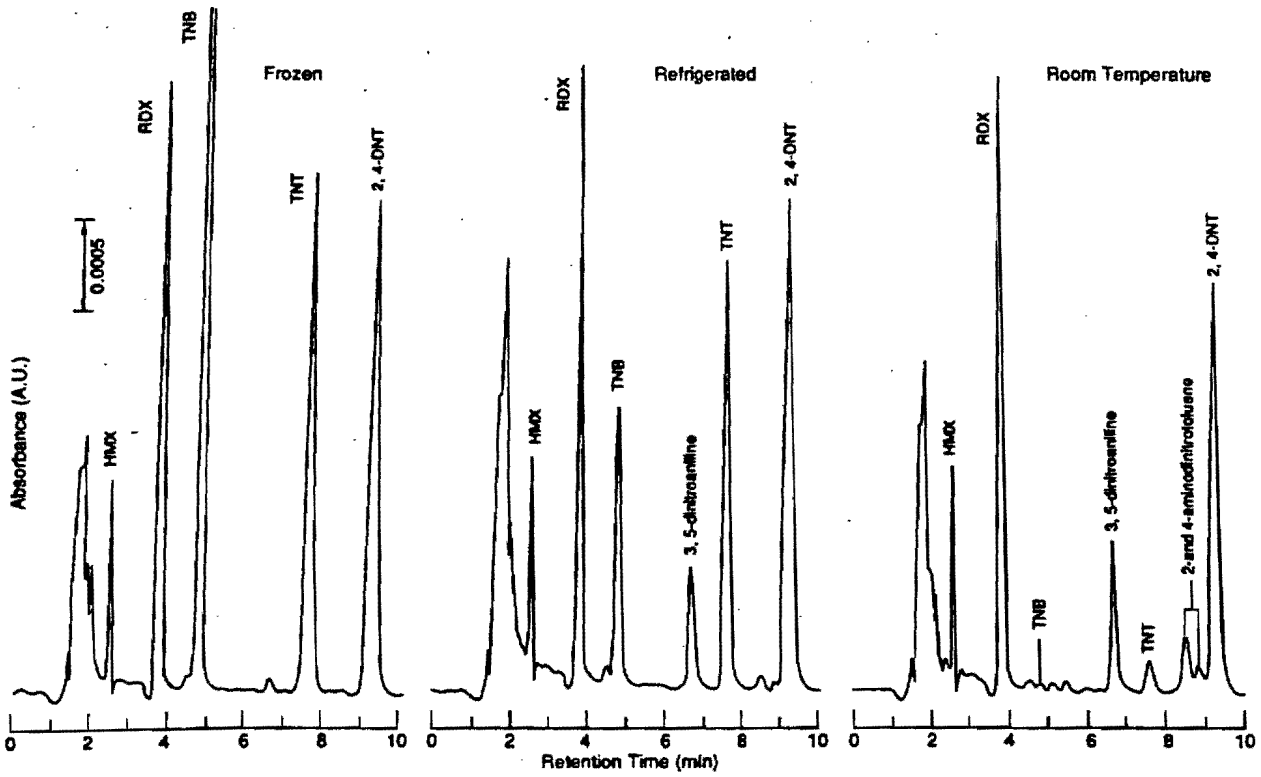

Figure 6. Chromatograms for extracts of Windsor soil after seven days of soil storage at different temperatures.

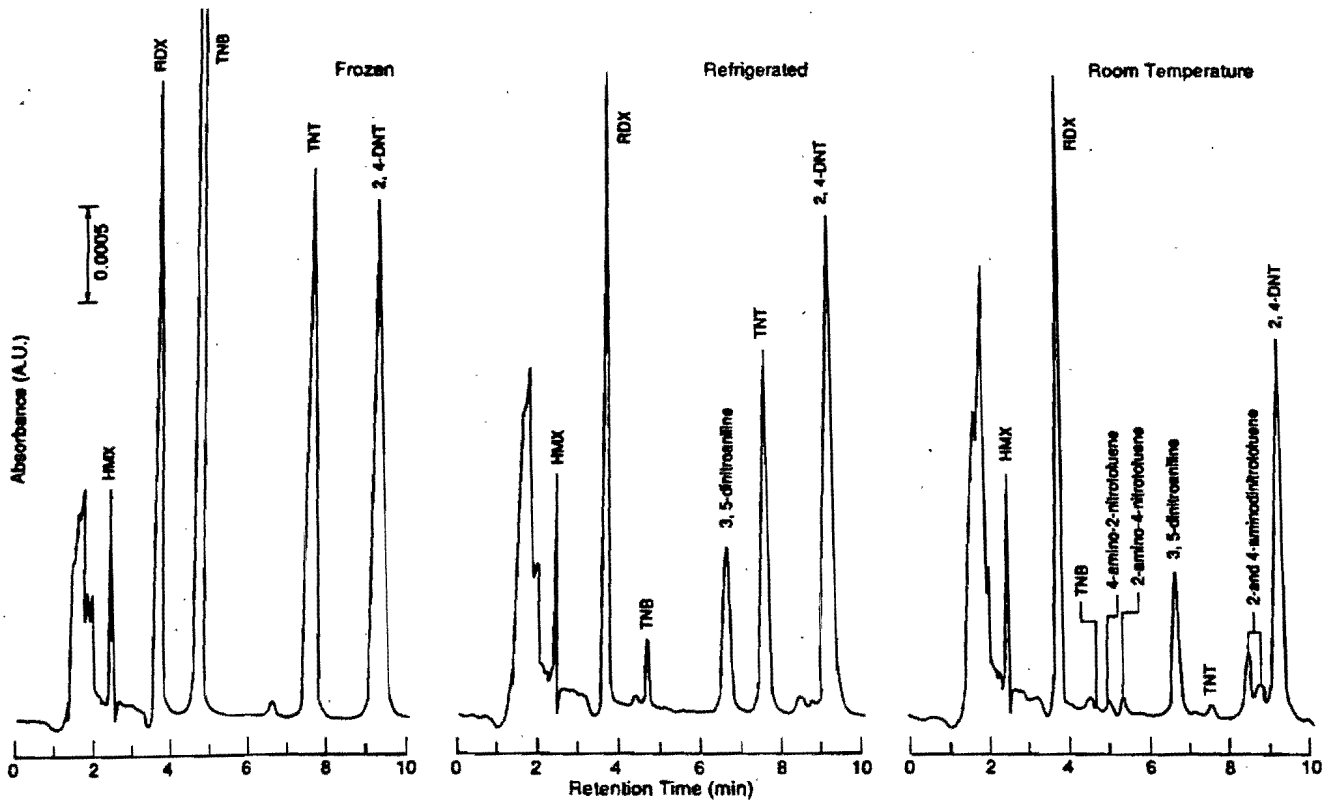

Figure 7. Chromatograms for extracts of Windsor soil after 14 days of soil storage at different temperatures.

Table 7. Concentrations of analytes and transformation products as a function of holding time and storage condition, Windsor sandy loam.

		Mean concentration (μg/g) ± standard deviation (μg/g) *Holding time*											
		00 Days		*03 Days*		*07 Days*		*14 Days*		*28 Days*		*56 Days*	
Compound	*Storage*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
HMX	Room. temp.	0.373	0.003	0.353	0.007	0.385	0.012	0.377	0.001	0.392	0.009	0.349	0.008
	Refrigerator	0.373	0.003	0.360	0.004	0.375	0.004	0.381	0.009	0.379	0.004	0.350	0.009
	Freezer	0.373	0.003	0.354	0.003	0.377	0.011	0.377	0.005	0.399	0.018	0.354	0.008
RDX	Room. temp.	1.500	0.007	1.355	0.019	1.608	0.005	1.568	0.003	1.622	0.015	1.572	0.016
	Refrigerator	1.500	0.007	1.374	0.006	1.612	0.009	1.590	0.015	1.597	0.006	1.570	0.046
	Freezer	1.500	0.007	1.368	0.008	1.600	0.023	1.575	0.004	1.633	0.025	1.586	0.010
TNB	Room. temp.	0.914	0.004	0.013	0.023								
	Refrigerator	0.914	0.004	0.598	0.020	0.300	0.030	0.090	0.027			0.013	0.001
	Freezer	0.914	0.004	0.885	0.008	0.946	0.037	0.952	0.001	0.937	0.054	0.949	0.010
3,5-DNA	Room. temp.			0.277	0.007	0.274	0.016	0.238	0.007	0.191	0.008	0.127	0.009
	Refrigerator			0.116	0.005	0.220	0.013	0.283	0.003	0.277	0.007	0.255	0.022
	Freezer									0.014	0.024	0.028	0.001
TNT	Room. temp.	0.969	0.005	0.465	0.030	0.067	0.010						
	Refrigerator	0.969	0.005	0.861	0.005	0.777	0.013	0.637	0.043	0.309	0.026	0.086	0.017
	Freezer	0.969	0.005	0.926	0.006	0.975	0.026	0.978	0.003	0.980	0.024	0.954	0.010
4-Am-DNT	Room. temp.			0.109	0.005	0.202	0.006	0.215	0.005	0.211	0.010	0.169	0.004
	Refrigerator			0.025	0.002	0.041	0.006	0.067	0.010	0.124	0.002	0.169	0.003
	Freezer			0.004	0.003								
2-Am-DNT	Room. temp.			0.037	0.002	0.074	0.004	0.088	0.002	0.092	0.000	0.079	0.003
	Refrigerator			0.010	0.004	0.016	0.004	0.031	0.002	0.051	0.002	0.065	0.018
	Freezer											0.004	0.007
2,4-DNT	Room. temp.	0.850	0.002	0.741	0.016	0.716	0.021	0.626	0.006	0.573	0.004	0.419	0.020
	Refrigerator	0.850	0.002	0.802	0.004	0.837	0.007	0.828	0.013	0.772	0.005	0.675	0.015
	Freezer	0.850	0.002	0.799	0.006	0.863	0.020	0.856	0.005	0.857	0.017	0.808	0.007

their holding time study, and also by Pennington and Patrick (1990) and Cragin et al. (1985) (Fig.10) for their low concentration spiked soils. Our results are quite different from those found by Maskarinec for refrigerated storage, however. We found that for seven days of storage, the concentrations of TNT remaining were only 80%, 72% and 0%, respectively, for Windsor, Charlton and Ft. Edwards while Maskarinec et al. (1991) found no significant TNT loss until after day 7 for the three soils studied. The accumulation of TNT biodegradation products is shown in Figure 11, where the sums of 2- and 4-Am-DNT are plotted along with TNT concentrations. In contrast to 3,5-DNA, the Am-DNT concentrations continue to increase throughout the storage period, albeit at a slow rate after 28 days.

When soils were frozen our modified ASTM criterion showed no significant change for TNT in Windsor or Charlton soils during the 56-day test period. With Ft. Edwards soil the TNT concentration reached the lower 99% confidence interval (15% change) after about 20 days. However, the total decrease was still only 16.1% after 56 days. When averaged across the five storage times and three soils, the mean percent recovery of TNT for freezer storage was 95.6% of the day zero concentration and the average for the 56 day test was 94.4%.

The stability of 2,4-DNT in these fortified soils is much greater than that of either TNB or TNT. At room temperature an average of 68.4% remained after three days. This increased stability of 2,4-DNT relative to TNT at room temperature agrees with the results of Maskarinec et al. (1991). Under refrigeration an average of 86% remained after seven days of storage. A slow rate of loss continued throughout the study and, by 14 days, peaks corresponding to the expected reduction products,

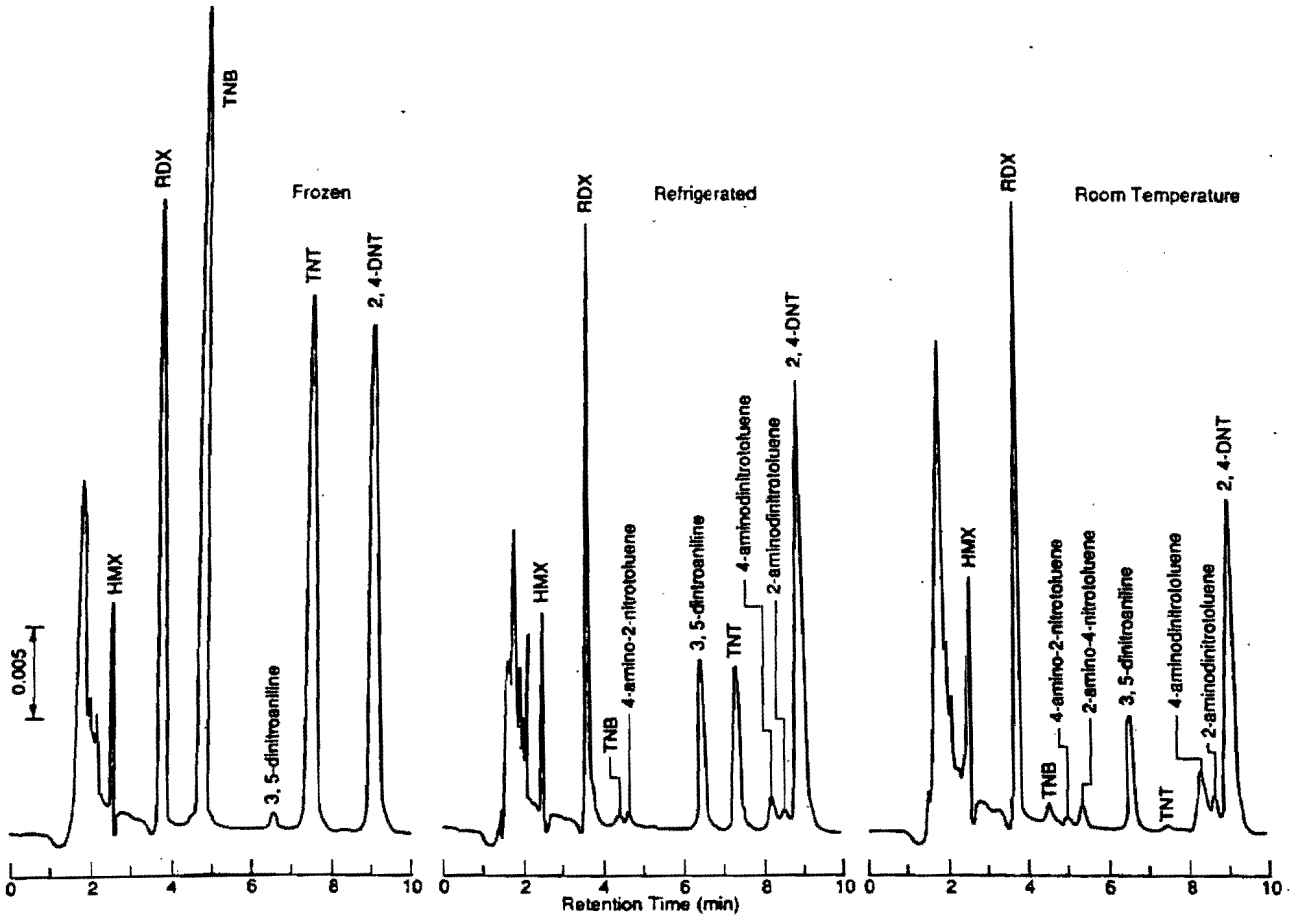

Figure 8. Chromatograms for extracts of Windsor soil after 28 days of soil storage at different temperatures.

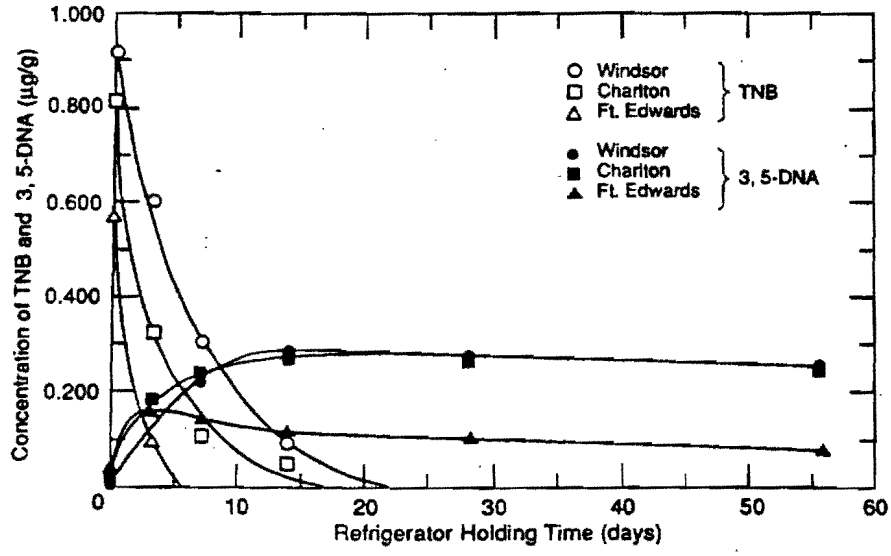

Figure 9. Refrigerator storage effects on TNB for three fortified soils.

Table 8. Concentrations of analytes and transformation products as a function of holding time and storage condition, Charlton silty loam.

		Mean concentration (μg/g) ± standard deviation (μg/g)											
		Holding time											
		00 Days		*03 Days*		*07 Days*		*14 Days*		*28 Days*		*56 Days*	
Compound	*Storage*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
HMX	Room. temp.	0.387	0.010	0.414	0.032	0.389	0.026	0.399	0.027	0.378	0.009	0.358	0.008
	Refrigerator	0.387	0.010	0.400	0.006	0.369	0.013	0.403	0.005	0.387	0.017	0.363	0.009
	Freezer	0.387	0.010	0.389	0.010	0.391	0.006	0.409	0.016	0.390	0.003	0.371	0.013
RDX	Room. temp.	1.618	0.038	1.448	0.025	1.604	0.043	1.570	0.004	1.500	0.058	1.349	0.051
	Refrigerator	1.618	0.038	1.475	0.013	1.588	0.069	1.672	0.026	1.654	0.017	1.542	0.128
	Freezer	1.618	0.038	1.439	0.064	1.666	0.010	1.682	0.021	1.633	0.041	1.668	0.028
TNB	Room. temp.	0.817	0.014	0.119	0.036	0.059	0.004						
	Refrigerator	0.817	0.014	0.320	0.030	0.108	0.001	0.054	0.003			0.013	0.012
	Freezer	0.817	0.014	0.820	0.034	0.854	0.012	0.884	0.012	0.833	0.020	0.879	0.029
3,5-DNA	Room. temp.	0.016	0.028	0.282	0.005	0.278	0.008	0.258	0.016	0.218	0.005	0.166	0.006
	Refrigerator	0.016	0.028	0.178	0.006	0.224	0.011	0.270	0.008	0.274	0.002	0.252	0.017
	Freezer	0.016	0.028			0.014	0.024					0.044	0.004
TNT	Room. temp.	0.977	0.021	0.437	0.028	0.190	0.006	0.072	0.008			0.008	0.007
	Refrigerator	0.977	0.021	0.876	0.018	0.702	0.029	0.601	0.014	0.372	0.021	0.225	0.005
	Freezer	0.977	0.021	0.940	0.041	0.963	0.014	0.993	0.018	0.944	0.037	0.984	0.026
4-Am-DNT	Room. temp.			0.130	0.007	0.175	0.010	0.190	0.009	0.179	0.009	0.132	0.010
	Refrigerator			0.021	0.005	0.041	0.004	0.077	0.009	0.111	0.004	0.135	0.010
	Freezer												
2-Am-DNT	Room. temp.			0.061	0.003	0.081	0.004	0.096	0.007	0.097	0.004	0.087	0.007
	Refrigerator			0.011	0.004	0.018	0.003	0.037	0.009	0.051	0.002	0.071	0.003
	Freezer												
2,4-DNT	Room. temp.	0.860	0.021	0.793	0.009	0.751	0.024	0.667	0.040	0.574	0.011	0.426	0.027
	Refrigerator	0.860	0.021	0.828	0.013	0.783	0.037	0.843	0.021	0.803	0.005	0.726	0.057
	Freezer	0.860	0.021	0.813	0.037	0.850	0.014	0.869	0.016	0.825	0.032	0.839	0.018

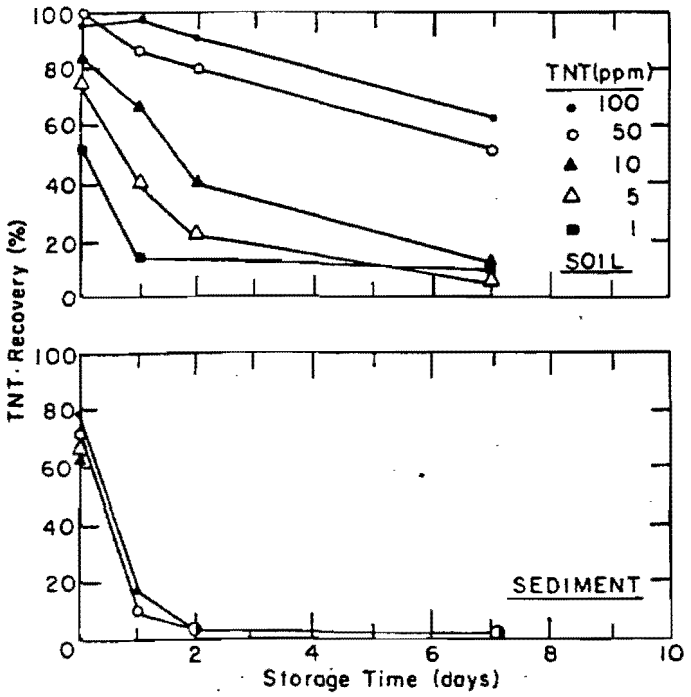

Figure 10. Time variation of recoveries of TNT from spiked Charlton soil and Kewanee sediment samples (from Cragin et al. 1985).

Table 9. Concentrations of analytes and transformation products as a function of holding time and storage condition, Ft. Edwards clay.

		Mean concentration (µg/g) ± standard deviation (µg/g) *Holding time*											
		00 Days		*03 Days*		*07 Days*		*14 Days*		*28 Days*		*56 Days*	
Compound	*Storage*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
HMX	Room. temp.												
	Refrigerator												
	Freezer												
RDX	Room. temp.	1.335	0.085	1.241	0.005	1.365	0.125	1.240	0.123	1.214	0.071	1.343	0.011
	Refrigerator	1.335	0.085	1.206	0.054	1.324	0.037	1.220	0.089	1.372	0.081	1.375	0.017
	Freezer	1.335	0.085	1.180	0.004	1.259	0.097	1.220	0.086	1.279	0.046	1.296	0.039
TNB	Room. temp.	0.566	0.148	0.020	0.034								
	Refrigerator	0.566	0.148	0.102	0.018								
	Freezer	0.566	0.148	0.609	0.310	0.477	0.221	0.538	0.108	0.480	0.041	0.477	0.081
3,5-DNA	Room. temp.	0.027	0.046	0.082	0.010	0.042	0.037					0.028	0.001
	Refrigerator	0.027	0.046	0.166	0.008	0.144	0.013	0.112	0.009	0.099	0.009	0.080	0.005
	Freezer	0.027	0.046	0.131	0.055	0.062	0.009	0.065	0.018	0.054	0.047	0.070	0.017
TNT	Room. temp.	0.596	0.089										
	Refrigerator	0.596	0.089	0.130	0.025								
	Freezer	0.596	0.089	0.530	0.015	0.479	0.215	0.553	0.077	0.504	0.007	0.500	0.060
4-Am-DNT	Room. temp.	0.110	0.035	0.205	0.034	0.143	0.018	0.109	0.006	0.086	0.024	0.056	0.021
	Refrigerator	0.110	0.035	0.226	0.031	0.208	0.008	0.174	0.019	0.223	0.008	0.187	0.023
	Freezer	0.110	0.035	0.210	0.054	0.087	0.013	0.106	0.027	0.106	0.030	0.135	0.036
2-Am-DNT	Room. temp.					0.049	0.017	0.027	0.010	0.029	0.006	0.032	0.004
	Refrigerator					0.044	0.005	0.028	0.012	0.052	0.006	0.117	0.005
	Freezer					0.011	0.010	0.004	0.006				
2,4-DNT	Room. temp.	0.875	0.013	0.226	0.063	0.194	0.024	0.113	0.025	0.060	0.052	0.047	0.005
	Refrigerator	0.875	0.013	0.768	0.024	0.586	0.057	0.426	0.050	0.391	0.036	0.315	0.017
	Freezer	0.875	0.013	0.840	0.006	0.719	0.152	0.783	0.090	0.749	0.062	0.697	0.010

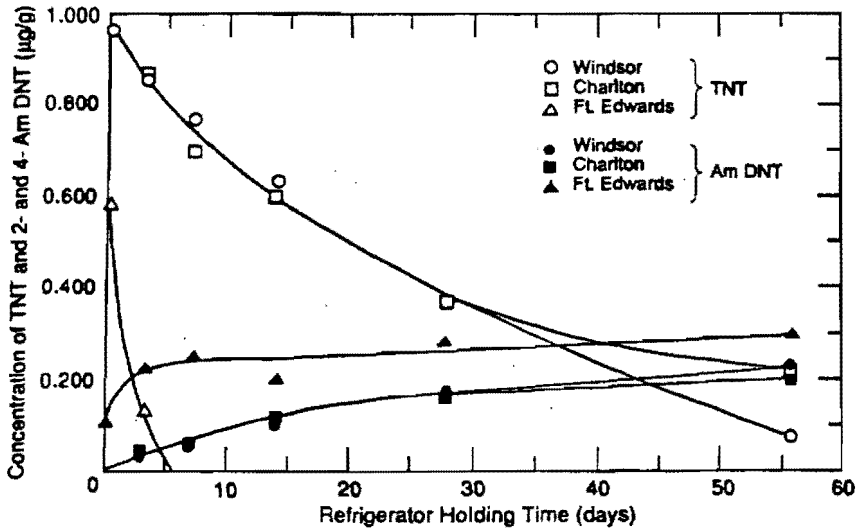

Figure 11. Refrigerator storage effects on TNT for three fortified soils.

2-amino-4-nitrotoluene and 4-amino-2-nitrotoluene (McCormick et al. 1976), were observed (Fig. 7).

With freezer storage, 2,4-DNT was quite stable. For the Windsor soil, our modified ASTM criterion was exceeded on the low side after 42 days. Once again, this occurred because of a very small pooled standard deviation and, at 56 days, the concentration decrease was only 4.9%. Charlton soil showed no significant change during the 56-day test period. However, the Ft. Edwards soil produced a significant 2,4-DNT decrease after 30 days and the loss after 56 days was 20.3%. Still, the overall mean recovery relative to day zero for the three soils was 94.2% and the mean for the 56-day time was 90.8%.

The stability of HMX and RDX in these three fortified soils is much greater than that of TNB, TNT or 2,4-DNT. This agrees with the results obtained by Maskarinec et al. (1991) and Harvey et al. (1991) and is consistent with results from Hoffsommer et al. (1978) and Spanggord et al. (1980) who showed that RDX does not biodegrade under aerobic conditions. Regardless of storage conditions, no loss of HMX or RDX was observed over the entire 56-day study. The overall mean recoveries for HMX and RDX were, respectively, 99.8% and 97.1% for room temperature storage, 99.1% and 99.5% for refrigerator storage, and 100.3% and 99.0% for freezer storage. When HMX and RDX are the only analytes of interest, these data indicate that all three storage conditions are acceptable for at least 56 days.

Holding time behavior of analytes in a field-contaminated soil

The mean concentrations of four explosives (2,4-DNT concentration was too low to quantitate) and three transformation products in Crane-Rockeye soil are presented in Table 10 as a function of hold time and storage condition. Several differences from the fortified soils are evident from these data. First, it is apparent that triplicate analysis of 2.0-g samples of this field-contaminated soil failed to yield satisfactory precision despite efforts at homogenization. RSDs often exceeded ±25%, with the poorest results found for HMX and TNT. Secondly, and most important, the rapid loss of

Table 10. Concentrations of analytes and transformation products as a function of holding time and storage condition, Crane-Rockeye soil.

		Mean concentration (µg/g) ± standard deviation (µg/g)											
		Holding time											
		00 Days		*03 Days*		*07 Days*		*14 Days*		*28 Days*		*56 Days*	
Compound	*Storage*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*	*X*	*S*
HMX	Room. temp.	2.478	0.927	1.882	0.302	1.936	0.030	2.534	1.351	2.475	0.853	2.199	0.780
	Refrigerator	2.478	0.927	2.188	0.711	1.850	0.067	1.986	0.475	1.848	0.410	2.101	0.894
	Freezer	2.478	0.927	2.668	0.850	1.938	0.516	3.068	1.888	1.946	0.432	1.915	0.784
RDX	Room. temp.	0.421	0.052	0.398	0.033	0.432	0.070	0.335	0.027	0.380	0.015	0.399	0.034
	Refrigerator	0.421	0.052	0.421	0.035	0.447	0.100	0.355	0.037	0.467	0.042	0.351	0.058
	Freezer	0.421	0.052	0.390	0.039	0.383	0.044	0.403	0.090	0.404	0.029	0.375	0.071
TNB	Room. temp.	0.794	0.213	0.912	0.133	0.671	0.320	0.406	0.103	0.701	0.084	0.563	0.084
	Refrigerator	0.794	0.213	0.842	0.122	1.010	0.012	0.559	0.009	0.927	0.310	0.636	0.122
	Freezer	0.794	0.213	1.035	0.238	0.672	0.170	0.689	0.027	0.825	0.133	0.644	0.071
3,5-DNA	Room. temp.	0.643	0.079	0.770	0.038	0.692	0.162	0.493	0.051	0.512	0.074	0.416	0.041
	Refrigerator	0.643	0.079	0.705	0.110	0.786	0.050	0.625	0.010	0.775	0.133	0.633	0.041
	Freezer	0.643	0.079	0.762	0.085	0.650	0.100	0.639	0.017	0.707	0.052	0.604	0.047
TNT	Room. temp.	2.209	0.334	2.346	0.313	2.085	0.510	1.520	0.135	2.400	0.469	1.692	0.371
	Refrigerator	2.209	0.334	2.085	0.032	2.348	0.383	2.369	0.584	2.137	0.171	1.718	0.321
	Freezer	2.209	0.334	2.631	0.271	2.642	0.449	2.117	0.035	2.044	0.183	2.421	0.241
4-Am-DNT	Room. temp.	1.765	0.147	2.034	0.134	1.909	0.308	1.587	0.061	1.667	0.087	1.501	0.097
	Refrigerator	1.765	0.147	1.848	0.099	2.068	0.091	1.699	0.068	1.939	0.155	1.818	0.142
	Freezer	1.765	0.147	1.955	0.158	1.754	0.130	1.700	0.053	1.802	0.129	1.695	0.090
2-Am-DNT	Room. temp.	1.130	0.099	1.285	0.129	1.205	0.187	1.077	0.055	1.149	0.056	1.087	0.105
	Refrigerator	1.130	0.099	1.167	0.090	1.262	0.086	1.059	0.044	1.204	0.086	1.137	0.081
	Freezer	1.130	0.099	1.236	0.074	1.083	0.062	1.081	0.032	1.155	0.082	1.085	0.061

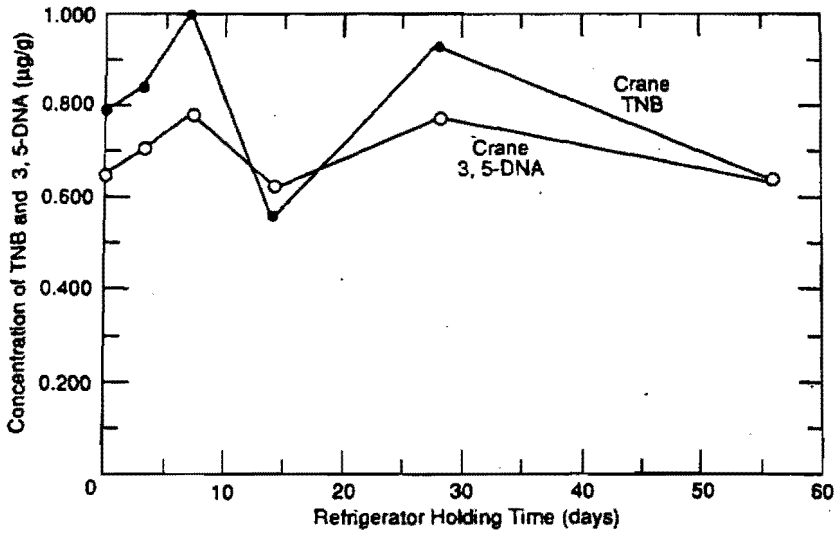

Figure 12. Refrigerator storage effects on TNB and 3,5-DNA for field-contaminated soil.

nitroaromatics observed with the fortified soils is not evident in the field contaminated soil. Also, there is no significant increase with time for the concentrations of degradation products. However, these compounds are initially present at much higher concentrations than ever found in the fortified soils. These points are illustrated in Figure 12 for TNB and 3,5-DNA. The striking similarity in the patterns of variation with time for these two analytes offers convincing evidence that random sampling errors are a dominant factor controlling results.

In view of the poor precision, our modified ASTM procedure to estimate MHTs was not applied. Only the isomers of Am-DNT yielded 99% confidence intervals that were less ±15%. However, overall mean recoveries relative to day zero were calculated. For freezer storage, mean recoveries were 93.1%, 92.9%, 97.4% and 107.3% for HMX, RDX, TNB and TNT, respectively. Comparable values for refrigerator storage given in the same order were 80.5%, 97.0%, 100.8% and 96.5%. If we consider the large uncertainties in the day zero means, these recovery estimates do not suggest rapid degradation of these analytes in the Crane soil.

ADDITIONAL COMMENTS

Least squares models were not fitted to our data. Maskarinec et al. (1991) required five different models to fit all their data and there was no consistent pattern of the "best fit" models as a function of soil or storage condition. We doubt these empirical fits imply any fundamental relationships. The problem is further exacerbated by 1) nonrandom calibration errors (day-to-day) that cannot be separated from real changes in analyte concentrations, and 2) by distortion of experimental errors caused by transformations of data (Motulsky and Ransnas 1987). We believe that our modified ASTM procedure using a pooled standard deviation is an acceptable way to estimate MHTs. However, future work should employ preliminary studies to estimate the required number of replicates for acceptable precision of means, and more replicates should be used for day zero data. For organic analytes in field-contaminated soils, consideration should be given to relaxing the limits for 99% confidence from ±15% to ±20 or 25% to accommodate insurmountable sample heterogeneity problems.

Results from fortified soils appear most applicable to freshly contaminated soils such as one might find near the front of a moving groundwater plume. If we assume that future studies will confirm the difference observed here between fortified and field-contaminated soils, MHTs for sites with long-standing contamination could be based on soils from similar sites because this offers the potential to extend MHTs. Where this is impractical, MHTs should be based on worst case results, which appear to result from fortified soils. Based on results for fortified soils, when HMX and RDX are the only analytes of interest, either refrigeration or freezing are acceptable storage conditions for at least eight weeks. When nitroaromatics are to be

determined, soil differences become important, as noted from the much more rapid degradation found in Ft. Edwards clay compared to Windsor and Charlton loams. Samples should be immediately frozen. At –15°C, TNB and TNT remain acceptably stable for eight weeks and 2,4-DNT is stable for four weeks. From practical considerations, 2,4-DNT will still give acceptable results after being frozen for eight weeks.

There remains a further unresolved issue relative to the effects of air drying. In an earlier study, Bauer et al. (1989) spiked air-dried soils with a series of nitroaromatics and nitramines in ACN, evaporated the ACN and studied the stability of these analytes over a 62-day period under refrigeration. Their results indicate that these analytes are stable once the soil is dry. In our study, however, we find substantial degradation in only two hours for TNB and TNT added to wet soils maintained at room temperature. This raises the issue of when to dry soils for homogenization and subsampling. Regardless of whether soils are air dried after sampling and before freezing, or not until they are thawed, significant loss of TNB and TNT is possible. Furthermore, there is some evidence to suggest more microbiological activity on thawing than before freezing (Skagland et al. 1988). Is it possible that freezing would be unnecessary if soils are first dried? Is there any way to speed the drying process to minimize microbiological degradation? Although freeze drying could possibly minimize the problem (Cragin et al. 1985), a question remains as to the practicality of this alternative for general usage. Will drying have a different effect on fortified samples compared to field-contaminated samples? Must we avoid drying and, therefore, homogenization, in order to prevent large losses of analytes such as TNB and TNT? Separate samples could be air dried for moisture correction. All of these issues should be addressed in future work.

The large difference in the behavior of nitroaromatics behavior between fortified and field-contaminated soils is extremely important. Even with avoidance of the addition of unnatural solvents during fortification, the behavior of nitroaromatics appears not to accurately mimic soils contaminated in the field over extended periods of time. To better define these differences, there is need for more extensive studies of field-contaminated soils under conditions where sample size and replicate numbers are not arbitrarily limited. If analytes in field-contaminated soils are consistently found to be much more stable than in fortified soils, continued use of fortified soils to estimate MHTs will lead to unnecessarily restrictive sample handling procedures and storage times. At some time these comparisons should be extended to other biodegradable organic compounds with different binding strengths to soils.

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Attachment E

00-011(a,e)

Memo to File

Date: November 16, 2000

To: PRS 00-011(a,e) File

From: Richard Mirenda, EES-13 RM

RE: ECOLOGICAL SCREENING EVALUATIONS FOR PRSs 00-011(a,e)

Attached is the ecological screening evaluations for Potential Release Sites 00-011(a, e) conducted for the Los Alamos National Laboratory Environmental Restoration Project. This evaluation was originally completed in the summer of 1999. Subsequent revisions to the ecological screening methodology and screening values did not change the original assessment. This packet includes the following items:

- screening evaluation and discussion,
- scoping checklist with conceptual model diagrams,
- site photo, and
- threatened and endangered habitat review by ESH-20.

Ecological Screening Evaluation for PRS 0-011(a)

This PRS is a mortar impact area located on DOE land about 0.4 miles east of the Sportsman's Club firing range in Rendija Canyon. The PRS boundary extends to the south beyond the fenced area. Because Rendija Canyon is open to the public, the unfenced part of the impact area has been used by visitors for a variety of activities. The area inside and outside of the fence was swept for unexploded ordnance and ordnance fragments prior to sampling. Samples collected from this PRS as part of the RFI were analyzed for metals and high explosives (HE).

The purpose of the ecological screening evaluation is to identify chemicals of potential ecological concern (COPECs) and not to calculate risk. The evaluation involves the calculation of hazard quotients (HQs) and hazard indices (HIs) for all chemicals of potential concern (COPCs) identified in the data review and all appropriate screening receptors as described in Ryti et al. (1999, 63303.2). The HQ analysis is based on the maximum detected concentration or detection limit for each COPC and is calculated by dividing these values by the soil ecological screening level (ESL) for nine screening receptors. The derivation of ESLs is based on the approach presented in Ryti et al. (1999, 63303.2) and LANL (1998, ER ID Package 186). The screening receptors for which ESLs have been derived include a plant, an invertebrate, deer mouse, vagrant shrew, desert cottontail, American robin, American kestrel, and the red fox. The rationale for these receptors is presented in Ryti et al. (1999, 63303.2). A HI is the sum of HQs across contaminants with like effects for a given screening receptor. A HQ or HI greater than 1.0 is considered to be an indicator of potential adverse impacts. The chemicals resulting in a HQ greater than 1.0 or contribute more than 0.1 to a HI greater than 1.0 are identified as COPECs. The analysis is designed to be conservative (i.e., some assumptions may not represent actual conditions) in order to minimize the possibility of eliminating an analyte that may pose a potential ecological risk.

Several inorganic chemicals were detected above sediment background values (BVs), including barium (3 samples, 1 of which is a duplicate), cobalt (15 samples), chromium (3 samples), iron (2 samples), lead manganese, and nickel (1 sample each), selenium (14 samples), and vanadium (5 samples). All of the detected values were less than twice the sediment BV, except for selenium, which was approximately 2.6 times the BV (*Note*: BV for selenium is the nominal detection limit and not a calculated value). In addition, all of the inorganic chemical concentrations, except for a lead and a cobalt concentration, were below the soil BVs. All other metals were either detected below BVs or had detection limits less than the BV. No HE was detected in any of the samples.

Table 1 presents a comparison of the maximum detected values for barium, cobalt, chromium, lead, manganese, nickel, selenium, and vanadium to their minimum terrestrial ESL. Iron does not have an ESL for comparison. Because the maximum HQs are greater than 1.0, these chemicals are considered to be COPECs and are further evaluated using a HI analysis (Table 2).

The HI is the sum of HQs for chemicals with common toxicological endpoints for a given receptor. For the purposes of ecological screening, it is assumed nonradionuclides could have a common toxicological effect. Although it is likely that this assumption is incorrect, the COPCs are grouped together in the comparison to ESLs. The HIs are greater than 1.0 for the plant, deer mouse, shrew, cottontail, robin, and kestrel and less than 1.0 for the earthworm and red fox. The HIs greater than 1.0 are driven by manganese and vanadium for the plant, by barium, cobalt, manganese for the mouse, by barium and cobalt for the shrew, cobalt and manganese for the cottontail, by barium, cobalt, and vanadium for the robin, and by barium and cobalt for the kestrel. All of the HQs for the earthworm and fox are 0.3 or less and the HIs are 0.5 and 0.2, respectively. Although iron does not have any ESLs, its maximum detected concentration (14000 mg/kg) is similar to the BV of 13800 mg/kg (Ryti et al. 1998, 59730.2), while other detected concentrations of iron are less than the BV. Therefore, iron concentrations across the area encompassed by the PRS are considered to be similar to background.

The majority of the ESLs used in the above comparisons are below the sediment BVs for the various inorganic chemicals. As a result, the HQs and subsequent HIs are elevated and overestimate the potential for risk to ecological receptors. As noted previously, the elevated concentrations of inorganic chemicals are similar to sediment background (i.e., generally less than twice the sediment BV) and equivalent to or slightly above the soil BVs. Comparisons of ESLs that are similar to or greater than the sediment BVs to the maximum detected concentrations of each inorganic chemical results in HQs of approximately 1.0 or less. For example, the maximum lead concentration (29 mg/kg) was approximately 1.5 times the sediment BV (19.7 mg/kg) (Ryti et al. 1998, 59730.2), and had HQs ranging from 0.005 to 1.5. Because background levels are defined as the naturally occurring concentrations of inorganic chemicals and are used to distinguish between contaminated and uncontaminated media, concentrations below or similar to background concentrations are assumed not to pose a potential risk to receptors. Therefore, the elevated concentrations of inorganic chemicals in the sediment at PRS 0-011(a) do not pose a potential for adverse impacts to ecological receptors.

The sample collected from the farthest downstream portion of the drainage channel (location ID 00-1212) reported a concentration below the sediment BV for all inorganic chemicals, except selenium. Selenium, which does not have a calculated sediment BV, was detected at

concentrations ranging from 0.3 mg/kg to 0.8 mg/kg at sample location IDs 00-1209, 00-1210, 00-1211, and 00-1212. These low-level detected concentrations are similar to the nominal detection limit for selenium (0.3 mg/kg) used as the sediment BV (Ryti et al. 1998, 59730.2). Furthermore, selenium is not a contaminant associated with the activities that occurred at this PRS, i.e., mortar impact area containing unexploded ordnance and ordnance fragments. Thus, extent is defined.

TABLE 1
MAXIMUM DETECTED SOIL CONCENTRATIONS AND ESLs
FOR PRS 0-011(a)

Analyte	Sediment BV[a] (mg/kg)	Maximum Value (mg/kg)	Minimum ESL (mg/kg)	Receptor	Maximum HQ
Barium	127	180	23	Shrew	7.8
Cobalt	4.73	8.8	0.51	Robin (insectivore)	16.3
Chromium	10.5	12	3.1	Plant	3.9
Lead	19.7	29	20	Plant	1.5
Manganese	543	640	5.0	Plant	128
Nickel	9.38	10	20	Plant	0.5
Selenium	0.3	0.8	0.5	Plant	1.6
Vanadium	19.7	24	0.25	Plant	96

[a] Sediment BVs were obtained from Ryti et al. (1998, 59730.2).

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TABLE 2
HAZARD INDEX ANALYSIS FOR PRS 0-011(a)

Analyte	HQ Plant		HQ Earthworm		HQ Mouse		HQ Shrew		HQ Cottontail		HQ Robin		HQ Kestrel		HQ Fox	
	ESL	HQ	ESL	HQ	ESL	HQ	ESL	HQ	ESL	HQ	ESL	HQ	ESL	HQ	ESL	HQ
Barium	1000	0.2	NV[a]	-	42	4.3	23	7.8	310	0.6	54	3.3	400	1.8	3700	0.05
Cobalt	2.5	3.5	NV	-	1.3	6.8	0.91	9.7	5.0	1.8	0.51	17.3	3.8	2.3	74	0.1
Chromium	3.1	3.9	NV	-	91000	0.0001	42000	0.0003	320000	0.00004	960	0.01	9100	0.001	1200000	0.00001
Lead	20	1.5	100	0.3	470	0.06	280	0.1	750	0.04	78	0.4	970	0.03	5900	0.005
Manganese	5.0	128	NV	-	130	4.9	520	1.2	150	4.3	3900	0.2	32000	0.02	29000	0.02
Nickel	20	0.5	100	0.1	640	0.02	420	0.02	1900	0.005	460	0.02	3700	0.003	27000	0.0004
Selenium	0.5	1.6	7.7	0.1	1.2	0.7	0.91	0.9	4.1	0.2	1.1	0.7	8.1	0.1	34	0.02
Vanadium	0.25	96	NV	-	20	1.2	9.6	2.5	760	0.03	2.9	8.3	22	1.1	1400	0.02
HI		**235**		**0.5**		**18**		**22.3**		**7**		**30**		**5.3**		**0.2**

[a] NV = no value

ECOLOGICAL SCOPING CHECKLIST

Part A—Scoping Meeting Documentation

Site ID	PRS 0-011(a)
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential areas of release. Reference locations on a map as appropriate.	This PRS is located on DOE property about 0.4 miles east of the Sportsman's Club firing range in Rendija Canyon. This PRS was a known ordnance impact area used by the U.S Army in the 1940s. It was the only site in this area where live HE mortar rounds with live fusings were found. Any release would have been in solid form from the exploded and unexploded ordnance. The area of release would have been as much as 28.5 acres based on available information on the size of this PRS.
List of Primary Impacted Media (Indicate all that apply.)	Surface soil – XX – Primary impacted medium from the exploded and unexploded ordnance. Surface water/sediment – X – May have been impacted as the explosive material deteriorated over time and washed into the ephemeral stream channels in the area. Subsurface – X – May have been secondarily impacted from the disturbance of the surface material by the explosions. Groundwater – Other, explain –
FIMAD vegetation class based on Arcview vegetation coverage (Indicate all that apply.)	Water – Bare Ground/Unvegetated – Spruce/fir/aspen/mixed conifer – Ponderosa pine – This area changes to ponderosa pine forest about ¼ mile south of the road as well as on the other side of the road to the north. Piñon juniper/juniper savannah – Grassland/shrubland – The primary impact area is an open meadow/grassland next to an unpaved road. The area is crisscrossed by several dirt roads/paths that are defined by the tire ruts. The meadow is primarily grasses and wildflowers with some trees scattered about. Developed –
Is T&E Habitat Present? If applicable, list species known or suspected to use the site for breeding or foraging.	The PRS is in the vicinity of potential peregrine falcon nesting habitat, approximately 6200 ft away. It is entirely within an area in which the falcon can be conservatively assumed to forage at a relatively high frequency. It is also within an area where the bald eagle is conservatively assumed to forage at a relatively low frequency.
Provide list, of Neighboring/ Contiguous/ Up-gradient sites, includes a brief summary of COPCs and the form of releases for relevant sites and reference a map as appropriate. (Use this information to evaluate the need to aggregate sites.)	The only other PRSs in the vicinity are other impact areas and include PRSs 0-011(c and e). These are located to the northwest of 0-011(a) about 4500 ft and 2500 ft, respectively. Because of the distances between them, these PRSs are not expected to influence 0-011(a) and vice versa. Other PRSs are located further away from the impact areas and also do not influence this PRS. COPCs for the impact areas are inorganics and HE.

Surface Water Erosion Potential Information Summarize information from SOP 2.01, including the run-off subscore (maximum of 46); terminal point of surface water transport; slope; and surface water runon sources.	The Erosion Matrix score for this PRS is 0.0 because it covers too large an area to determine the erosion potential. The site consists of open meadows and forested land with dirt roads bisecting it throughout. There is heavy erosion on the roadways, but there is no erosion from the site itself because of the lush vegetation. The terminal point of any runoff is the Rendija Canyon drainage.

Part B—Site Visit Documentation

Site ID	PRS 0-011(a)
Date of Site Visit	6/25/99
Site Visit Conducted by	Richard Mirenda, Dave Bradbury, Steve Veenis

Receptor Information:

Estimate cover	Relative vegetative cover (high, medium, low, none) = high; the area is a meadow covered with grasses and wildflowers along with some trees. The surrounding area is mature ponderosa pine forest. Relative wetland cover (high, medium, low, none) = none Relative structures/asphalt, etc. cover (high, medium, low, none) = none
Field notes on the FIMAD vegetation class to assist in ground-truthing the Arcview information	FIMAD classifies this area as a mixture of juniper savannah and ponderosa pine. The site visit found that part of the impact area was a meadow with grasses and wildflowers along with some trees. The surrounding area is mature ponderosa pine forest.
Field notes on T&E Habitat, if applicable. Consider the need for a site visit by a T&E subject matter expert to support the use of the site by T&E receptors.	The area does not provide suitable nesting habitat for the peregrine falcon. It may provide adequate habitat for foraging by this T&E species. There is no foraging habitat for the bald eagle.
Are ecological receptors present at the site? (yes/no/uncertain) Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.	Yes. The area has a variety of terrestrial receptors including deer, elk, small mammals, and birds. There was also a large amount of gopher activity in the meadow. There are no permanent aquatic habitats in the area.

Contaminant Transport Information:

Surface water transport Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable).	There are several distinct drainage channels crisscrossing the area. The main drainage runs to the east along the unpaved road. There is some erosion occurring in the area with gullies being formed by erosion as well as human activity. Most of the surface water runoff is in the form of sheet flow.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Yes. Surface water is the primary off-site transport pathway for materials. There are a number of distinct drainage channels to flow to the east and form the main drainage channel next to the unpaved road. Other transport pathways are unlikely due to the vegetative cover and distance to groundwater.
Interim action needed to limit off-site transport? (yes/no/uncertain) Provide explanation/ recommendation to project lead for IA SMDP.	No. The site has been thoroughly surveyed and exploded and unexploded ordnance has been removed from the area. Based on this activity and samples results, there is no longer a source of contamination.

Ecological Effects Information:

Physical Disturbance (Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)	There is some minor physical disturbance of the area as evidenced by the use of the dirt roads that crisscross the site. These rutted paths diminish and eventually disappear as the distance from the main road increases. No other disturbances are apparent.
Are there obvious ecological effects? (yes/no/uncertain) Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).	No. Other than the physical disturbance mentioned above, there are no obvious ecological effects.
Interim action needed to limit apparent ecological effects? (yes/no/uncertain) Provide explanation and recommendations to mitigate apparent exposure pathways to project lead for IA SMDP.	No. There are no obvious ecological effects.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors onsite and no transport pathways to offsite receptors, the remainder of the checklist should not be completed. Stop here and provide additional explanation/justification for proposing an ecological No Further Action recommendation (if needed). At a *minimum*, the potential for future transport should include likelihood that future construction activities could make contamination more available for exposure or transport.

Not applicable.

Adequacy of Site Characterization:

Do existing or proposed data provide information on the nature, rate and extent of contamination? (yes/no/uncertain) Provide explanation (Consider if the maximum value was captured by existing sample data.)	Yes. The samples were collected in the drainage channels from sediment accumulation areas. The data indicates that there is no movement of materials and that extent has been defined.
Do existing or proposed data for the site address potential transport pathways of site contamination? (yes/no/uncertain) Provide explanation (Consider if other sites should aggregated to characterize potential ecological risk.)	Yes. See above.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors.

Provide additional field notes on the site setting and potential ecological receptors.

Part C—Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors via vapors?

Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant $>10^{-5}$ atm-me/mol and molecular weight <200 g/mol).

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Volatile organic compounds were not used at this PRS.

Question B:

Could the soil contaminants reach receptors through fugitive dust carried in air?

Soil contamination would have to be on the actual surface of the soil to become available for dust.

In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.

Answer (likely/unlikely/uncertain): Likely

Provide explanation: Residual HE and inorganics may have been distributed on surface and available as particulates/fugitive dust.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off score and terminal point of surface water runoff to help answer this question)?

If the SOP 2.01 run-off score* for each PRS included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* Note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).

If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Although there is runoff from the site, there are no aquatic communities located in the vicinity of the PRS.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?

Known or suspected presence of contaminants in groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: There are no seeps or springs in the area.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?

Suspected ability of contaminants to migrate to groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Surface contamination may infiltrate into the shallow subsurface. However, there is no hydraulic driver to promote the movement of materials by infiltration/percolation. In addition, there is no evidence of either alluvial or perched aquifers in the area and the regional aquifer is several 100 ft below the mesa top.

Question F:

Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?

This question is only applicable to release sites located on or near the mesa edge.

Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: This pathway is not relevant to the PRS because the impact areas are not near the mesa edge.

Question G:

Could airborne contaminants interact with receptors through respiration of vapors?

Contaminants must be present as volatiles in the air.

Consider the importance of inhalation of vapors for burrowing animals.

Foliar uptake of organic vapors is typically not a significant exposure pathway.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: No volatile organic compounds were used at this PRS.

Question H:

Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?

Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.

Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Terrestrial Animals: 2

Provide explanation: The explosive material may have deteriorated over time so that contaminants could be available as particulates/fugitive dust. There is a large amount of burrowing activity in the meadow from gophers.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

Contaminants in bulk soil may partition into soil solution, making them available to roots.

Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Provide explanation: The explosive material may have deteriorated over time so that contaminants could be available as particulates in the surface soil.

Question J:

Could contaminants interact with receptors through food web transport from surficial soils?

The chemicals may bioaccumulate in animals.

Animals may ingest contaminated food items.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: Lead is a potential bioaccumulating chemical.

Question K:

Could contaminants interact with receptors via incidental ingestion of surficial soils?

Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: The explosive material may have deteriorated over time so that contaminants could be available as particulates in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soils?

Significant exposure via dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Contaminants are not lipophilic.

Question M:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination attenuates radiological exposure.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not used at this PRS.

Question N:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.

Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (I.e., rain splash) in an area that is only periodically inundated with water.

Contaminants in sediment may partition into soil solution, making them available to roots.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Provide explanation: The explosive material may have deteriorated over time so that contaminants could be available as particulates in the surface soil and subsequently washed into the drainages by storm water runoff. Any particulates may have accumulated in sediments.

Question O:

Could contaminants interact with receptors through food web transport from water and sediment?

The chemicals may bioconcentrate in food items.

Animals may ingest contaminated food items.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: Lead is a potential bioaccumulating chemical and was detected in a drainage sample.

Question P:

Could contaminants interact with receptors via ingestion of water and suspended sediments?

If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.

Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: The explosive material may have deteriorated over time so that contaminants could be available as particulates in the surface soil and subsequently washed into the drainages by storm water runoff. Any particulates may have accumulated in sediments.

Question Q:

Could contaminants interact with receptors through dermal contact with water and sediment?

If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.

Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Contaminants are not lipophilic.

Question R:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination attenuates radiological exposure.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not used at this PRS.

Question S:

Could contaminants bioconcentrate in free floating aquatic, attached aquatic plants, or emergent vegetation?

Aquatic plants are in direct contact with water.

Contaminants in sediment may partition into pore water, making them available to submerged roots.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants/Emergent Vegetation: 0

Provide explanation: There are no permanent aquatic communities within the PRS or down canyon from the PRS.

Question T:

Could contaminants bioconcentrate in sedimentary or water column organisms?

Aquatic receptors may actively or incidentally ingest sediment while foraging.

Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.

Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no permanent aquatic communities within the PRS or down canyon from the PRS.

Question U:

Could contaminants bioaccumulate in sedimentary or water column organisms?

Lipophillic organic contaminants and some metals may concentrate in an organism's tissues

Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no permanent aquatic communities within the PRS or down canyon from the PRS.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

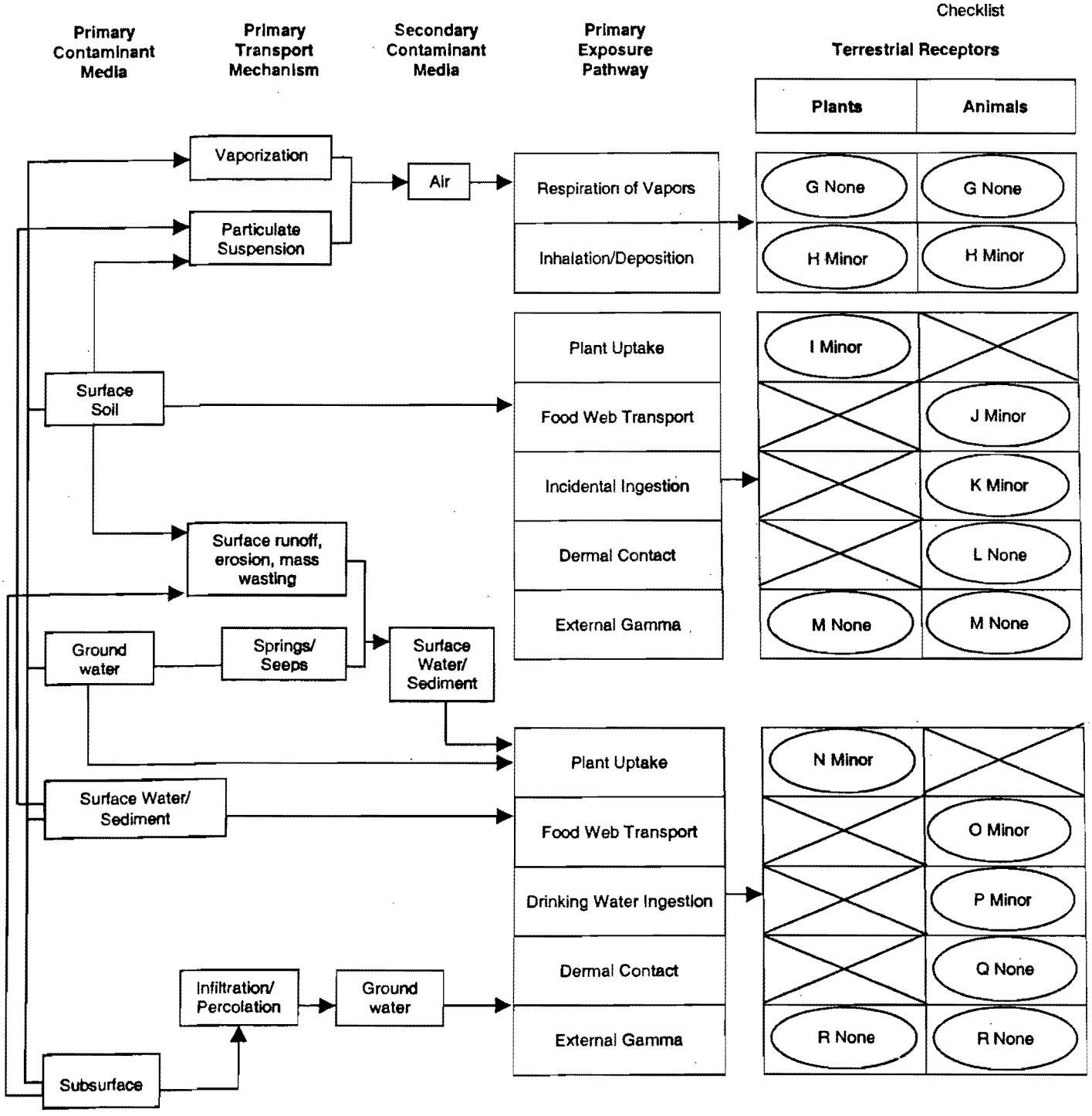
Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: Radionuclides were not used at this PRS.

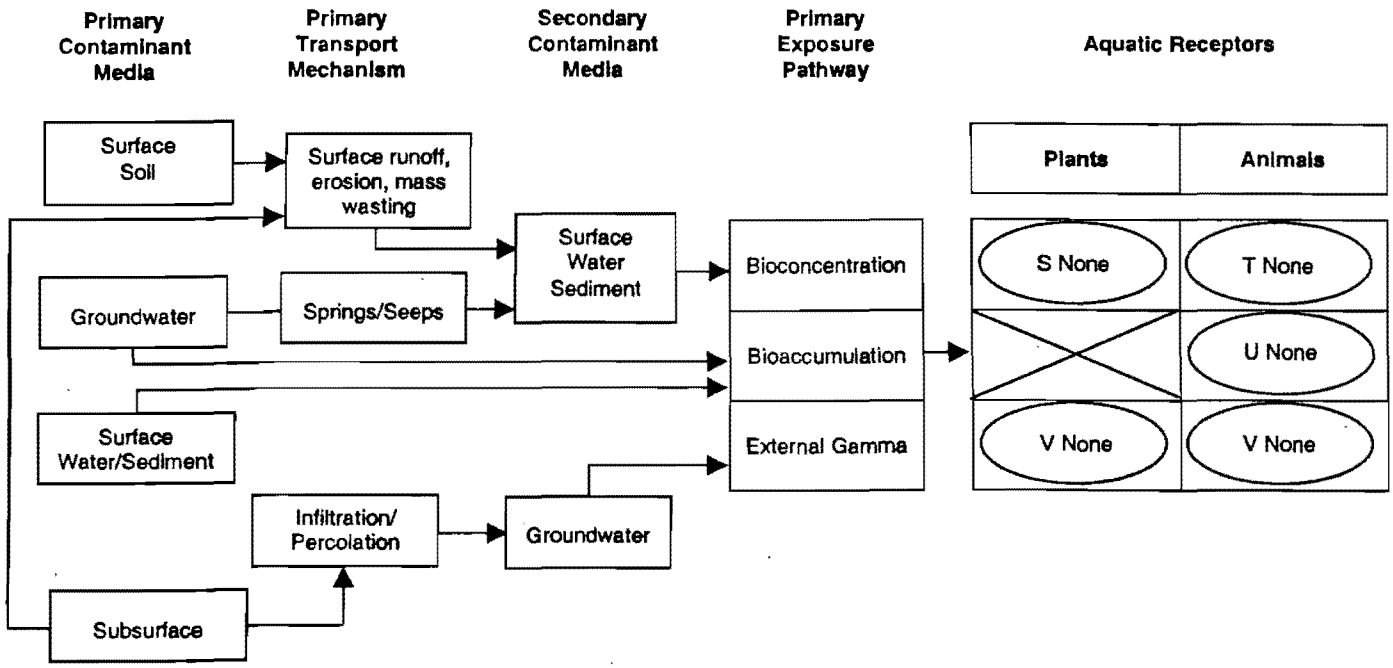
Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the Scoping Checklist



NOTE:
Letters in circles refer to questions on the Scoping Checklist

Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model



Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Richard Mirenda, Ph.D.
Name (signature): Richard Mirenda
Organization: MK/PMC
Phone number: (505)662-1329

Date Completed: **7/1/99**

Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number):

Name (printed): Lars F. Soholt, Ph.D.
Name (signature): Lars F. Soholt
Organization: E/ER
Phone number: (505)667-2256

110-011

Los Alamos
NATIONAL LABORATORY

memorandum
Environmental, Safety, & Health Division
Ecology Group, ESH-20, MS M887

To/Ms: David Bradbury/MS M992
From/Ms: Gil Gonzales, ESH-20/MS M887
Phone/FAX: 5-6630/7-0731
Symbol: ESH-20/Ecol-99-0237
Date: June 16, 1999

SUBJECT: Review of PRS #0-011(a) for Threatened and Endangered Species Habitat for The Purpose of Ecological Screening/Risk Assessment.

Resulting from your request, the purpose of this memo is to communicate whether threatened and endangered (T&E) species may be present in Environmental Restoration Potential Release Sites (PRS's) that are under consideration for ecological screening and/or risk assessment. This information will help:

(1) to establish whether contaminant pathways might exist to T&E species nesting within or in the vicinity of a PRS,
(2) to notify, when necessary, risk assessors to pay particular attention to relevant contaminant Toxicity Reference Values primarily for birds,
(3) to notify, when necessary, risk assessors to pay particular attention to PRS aggregation issues relative to foraging patterns of T&E species.

Information about PRS 0-011(a) was reviewed to determine whether or not this site is in or near nesting habitat of federally-listed T&E species, whether it is in a foraging area and, if so, the relative amount of potential foraging at or in the vicinity of the specific PRS.

PRS location information maintained by the Facility for Information Management and Display was intersected with T&E species habitat using GIS databases maintained by the Ecology Group, ESH-20. The PRS is in the vicinity of potential American peregrine falcon nesting habitat, which is approximately 6,200 ft.away. PRS 0-011(a) is entirely within an area in which the falcon can be conservatively assumed to forage at a relatively high frequency. The PRS is within an area in which the bald eagle is conservatively assumed to forage at a relatively low frequency.

If you need more detailed or more extensive information please do not hesitate to contact me.

GG:rm

Cy: Elizabeth Kelly, TSA-1, MS F600

Ecological Screening Evaluation for PRS 0-011(e)

This PRS is a mortar impact area located in an area that extends north along a tributary of Rendija Canyon, known as Thirty-Seven Millimeter Canyon, to the top of the cliff face that is the head waters of the tributary drainage and is the north drainage divide of Rendija Canyon. It is located north-northeast of the Sportsman's Club. The canyon was used by tanks firing 37-mm rounds in the mid- to late 1940s. This PRS is largely on Santa Fe National Forest land except for a small segment at the southern boundary that is on DOE land.

The area inside the fence, the cliff, and the mesa top was swept for unexploded ordnance and ordnance explosive wastes prior to sampling. Samples collected from the surface and selected sediment traps at this PRS as part of the RFI were analyzed for metals and high explosives (HE). Zinc was detected at a concentration of 80 mg/kg, which is above the sediment background value of 60.2 mg/kg (Ryti et al. 1998, 59730.2). The zinc value was also outside of the range of background values for this metal in sediment (9 mg/kg to 56.2 mg/kg) (Ryti et al. 1998, 59730.2). All other metals were either detected below background or had detection limits at or less than background. No HE was detected in any of the samples.

The maximum detected zinc concentration (80 mg/kg) was compared to the minimum ecological screening level (ESL) to determine if there was a potential for adverse impacts to ecological receptors. The minimum ESL for zinc is 10 mg/kg for the plant (Ryti et al. 1999, 63303.2; LANL 1998, ER ID Package 186) and results in a maximum hazard quotient (HQs) for zinc of 8.0. The HQs for the other receptors are approximately 1.0 or less (0.004 to 1.0). Zinc was detected above the range of background values in only one of seven samples collected from the PRS; all other zinc concentrations were less than the sediment background value. Based on the comparison to ESLs, the low frequency of detection, and the fact that the site is well vegetated, there is no potential for adverse impacts to ecological receptors from exposure to zinc. Therefore, zinc is not a chemical of potential ecological concern (COPEC) at this PRS.

In addition, zinc decreased to below background as sample locations progressed down drainage. The elevated zinc is therefore localized and the extent of zinc above background has been defined.

References

Ryti, R., P.A. Longmire, D.E. Broxton, S.L. Reneau, and E.V. McDonald, September 1998. " Inorganic and Radionuclide Background Data for Soils, Canyon Sediment, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory LA-UR-98-4847, Los Alamos New Mexico. (Ryti et al. 1998, 59730.2)

R. Ryti, Kelly, E., M. Hooten, and L. Soholt, April 1999. "Screening Level Ecological Risk Assessment Methods," Los Alamos National Laboratory LA-UR-99-1405, Los Alamos New Mexico. (Ryti et al. 1999, 63303.2)

LANL (Los Alamos National Laboratory) October 1998. "Los Alamos National Laboratory Environmental Restoration Project ECORISK Database (beta version)," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1998, ER ID Package 186)

ECOLOGICAL SCOPING CHECKLIST

Part A—Scoping Meeting Documentation

Site ID	PRS 0-011(e)
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential areas of release. Reference locations on a map as appropriate.	This PRS is located on DOE and Forest Service land north-northeast of the Sportsman's Club in Thirty-Seven Millimeter Canyon, a tributary of Rendija Canyon. This PRS was a known ordnance impact area used by the U.S Army in the 1940s. Ordnance sweeps found a variety of rounds of ammunition and fragments of ammunition and HE from past activities. Any release would have been in solid form from the spent and unspent ordnance. The area of release would have been within the boundaries of the PRS.
List of Primary Impacted Media (Indicate all that apply.)	Surface soil – XX – Primary impacted medium from the exploded and unexploded ordnance. Surface water/sediment – X – May have been impacted as the explosive material deteriorated over time and washed into the ephemeral stream channels in the area. Subsurface – Groundwater – Other, explain –
FIMAD vegetation class based on Arcview vegetation coverage (Indicate all that apply.)	Water – Bare Ground/Unvegetated – Spruce/fir/aspen/mixed conifer – Ponderosa pine – The area on top of the cliff face and below the impact area is ponderosa pine forest. The impact area is in a bowl below the cliff face and appears from a distance to be successional grasses, shrubs, and wildflowers. Piñon juniper/juniper savannah – Grassland/shrubland – Developed –
Is T&E Habitat Present? If applicable, list species known or suspected to use the site for breeding or foraging.	The PRS is approximately 400 ft away from potential Mexican spotted owl nesting habitat and within an area in which the owl can be conservatively assumed to forage at a relatively medium frequency. The PRS is also in the vicinity of potential peregrine falcon nesting habitat, approximately 8500 ft away. It is entirely within an area in which the falcon can be conservatively assumed to forage at a relatively high frequency. It is also within an area where the bald eagle is conservatively assumed to forage at a relatively low frequency.
Provide list, of Neighboring/ Contiguous/ Up-gradient sites, includes a brief summary of COPCs and the form of releases for relevant sites and reference a map as appropriate. (Use this information to evaluate the need to aggregate sites for screening.)	The only other PRSs in the vicinity are other impact areas and include PRSs 0-011(a and c). These are located to the southeast and west, respectively about 2500 ft in either direction. Because of the distances between them, these PRSs are not expected to influence 0-011(e) and vice versa. Other PRSs are located further away from the impact areas and also do not influence this PRS. COPCs for the impact areas are inorganics and HE.
Surface Water Erosion Potential Information Summarize information from SOP 2.01, including the run-off subscore (maximum of 46); terminal point of surface water transport; slope; and surface water runon sources.	The Erosion Matrix score for this PRS is 0.0 because the site encompasses too large an area to do an assessment. The PRS is on the cliff face facing south +/- 0.5 miles north of the Sportsman's Club. No soil erosion at this site was visible. The terminal point of any runoff is the Rendija Canyon drainage.

Part B—Site Visit Documentation

Site ID	PRS 0-011(e)
Date of Site Visit	6/25/99
Site Visit Conducted by	Richard Mirenda, Dave Bradbury, Steve Veenis

Receptor Information:

Estimate cover	Relative vegetative cover (high, medium, low, none) = high; the impact area appears to be covered with grasses, shrubs, and wildflowers. Relative wetland cover (high, medium, low, none) = none Relative structures/asphalt, etc. cover (high, medium, low, none) = none
Field notes on the FIMAD vegetation class to assist in ground-truthing the Arcview information	FIMAD classifies this area as ponderosa pine. The site visit found that the impact area was vegetated with grasses and wildflowers along with some shrubs. The area on top of the cliff and below the PRS is mature ponderosa pine forest.
Field notes on T&E Habitat, if applicable. Consider the need for a site visit by a T&E subject matter expert to support the use of the site by T&E receptors.	The PRS does not provide suitable nesting habitat for the spotted owl because there are no trees on the site. It does provide adequate foraging habitat. The area may provide suitable nesting habitat for the peregrine falcon particularly along the cliff face. It may provide adequate habitat for foraging by this T&E species. There is no foraging habitat for the bald eagle.
Are ecological receptors present at the site? (yes/no/uncertain) Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.	Yes. The area can probably support a variety of terrestrial receptors including deer, elk, small mammals, and birds. There are no permanent aquatic habitats in the area. Activity by burrowing animals is unknown.

Contaminant Transport Information:

Surface water transport Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable).	The PRS is in an area that extends north along a tributary of Rendija Canyon to the top of the cliff face that is the headwaters of the tributary drainage and is the north drainage divide of Rendija canyon. The impact area is on the steep portion of the cliff below the vertical portion formed on the Bandelier Tuff. Drainage channels flow vertically from the impact area into Rendija Canyon. Erosion was not visible within the impact area from a distance.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Yes. Surface water runoff is the major off-site transport pathway for materials as described above. Other off-site transport pathways may include air but not ground water.
Interim action needed to limit off-site transport? (yes/no/uncertain) Provide explanation/ recommendation to project lead for IA SMDP.	No. No erosion was visible and the area has been the subject of ordnance sweeps to remove material.

Ecological Effects Information:

Physical Disturbance (Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)	No physical disturbances were apparent from a distance. It is not clear whether the area had been cleared in the past and that the grass, shrub, and wildflower area is successional vegetation.
Are there obvious ecological effects? (yes/no/uncertain) Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).	No obvious ecological effects were observed from a distance. See comment above.
Interim action needed to limit apparent ecological effects? (yes/no/uncertain) Provide explanation and recommendations to mitigate apparent exposure pathways to project lead for IA SMDP.	No. There are no obvious ecological effects.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors onsite and no transport pathways to offsite receptors, the remainder of the checklist should not be completed. Stop here and provide additional explanation/justification for proposing an ecological No Further Action recommendation (if needed). At a minimum, the potential for future transport should include likelihood that future construction activities could make contamination more available for exposure or transport. Not applicable.

Adequacy of Site Characterization:

Do existing or proposed data provide information on the nature, rate and extent of contamination? (yes/no/uncertain) Provide explanation (Consider if the maximum value was captured by existing sample data.)	Yes. The samples were collected in the drainage channels from sediment accumulation areas. The data indicates that there is no movement of materials and that extent has been defined.
Do existing or proposed data for the site address potential transport pathways of site contamination? (yes/no/uncertain) Provide explanation (Consider if other sites should aggregated to characterize potential ecological risk.)	Yes. See above.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors.

Part C—Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors via vapors?

Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant >10^{-5} atm-me/mol and molecular weight <200 g/mol).

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Volatile organic compounds were not used at this PRS.

Question B:

Could the soil contaminants reach receptors through fugitive dust carried in air?

Soil contamination would have to be on the actual surface of the soil to become available for dust.

In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.

Answer (likely/unlikely/uncertain): Likely

Provide explanation: Residual HE and inorganics may have been distributed on surface and available as particulates/fugitive dust.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off score and terminal point of surface water runoff to help answer this question)?

If the SOP 2.01 run-off score* for each PRS included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* Note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).

If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Although there is runoff from the site, there are no aquatic communities located in the vicinity of the PRS or below the impact area in Rendija Canyon.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?

Known or suspected presence of contaminants in groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: There are no known seeps or springs in the area.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?

Suspected ability of contaminants to migrate to groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Surface contamination may infiltrate into the shallow subsurface. However, there is no hydraulic driver to promote the movement of materials by infiltration/percolation. In addition, there is no evidence of either alluvial or perched aquifers in the area and the regional aquifer is several 100 ft below the mesa top.

Question F:

Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?

This question is only applicable to release sites located on or near the mesa edge.

Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The area appears stable and no evidence of erosion was visible.

Question G:

Could airborne contaminants interact with receptors through respiration of vapors?

Contaminants must be present as volatiles in the air.

Consider the importance of inhalation of vapors for burrowing animals.

Foliar uptake of organic vapors is typically not a significant exposure pathway.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: No volatile organic compounds were used at this PRS.

Question H:

Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?

Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.

Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Terrestrial Animals: 2

Provide explanation: The ordnance material may have deteriorated over time so that contaminants could be available as particulates/fugitive dust. It is unknown whether there is any burrowing activity within the impact area.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

Contaminants in bulk soil may partition into soil solution, making them available to roots.

Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Provide explanation: The ordnance material may have deteriorated over time so that contaminants could be available as particulates in the surface soil.

Question J:

Could contaminants interact with receptors through food web transport from surficial soils?

The chemicals may bioaccumulate in animals.

Animals may ingest contaminated food items.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Sampling data did not detect any potential bioaccumulators nor are any suspected of being present.

Question K:

Could contaminants interact with receptors via incidental ingestion of surficial soils?

Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: The ordnance material may have deteriorated over time so that contaminants could be available as particulates in the surface soil.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soils?

Significant exposure via dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Contaminants are not lipophilic.

Question M:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination attenuates radiological exposure.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not use at this PRS.

Question N:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.

Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash) in an area that is only periodically inundated with water.

Contaminants in sediment may partition into soil solution, making them available to roots.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Provide explanation: The ordnance material may have deteriorated over time so that contaminants could be available as particulates in the surface soil and subsequently washed into the drainages by storm water runoff. Any particulates may have accumulated in sediments.

Question O:

Could contaminants interact with receptors through food web transport from water and sediment?

The chemicals may bioconcentrate in food items.

Animals may ingest contaminated food items.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Sampling data did not detect any potential bioaccumulators nor are any suspected of being present.

Question P:

Could contaminants interact with receptors via ingestion of water and suspended sediments?

If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.

Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: The ordnance material may have deteriorated over time so that contaminants could be available as particulates in the surface soil and subsequently washed into the drainages by storm water runoff. Any particulates may have accumulated in sediments.

Question Q:

Could contaminants interact with receptors through dermal contact with water and sediment?

If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.

Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Contaminants are not lipophilic.

Question R:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination attenuates radiological exposure.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: Radionuclides were not used at this PRS.

Question S:

Could contaminants bioconcentrate in free floating aquatic, attached aquatic plants, or emergent vegetation?

Aquatic plants are in direct contact with water.

Contaminants in sediment may partition into pore water, making them available to submerged roots.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants/Emergent Vegetation: 0

Provide explanation: There are no permanent aquatic communities within the PRS or in the canyon below the PRS.

Question T:

Could contaminants bioconcentrate in sedimentary or water column organisms?

Aquatic receptors may actively or incidentally ingest sediment while foraging.

Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.

Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no permanent aquatic communities within the PRS or in the canyon below the PRS.

Question U:

Could contaminants bioaccumulate in sedimentary or water column organisms?

Lipophillic organic contaminants and some metals may concentrate in an organism's tissues

Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no permanent aquatic communities within the PRS or in the canyon below the PRS.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

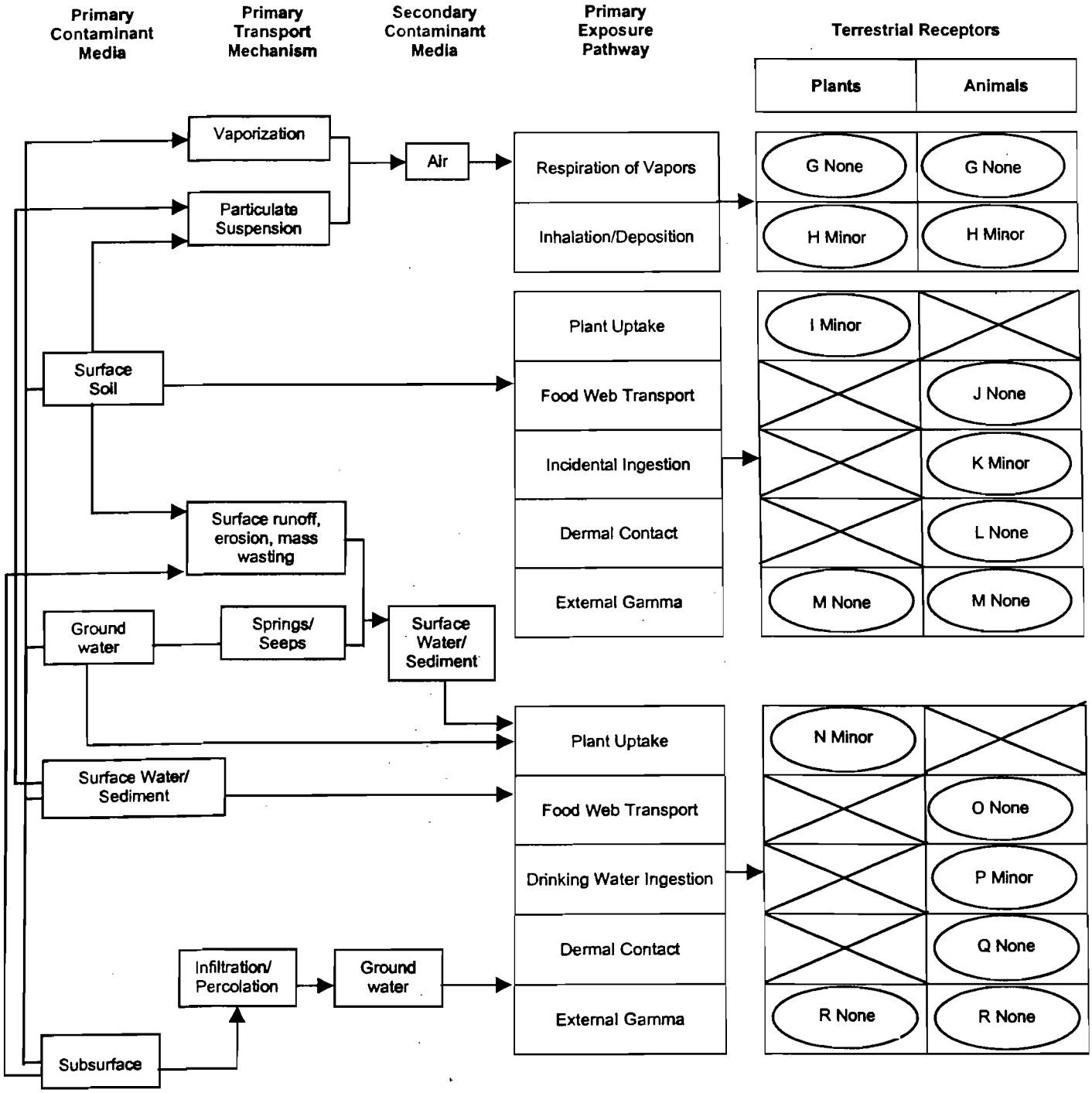
Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: Radionuclides were not used at this PRS.

Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the Scoping Checklist



Ecological Scoping Checklist
Aquatic Receptors
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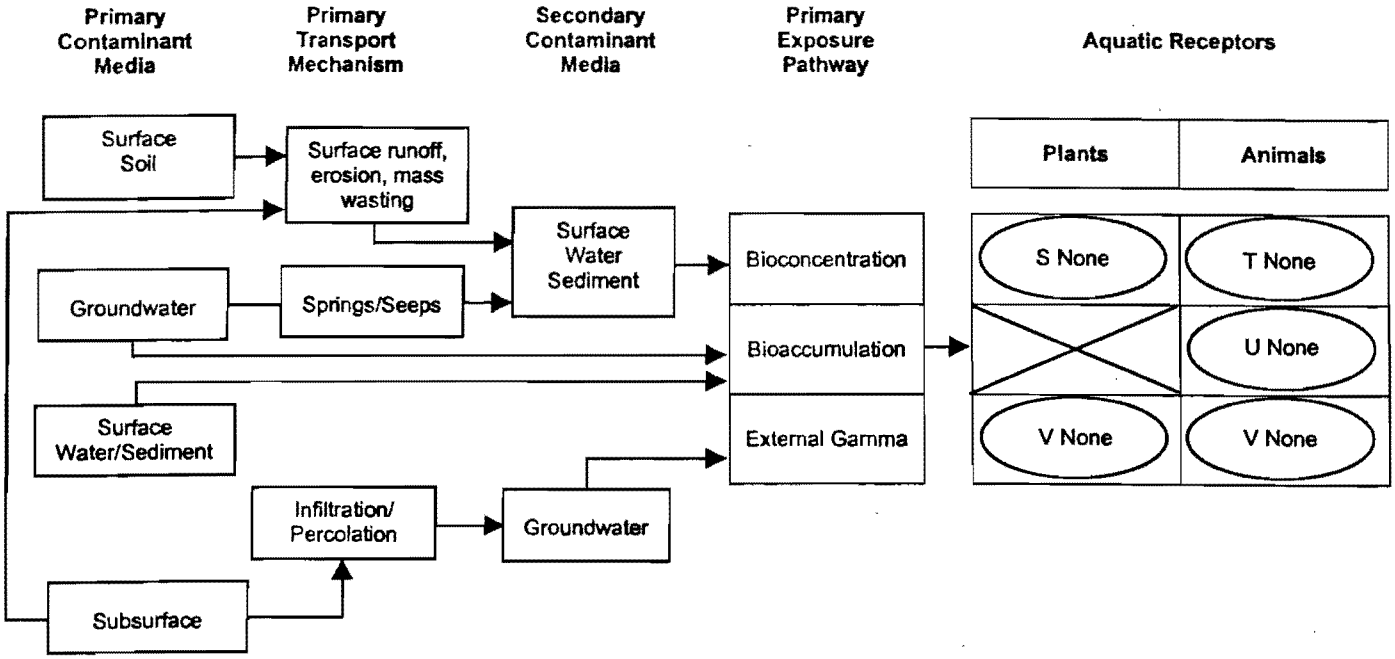
Letters in circles refer to questions on the Scoping Checklist



Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed):	Richard Mirenda, Ph.D.
Name (signature):	Richard Mirenda
Organization:	MK/PMC
Phone number:	(505)662-1329
Date Completed:	**7/1/99**

Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number):

Name (printed):	Lars F. Soholt, Ph.D.
Name (signature):	Lars F. Soholt
Organization:	E/ER
Phone number:	(505)667-2256

0-01

Los Alamos
NATIONAL LABORATORY

memorandum
Environmental, Safety, & Health Division
Ecology Group, ESH-20, MS M887

To/Ms: David Bradbury/MS M992
From/Ms: Gil Gonzales, ESH-20/MS M887
Phone/FAX: 5-6630/7-0731
Symbol: ESH-20/Ecol-99-0235
Date: June 16, 1999

SUBJECT: Review of PRS #0-011(e) for Threatened and Endangered Species Habitat for The Purpose of Ecological Screening/Risk Assessment.

Resulting from your request, the purpose of this memo is to communicate whether threatened and endangered (T&E) species may be present in Environmental Restoration Potential Release Sites (PRS's) that are under consideration for ecological screening and/or risk assessment. This information will help:

(1) to establish whether contaminant pathways might exist to T&E species nesting within or in the vicinity of a PRS,
(2) to notify, when necessary, risk assessors to pay particular attention to relevant contaminant Toxicity Reference Values primarily for birds,
(3) to notify, when necessary, risk assessors to pay particular attention to PRS aggregation issues relative to foraging patterns of T&E species.

Information about PRS 0-011(e) was reviewed to determine whether or not this site is in or near nesting habitat of federally-listed T&E species, whether it is in a foraging area and, if so, the relative amount of potential foraging at or in the vicinity of the specific PRS.

PRS location information maintained by the Facility for Information Management and Display was intersected with T&E species habitat using GIS databases maintained by the Ecology Group, ESH-20. PRS 0-011(e) is approximately 400 feet away from potential Mexican spotted owl nesting habitat and is partially within an area in which the owl can be conservatively assumed to forage at a relatively medium frequency. The PRS is in the vicinity of potential American peregrine falcon nesting habitat, which is approximately 8,500 ft.away. PRS 0-011(e) is entirely within an area in which the falcon can be conservatively assumed to forage at a relatively high frequency. The PRS is within an area in which the bald eagle is conservatively assumed to forage at a relatively low frequency.

If you need more detailed or more extensive information please do not hesitate to contact me.

GG:rm

Cy: Elizabeth Kelly, TSA-1, MS F600

Attachment F

00-011 (a,e)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

DEC 09 1994

Mr. Joseph C. Vozella
Assistant Area Manager
Environment, Safety and Health Branch
Department of Energy
Los Alamos National Laboratory
Los Alamos, NM 87544

Re: RFI Phase Report, Operable Unit 1071, SWMU Aggregate 0-D
Los Alamos National Laboratory, NM0890010515

Dear Mr. Vozella:

The Environmental Protection Agency (EPA) has reviewed the RFI Phase Report dated March 30, 1994, for Operable Unit 1071, SWMU Aggregate 0-D, Ordnance Impact Areas and found it to be approvable. The primary problem associated with these solid waste management units (SWMUs) was unexploded ordnance (UXO) and ordnance explosive waste (OEW). The units which were impacted have had all UXO and OEW removed, and there appears to be no high explosive residue at the sites. Los Alamos National Laboratory (LANL) may request removal of the following SWMUs from the permit via a Class 3 permit modification: 0-011(a) and 0-011(c-e).

EPA has enclosed several suggestions which should improve future reports. In future reports, information related to background and data quality for analysis will be more crucial.

Should you have any questions, please contact Barbara Driscoll at (214) 665-7441.

Sincerely,

for William K. Honker, P.E.
Chief, RCRA Permits Branch

Enclosure

cc: Mr. Benito Garcia
Bureau Chief, Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
Mr. Jorg Jansen
Program Manager, Environmental Restoration Program
Los Alamos National Laboratory, M992

RFI Report Suggestions

1. Background information as presented for inorganics is not meaningful unless it can be demonstrated that the background data was collected at the same depth and from similar formations as the site samples. Future reports should indicate the location of background samples, and analytical methods including extraction methods used for those samples. LANL should also ensure that the methods used for extraction of soil samples is standardized, so that data is comparable.

2. Table 4 does not indicate which sample results are the original lead samples and which were taken later. Nor does the Table indicate which samples were collected from the upper granular versus underlying clay-rich layer.

3. If data has been qualified, for example found to be estimated or "J" data, this should be noted on the Tables.

4. Analysis results should be summarized as in Table 6 which indicates results for each sample, as opposed to Table 5 which shows the minimum, mean and maximum for a group of samples. The practical quantitation limit (PQL) or background values should be indicated on each table.

5. Analytical results should be compared with background or PQLs to determine if the extent of contamination has been defined.

3.0 SWMU 01-001(m) SEPTIC TANK

3.1 Summary

The SWMU report and the RFI work plan for OU 1078 identified SWMU 01-001(m) as a septic tank serving Building TA-1-97, a former Zia Company warehouse. This area is now privately owned and currently the site of a self-storage company. Information recovered in a recent site visit and an archival search of Laboratory engineering drawings demonstrates that the septic tank was planned for installation, but never installed. In a November 29, 2000, letter, NMED approved the NFA for SWMU 01-001(m). SWMU 01-001(m) is being proposed for NFA under NFA Criterion 1 (the site does not exist).

3.2 Description and Operational History

3.2.1 Site Description

SWMU 01-001(m) was a planned septic tank (structure number TA-1-275) that was slated to serve Building TA-1-97, also known as Warehouse 13, which was located in former Technical Area (TA) 1. Although a lavatory and the associated TA-1-275 septic tank were planned for this building, Laboratory as-built engineering drawings demonstrate that neither the lavatory nor the septic tank was installed.

In 1977, a radiological survey and decontamination of the area formerly occupied by TA-1 was conducted (Ahlquist et al. 1977, 05710) (relevant pages included as Attachment A). Both the Ahlquist report and the RFI work plan for OU 1078 based the information they presented for Septic Tank TA-1-275 on Los Alamos Scientific Laboratory (LASL) Engineering Drawing ENG-R 85 (LASL 1958, 23446)(Attachment B), which incorrectly indicates that the septic tank was installed. It is important to note that ENG-R 85 is not labeled "as-built," indicating that this drawing was based on one or more earlier engineering drawings/plans for the site. This fact prompted a more thorough search of the Laboratory's engineering archive, which was conducted in August 2000. The search uncovered a preliminary sketch for the proposed installation of Septic Tank TA-1-275, dated June 14, 1947 (LASL 1947, 68084)(Attachment C), and the as-built engineering drawing for Warehouse 13, structure number TA-1-97, dated April 20, 1948 (LASL 1948, 68085) (Attachment D).

LASL Engineering Sketch 4-329, dated 1947 (Attachment C), shows the plan for a lavatory to be installed at the northeast corner of Warehouse 13 and also shows the plan for an associated septic tank and leaching cesspool. This plan is labeled as a sketch, rather than an as-built drawing, indicating its preliminary status.

LASL Engineering Drawing ENG 4-558 (Attachment D), dated 1948, shows the as-built construction of Warehouse 13 (TA-1-97). The drawing was generated in 1948 and confirmed as as-built in 1953. No plumbing fixtures or drains are indicated on the drawing. Furthermore, the as-built series of drawings for this building contains no plumbing plan, which confirms that no plumbing was installed in the building.

Although Ahlquist et al. searched for Septic Tank 275 in 1977, it was not found during these field activities or during earlier decontamination and decommissioning (D&D) efforts conducted in the 1960s. Ahlquist et al. determined that the elevation of the area where the tank was purported to be located was bulldozed to below the elevation where the tank should have been installed. As a result, Ahlquist surmised that the tank had been removed during the previous D&D effort conducted in the 1960s. (Ahlquist et al. 1977, 05710, p.114)(Attachment A). It should be noted that Ahlquist et al. based the existence of Septic Tank 275 on an engineering drawing that was incorrectly based on the preliminary sketch rather than on the as-built drawing. The OU 1078 work plan also used the engineering drawing based on the preliminary sketch.

In approximately 1978, a private businessman purchased the property on which Septic Tank 275 was purported to be located and constructed three buildings for use as self-storage units. The property owner reports that the original floor, foundation, and stem walls of Warehouse 13 were present on the site when he purchased the property and stated that there were no open or plugged penetrations in the floor, foundation, or stem walls. He used the former floor, foundation, and stem walls of Warehouse 13 to erect his first storage building. (Rust 2000, 68069) (Attachment E)

On August 9, 2000, a site visit was made to the self-storage unit at the former location of Warehouse 13. Investigators received permission to remove all stored articles from the storage unit located at the northeast end of the building where the Warehouse 13 restroom was proposed for installation. Visual inspection identified no open or plugged penetrations in the floor, foundation, and stem walls; no water staining; no evidence of tiling or other flooring; and no other indication that any water or plumbing ever serviced the former warehouse. A detailed description of this site visit and photographs taken during the visit are included as Attachment F (Rust 2000, 68070).

3.2.2 Operational History

Built in 1942, TA-1 was the first technical area established at the Laboratory. TA-1 buildings were constructed hurriedly to avoid delaying the scientific and engineering work so important to the World War II effort. Construction work often started before plans were completed (Ahlquist et al. 1977, 05710). TA-1 housed theoretical divisions, plutonium chemistry, physics research, Laboratory administration, and other miscellaneous activities. Between 1943 and 1945, much of the theoretical, experimental, and production work in developing the atomic bomb took place at TA-1. A gradual move from TA-1 to new facilities at TA-3 started in the 1950s and continued until 1965 when TA-1 became inactive. The technical area was decontaminated and demolished in stages beginning in 1966. This process was completed in the late 1960s when the US Atomic Energy Commission transferred the land comprising TA-1 to the County of Los Alamos for commercial and residential development.

Building TA-1-97 was built in 1945 and removed in 1954 (LANL ER Records Package 732) (Attachment G). During this period, the building was used exclusively as a warehouse for the storage of nonradioactive materials (Ahlquist et al. 1977, 05710, p. 133) (Attachment A).

In approximately 1978, the property where Septic Tank TA-1-275 was reputed to be located was purchased by a private businessman who still owns the property. Shortly after purchasing the property, the private owner erected three self-storage units that remain on the property today.

3.3 Land Use

3.3.1 Current

The property where Septic Tank TA-1-275 was reputed to be located is located in the commercial business district of Los Alamos. The property is privately owned and occupied by a self-storage business. It is used for commercial activities and access is not restricted.

3.3.2 Future/Proposed

There is no anticipated change from the commercial use of this area.

3.4 No Further Action Proposal

3.4.1 Rationale

Based on archival information and site visits, the ER Project has shown that

- septic tank structure number TA-1-275, SWMU 01-001(m), was never installed.

Thus the ER Project has demonstrated that SWMU 01-001(m) has never existed.

In an October 23, 2000, letter, the ER Project proposed SWMU 01-001(m) for NFA and included documentation in support of the NFA (LANL 2000, 68071) (Attachment H). In a November 29, 2000, letter, NMED personnel approved the NFA for SWMU 01-001(m) (NMED 2000, 68552) (Attachment I).

3.4.2 Criterion

Based on the information presented in Sections 3.2 through 3.4.1, SWMU 01-001(m) is proposed for NFA under NFA Criterion 1.

3.5 Supporting Documentation Attached

Attachment A: Ahlquist et al. report regarding radiological survey and decontamination of TA-1 (pp. 114 and 133). (Ahlquist et al. 1977, 05710)

Attachment B: LASL Engineering Drawing ENG-R 85. (LASL 1958, 23446)

Attachment C: LASL Engineering Sketch 4-329. (LASL 1947, 68084)

Attachment D: LASL Engineering Drawing ENG 4-558. (LASL 1948, 68085)

Attachment E: T. Rust personal interview with Rollin Jones. (Rust 2000, 68069)

Attachment F: T. Rust description of site visit and photographs taken during site visit. (Rust 2000, 68070)

Attachment G: LANL TA-01 structure history book. (LANL ER Records Package 732)

Attachment H: October 23, 2000, letter from ER Project (ER2000-0581) proposing SWMU 01-001(m) for NFA. (LANL 2000, 68071)

Attachment I: November 29, 2000, letter from NMED approving NFA for SWMU 01-001(m). (NMED 2000, 68552)

3.6 Reference Used for Text of the Request for Permit Modification for SWMU 01-001(m)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1078," Los Alamos National Laboratory report LA-UR-92-838, Los Alamos, New Mexico. (LANL 1992, 43454)

LANL (Los Alamos National Laboratory) October 16, 2000. "Additional Information for Potential Release Site (PRS) 01-001(m), Septic Tank 275, on Rollin Jones Property," Los Alamos National Laboratory letter (ER2000-0581) to J. Young (NMED-HWB) from J. Canepa (LANL ER Program Manager) and T. Taylor (DOE-LAAO Project Manager), Los Alamos, New Mexico. (LANL 2000, 68071)

References Cited in Text

Ahlquist, A.J., A.K. Stoker, and L.K. Trocki, December 1977. "Radiological Survey and Decontamination of the Former Main Technical Area (TA-1) at Los Alamos, New Mexico," Los Alamos Scientific Laboratory report LA-6887, Los Alamos, New Mexico. (Ahlquist et al., 1977, 05710)

3.7 History of Regulatory Deliverables

LANL, May 1992:	RFI work plan for OU 1078 submitted to EPA Region 6. (LANL 1992, 43454)
EPA, August 17, 1992:	NOD for OU 1078 RFI work plan. (EPA 1992, 14806.82)
LANL (via DOE-LAAO), October 30, 1992:	Response to NOD for OU 1078 RFI work plan submitted to EPA via DOE-LAAO. (DOE-LAAO 1992, 11807)
EPA, January 6, 1993:	Approval of OU 1078 RFI work plan and LANL response to NOD. (EPA 1993, 15110)
LANL, March 5, 1996:	RFI report for PRSs 1-007 (d,e,j), 1-001(a,e,o,m), 1-003 (a,e,d) and 1-006(e,o) submitted to NMED. (LANL 1996, 54461)
NMED, September 24, 1997:	RSI for RFI report for PRSs 1-007 (d,e,j), 1-001(a,e,o,m), 1-003 (a,e,d) and 1-006(e,o). (NMED 1997, 56732)
LANL, December 19, 1997:	Response to RSI for RFI report for PRSs 1-007 (d,e,j), 1-001(a,e,o,m), 1-003 (a,e,d) and 1-006(e,o) submitted to NMED. (LANL 1997, 57294)
LANL, October 23, 2000:	Additional information for PRS 01-001(m). (LANL 2000, 68735)
NMED, November 29, 2000	NFA approval letter for PRS 01-001(m). (NMED 2000, 68552)

3.7.1 References for Regulatory Deliverables

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1078," Los Alamos National Laboratory report LA-UR-92-838, Los Alamos, New Mexico. (LANL 1992, 43454)

EPA (US Environmental Protection Agency), August 17, 1992. ". . . RFI work plan for Operable Unit 1078 . . . found to be deficient," EPA Region 6 letter to J.L. Bellows (DOE-LAAO Area Manager) from W.K. Honker (EPA Region 6 RCRA Permits Branch Chief), Dallas, Texas. (EPA 1992, 14806.82)

DOE-LAAO (US Department of Energy-Los Alamos Area Office), October 30, 1992. "Re: Notice of Deficiency (NOD) for Operable Unit (OU) 1078 Plan," DOE-LAAO letter (LESH: 6SS-051) transmitting LANL response to NOD (LANL 1992, 14806.88) to W. Honker (EPA Region 6 RCRA Permits Branch Chief) from J. Vozella (DOE-LAAO Area Manager), Los Alamos, New Mexico. (DOE-LAAO 1992, 11807)

EPA (US Environmental Protection Agency), January 6, 1993. "RFI Workplan for OU 1078, Los Alamos National Laboratory NM08900105," EPA approval letter to J.L. Bellows (DOE-LAAO Area Manager) from A.M. Davis (EPA Region 6 Hazardous Waste Management Division Director), Dallas, Texas. (EPA 1993, 15110)

LANL (Los Alamos National Laboratory), March 5, 1996. "Submittal of the Resource Conservation and Recovery Act Facility Investigation (RFI) Report for Aggregates A, B, H, I, J in Technical Area (TA) 1," Los Alamos National Laboratory letter (EM/ER:96-104) to D. Neleigh (EPA, Region 6) from J. Jansen (ER Program Manager) and T. Taylor (DOE-LAAO Program Manager), Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1996, 54461)

NMED (New Mexico Environment Department), September 24, 1997. "Request for Supplemental Information RCRA Facility Investigation Report, Technical Area 1, Aggregates A, B, H, I, & J, Los Alamos National Laboratory NM0890010515," NMED letter to G.T. Todd (DOE-LAAO Area Manager) and S. Hecker (Laboratory Director) from R.S. Dinwiddie (NMED RCRA Permit Management Program Manager), Santa Fe, New Mexico. (NMED 1997, 56732)

LANL (Los Alamos National Laboratory), December 19, 1997. "Response to Request for Supplemental Information for RFI Report for TA-1, Aggregates A, B, H, I, and J (Former OU 1078)," Los Alamos National Laboratory letter (EM/ER:97-487) to S. Dinwiddie (NMED-HRMB) from J. Canepa (LANL/ER Program Manager) and T. Taylor (DOE-LAAO Program Manager), Los Alamos, New Mexico. (LANL 1997, 57294)

LANL (Los Alamos National Laboratory) October 23, 2000. "Additional Information for Potential Release Site (PRS) 01-001(m), Septic Tank 275, on Rollin Jones Property," Los Alamos National Laboratory letter (ER2000-0581) to J. Young (NMED-HWB) from J. Canepa (LANL ER Program Manager) and T. Taylor (DOE-LAAO Project Manager), Los Alamos, New Mexico. (LANL 2000, 68735)

NMED (New Mexico Environment Department), November 29, 2000." Approval of No Further Action for Potential Release Site 01-001(m), Septic Tank 275, Los Alamos National Laboratory, NM0890010515," NMED letter to J. Browne (Laboratory Director) and T. Taylor (DOE-LAAO Program Manager) from J. Young (Corrective Action Project Leader, RPMP), Santa Fe, New Mexico. (NMED 2000, 68552)

01-001(m)

ATTACHMENTS

Attachment A

01-001(m)

LA-6887

Special Distribution

Issued: December 1977

Radiological Survey and Decontamination of the Former Main Technical Area (TA-1) at Los Alamos, New Mexico

Compiled by

A. John Ahlquist
Alan K. Stoker
Linda K. Trocki

los alamos
scientific laboratory
of the University of California
LOS ALAMOS, NEW MEXICO 87545

UNITED STATES
DEPARTMENT OF ENERGY
CONTRACT W-7405-ENG. 36

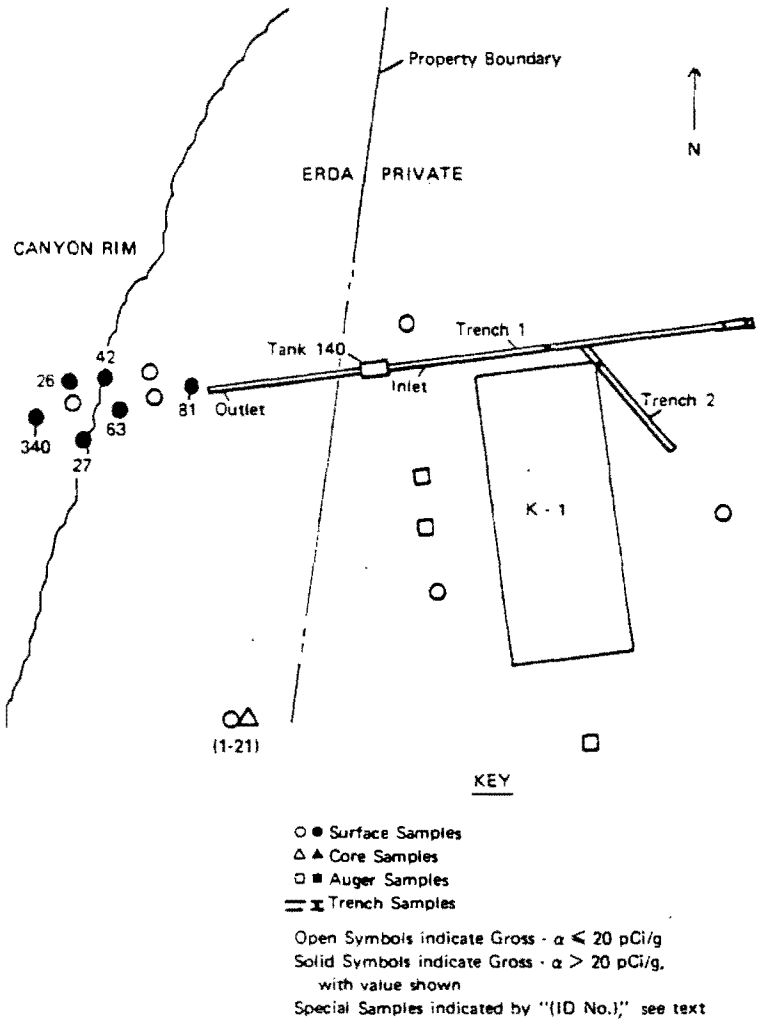


Fig. 124.
Septic Tank 140 excavation locations and postdecontamination soil-sampling results.

indicated on drawings. The outlet line and ~46 m of inlet line were removed with the tank.

An unidentified, uncontaminated septic tank was removed during excavations of uranium-contaminated soil in the TU area. It was near the map location of Septic Tank 143, listed in the records as having been removed. The tank removed may have been Septic Tank 143.

Septic Tanks 268 and 269 were listed in one set of records as having been removed but there was no record of removal in another set of records. Tank 268 served TU Building and apparently had been removed because nothing was found at its map location within the TU excavation. Tank 269 served Building S-1 (a storage building) and was located in an area that is now a paved parking lot. Engineering records show that Tank 269 comprised three joints of sewer tile, 0.91 m long and 0.61 m in diameter. Because of its location and the fact that it served a storage building, no attempts were made to verify its removal.

Tank 275 was listed as having been abandoned but had not been located in earlier searches. The hillside location of Tank 275 had been bulldozed to below the level where the tank should have been; therefore, the tank probably had been removed. On the hillside below the vicinity of Tanks 269 and 275, an abandoned septic tank of the approximate dimensions of Tank 275 (as listed in the records) was found lying on its side, and may have been Tank 275.

Structure Number	Structure Nomenclature	Removal Date	Radioactive Materials Used and/or Structure Use
TA-1-91	Warehouse 7	1956	None. Storage (sold to Junior National Rifle Association).
TA-1-92	Guard Tower 92	7/51	None.
TA-1-93	Guard Tower 93	Relocated	None. Moved in 1949 to current technical area (TA-18).
TA-1-94	Guard Tower 94	Relocated	None. Moved to current technical area (TA-15).
TA-1-95	Guard Tower 95	1946	None.
TA-1-96	M-1	3/65	Originally used for machining lithium; later for ^{238}U samples (no contamination).
TA-1-97	Warehouse 13	1954	None. Storage.
TA-1-98	K-1	3/65	None. Machining graphite.
TA-1-99	Warehouse 15	12/7/55	None. Storage.
TA-1-100	Warehouse 16	12/7/55	None. Storage.
TA-1-101	Warehouse 17	1954	None. Storage.
TA-1-102	Warehouse 18	1954	None. Storage.
TA-1-103	Warehouse 19	3/65	None. Storage.
TA-1-104	Sheet Metal Shop	3/65	^{238}U (spill on concrete floor).
TA-1-105	Gamma-2	8/64	None. Post office and storage.
TA-1-106	Passageway 106	2/59	None.
TA-1-107	Passageway 107	2/59	None.
TA-1-108	Passageway 108	2/59	None.
TA-1-109	Passageway 109	2/59	None.

Media Place Holder
Target

This target represents media that was not microfilmed. The original media can be obtained through the Records Processing Facility.

ER ID # 71096

Box # 292

Record Type: Engineering Drawing

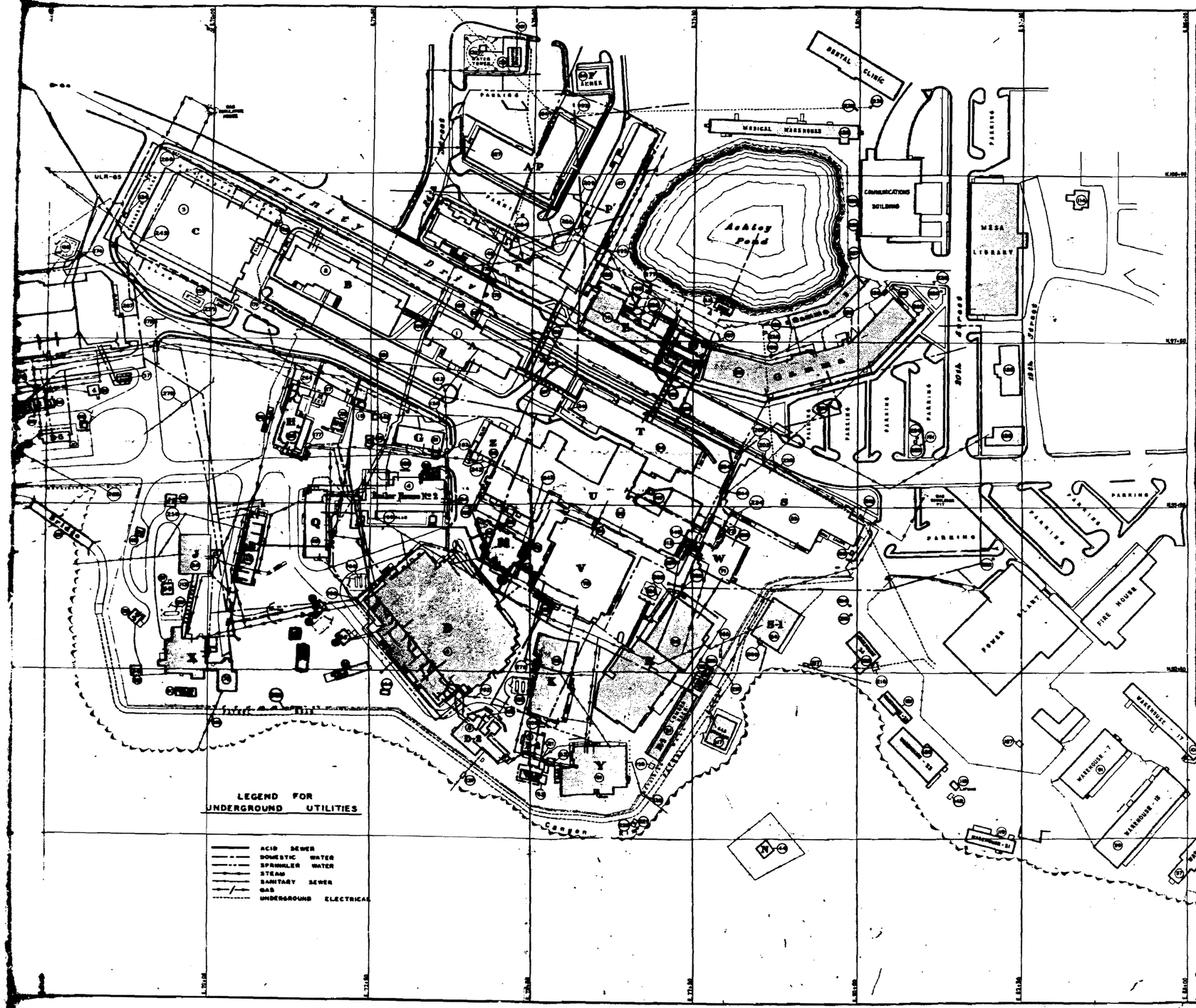
Date: 10-21-58

Symbol: ENG-R 85

Subject:

See ER ID # 23446

15



STRUCTURE NUMBER	DESIGNATION	APPROXIMATE GRID LOCATION	REMARKS
TA-1-1	BUILDING A	N. 87+30 E. 78+00	
TA-1-2	BUILDING B	N. 87+30 E. 78+50	
TA-1-3	BUILDING B-1		REMOVED
TA-1-4	BOILER HOUSE, NO. 2	N. 95+00 E. 78+50	
TA-1-5	BUILDING C	N.100+00 E. 70+00	
TA-1-6	BUILDING D	N. 92+80 E. 72+80	
TA-1-7	BUILDING D-1		REMOVED
TA-1-8	BUILDING D-2		REMOVED
TA-1-9	BUILDING D-3	N. 92+80 E. 76+00	REMOVED
TA-1-10	BUILDING D-4	N. 92+80 E. 76+00	REMOVED
TA-1-11	BUILDING D-5	N. 97+90 E. 82+50	REMOVED
TA-1-12	BUILDING D-6	N. 93+00 E. 87+50	SIGMA VAULT
TA-1-13	BUILDING D-7	N. 96+80 E. 72+80	REMOVED
TA-1-14	BUILDING D-8	N. 96+80 E. 72+80	REMOVED
TA-1-15	BUILDING D-9	N. 92+80 E. 78+50	REMOVED
TA-1-16	BUILDING DELTA	N. 98+80 E. 73+50	REMOVED
TA-1-17	BUILDING E	N. 96+30 E. 66+00	
TA-1-18	BUILDING F	N. 97+30 E. 77+50	
TA-1-19	BUILDING F-1	N. 97+80 E. 72+50	
TA-1-20	BUILDING FP	N. 97+80 E. 72+50	
TA-1-21	BUILDING G	N. 88+00 E. 68+50	
TA-1-22	BUILDING GAMMA	N. 98+00 E. 78+50	
TA-1-23	BUILDING GAMMA-1	N. 97+80 E. 82+00	
TA-1-24	BUILDING GAMMA-1	N. 97+30 E. 77+50	
TA-1-25	BUILDING GK		REMOVED
TA-1-26	WAREHOUSE GK	N. 93+00 E. 86+50	REMOVED
TA-1-27	BUILDING H	N. 97+90 E. 78+50	REMOVED
TA-1-28	BUILDING H-EXT.	N. 97+30 E. 78+50	REMOVED
TA-1-29	BUILDING AF	N. 97+80 E. 72+50	
TA-1-30	BUILDING KY	N. 93+00 E. 88+50	
TA-1-31	HT BARREL HOUSE	N. 87+80 E. 68+50	
TA-1-32	HT BARREL STORE	N. 87+80 E. 67+50	
TA-1-33	BUILDING I	N. 86+80 E. 87+50	
TA-1-34	PLATFORM J	N. 98+00 E. 68+00	REMOVED
TA-1-35	BUILDING J-3	N. 96+80 E. 68+00	REMOVED
TA-1-36	BUILDING J-3	N.	REMOVED
TA-1-37	BUILDING J-4	N. 96+00 E. 76+00	REMOVED
TA-1-38	BUILDING J-5	N. 92+80 E. 76+00	REMOVED
TA-1-39	BUILDING J-6	N. 92+80 E. 78+00	REMOVED
TA-1-40	BUILDING J-7	N. 92+80 E. 76+00	REMOVED
TA-1-41	BUILDING K	N. 92+80 E. 76+00	REMOVED
TA-1-42	BUILDING L		REMOVED
TA-1-43	BUILDING MH	N. 98+00 E. 70+00	
TA-1-44	BUILDING M	N. 95+00 E. 67+50	
TA-1-45	BUILDING N	N. 90+00 E. 77+50	REMOVED
TA-1-46	BUILDING O	N. 93+00 E. 78+50	REMOVED
TA-1-47	BUILDING P	N. 97+80 E. 77+50	
TA-1-48	BUILDING P - PENNEY	N. 100+00 E. 77+50	
TA-1-49	PAINT SHOP	N. 97+80 E. 77+50	REMOVED
TA-1-50	BUILDING Q	N. 93+00 E. 72+50	
TA-1-51	BUILDING R	N. 96+30 E. 77+50	REMOVED
TA-1-52	BUILDING R-1	N. 96+30 E. 77+50	REMOVED
TA-1-53	BUILDING R-2	N. 96+30 E. 77+50	REMOVED
TA-1-54	BUILDING S	N. 95+00 E. 80+00	
TA-1-55	BUILDING S-1	N. 95+00 E. 77+50	REMOVED
TA-1-56	LAB BUILDING	N. 93+80 E. 76+00	REMOVED
TA-1-57	BUILDING SIGMA	N. 97+90 E. 87+50	
TA-1-58	TOWER NO. 37	N. 97+30 E. 87+50	
TA-1-59	BUILDING SIGMA-1	N. 97+80 E. 87+50	REMOVED
TA-1-60	BUILDING SIGMA-2	N. 97+80 E. 87+50	REMOVED
TA-1-61	BUILDING SIGMA-3	N. 97+80 E. 87+50	REMOVED
TA-1-62	BUILDING SIGMA-4	N. 97+80 E. 87+50	REMOVED
TA-1-63	TOWER NO. 88	N. 92+80 E. 78+50	REMOVED
TA-1-64	TOWER NO. 89	N. 92+80 E. 78+50	REMOVED
TA-1-65	BUILDING T	N. 93+00 E. 77+30	
TA-1-66	BUILDING THETA		REMOVED
TA-1-67	BUILDING THETA-1	N. 93+00 E. 68+50	
TA-1-68	BUILDING TAU	N. 97+80 E. 82+50	
TA-1-69	BUILDING TAU-1	N. 97+80 E. 82+50	
TA-1-70	BUILDING U	N. 93+00 E. 77+50	
TA-1-71	BUILDING V	N. 88+00 E. 77+50	
TA-1-72	BUILDING W	N. 88+00 E. 77+50	
TA-1-73	TOWER NO. 72	N. 83+00 E. 77+50	
TA-1-74	WAREHOUSE 1		REMOVED
TA-1-75	WAREHOUSE 2	N. 97+30 E. 68+00	REMOVED
TA-1-76	J - GP BUILDING	N. 97+80 E. 83+50	WING - 3
TA-1-77	WAREHOUSE 4	N. 97+90 E. 82+50	REMOVED
TA-1-78	WAREHOUSE 5	N. 95+80 E. 82+50	REMOVED
TA-1-79	WAREHOUSE 6	N. 93+00 E. 68+00	REMOVED
TA-1-80	BUILDING K	N. 92+80 E. 76+00	REMOVED
TA-1-81	TOWER NO. 80	N. 98+80 E. 76+00	REMOVED
TA-1-82	BUILDING S	N. 90+80 E. 73+50	REMOVED
TA-1-83	BUILDING Z	N. 88+00 E. 78+00	
TA-1-84	SPRINKLER HOUSE	N. 98+80 E. 76+00	
TA-1-85	PLATFORM	N. 97+80 E. 77+80	
TA-1-86	BUILDING 87	N. 100+00 E. 68+50	REMOVED
TA-1-87	BUILDING 86	N. 98+00 E. 68+00	GRD. STA. 218
TA-1-88	BUILDING 88	N. 97+30 E. 73+50	GRD. STA. 202
TA-1-89	TOWER NO. 90	N. 94+00 E. 67+50	ABANDONED
TA-1-90	WAREHOUSE 7	N. 96+00 E. 68+50	RELEASED
TA-1-91	TOWER NO. 85		REMOVED
TA-1-92	TOWER NO. 83		REMOVED
TA-1-93	TOWER NO. 84		REMOVED
TA-1-94	TOWER NO. 96		REMOVED
TA-1-95	BUILDING 97	N. 95+00 E. 68+00	REMOVED
TA-1-96	WAREHOUSE 13	N. 90+00 E. 68+00	REMOVED
TA-1-97	BUILDING H-1	N. 93+00 E. 80+00	
TA-1-98	WAREHOUSE 15	N. 90+00 E. 90+00	REMOVED
TA-1-99	WAREHOUSE 16	N. 90+00 E. 87+50	REMOVED
TA-1-100	WAREHOUSE 17	N. 92+80 E. 93+00	REMOVED
TA-1-101	WAREHOUSE 17	N. 92+30 E. 93+00	REMOVED
TA-1-102	WAREHOUSE 18	N. 88+00 E. 87+50	REMOVED
TA-1-103	WAREHOUSE 19	N. 92+80 E. 65+00	
TA-1-104	SHEET METAL SHOP	N. 98+00 E. 65+00	
TA-1-105	BUILDING GAMMA-2	N. 97+80 E. 86+50	SKI CLUB
TA-1-106	PASSAGEWAY 106	N. 87+30 E. 72+50	
TA-1-107	PASSAGEWAY 107	N. 97+80 E. 75+00	
TA-1-108	PASSAGEWAY 108	N. 97+30 E. 75+00	
TA-1-109	PASSAGEWAY 109	N. 97+30 E. 77+80	
TA-1-110	PASSAGEWAY 110	N. 97+80 E. 77+80	
TA-1-111	PASSAGEWAY 111	N. 93+00 E. 76+00	
TA-1-112	PASSAGEWAY 112	N. 93+00 E. 77+30	
TA-1-113	PASSAGEWAY 113	N. 93+30 E. 76+00	REMOVED
TA-1-114	MICROSCOPY LAB.	N. 100+00 E. 86+50	REMOVED
TA-1-115	BUILDING J-2	N. 100+00 E. 60+00	
TA-1-116	BUILDING J-3	N. 93+00 E. 70+00	
TA-1-117	GAS STORAGE	N. 93+80 E. 77+80	REMOVED
TA-1-118	BUILDING 118	N. 96+00 E. 82+50	REMOVED
TA-1-119	WAREHOUSE 21	N. 96+00 E. 82+50	REMOVED
TA-1-120	WAREHOUSE 22	N. 90+00 E. 82+50	REMOVED
TA-1-121	WAREHOUSE 23	N. 92+80 E. 80+00	REMOVED
TA-1-122	WAREHOUSE 24	N. 94+80 E. 80+00	REMOVED
TA-1-123	TOWER NO. 125		REMOVED
TA-1-124	BUILDING 124	N. 100+00 E. 87+30	GRD. STA. 224
TA-1-125	BUILDING 125	N. 92+80 E. 87+30	200 37TH ST.
TA-1-126	OLD MESA LIBRARY	N. 97+30 E. 83+00	REMOVED
TA-1-127	BUILDING AF	N. 100+00 E. 75+00	
TA-1-128	MEDICAL WAREHOUSE	N. 100+00 E. 80+00	REMOVED
TA-1-129	BUILDING 129	N. 97+80 E. 80+00	REMOVED
TA-1-130	BUILDING 130	N. 100+00 E. 70+00	REMOVED
TA-1-131	BARLEY BRIDGE	N. 94+00 E. 97+00	
TA-1-132	WATER TOWER	N. 96+00 E. 93+00	
TA-1-133	BOOSTER STATION	N. 92+30 E. 93+00	
TA-1-134	TANK NO. 134	N. 92+80 E. 93+00	
TA-1-135	TANK NO. 135	N. 86+30 E. 86+00	
TA-1-136	PLATFORM 136	N. 90+80 E. 67+80	REMOVED
TA-1-137	TANK NO. 137	N. 86+30 E. 76+50	
TA-1-138	TANK NO. 138	N. 86+30 E. 76+50	
TA-1-139	TANK NO. 139	N. 93+00 E. 67+50	
TA-1-140	TANK NO. 140	N. 97+80 E. 67+50	
TA-1-141	TANK NO. 141	N. 86+30 E. 70+50	
TA-1-142	TANK NO. 142	N. 96+00 E. 86+30	ABANDONED
TA-1-143	TANK NO. 143	N. 97+80 E. 86+30	
TA-1-144	BUILDING 144	N. 98+30 E. 86+30	REMOVED
TA-1-145	BUILDING 145	N. 98+30 E. 77+80	REMOVED
TA-1-146	TANK NO. 146	N. 97+80 E. 76+00	
TA-1-147	INCINERATOR 147	N. 96+00 E. 76+00	
TA-1-148	PLATFORM 148	N. 86+30 E. 76+00	
TA-1-149	TANK NO. 149	N. 86+30 E. 77+80	YA-1-85
TA-1-150	BUILDING 150	N. 90+00 E. 77+80	YA-21-150
TA-1-151	BUILDING 151	N. 86+30 E. 76+00	ABANDONED
TA-1-152	TRANSFORMER STA. 152	N. 97+30 E. 77+50	
TA-1-153	TRANSFORMER STA. 153	N. 97+30 E. 80+00	
TA-1-154	TRANSFORMER STA. 154	N. 92+30 E. 80+00	
TA-1-155	TRANSFORMER STA. 155	N. 86+30 E. 80+00	
TA-1-156	TRANSFORMER STA. 156	N. 97+30 E. 76+00	
TA-1-157	TRANSFORMER STA. 157	N. 93+30 E. 70+00	REMOVED
TA-1-158	TRANSFORMER STA. 158	N. 97+30 E. 72+50	
TA-1-159	TRANSFORMER STA. 159	N. 97+30 E. 73+50	
TA-1-160	TRANSFORMER STA. 160	N. 92+30 E. 73+50	
TA-1-161	TRANSFORMER STA. 161	N. 86+30 E. 73+50	
TA-1-162	TRANSFORMER STA. 162	N. 97+30 E. 76+00	
TA-1-163	TRANSFORMER STA. 163	N. 86+30 E. 76+00	
TA-1-164	TRANSFORMER STA. 164	N. 86+30 E. 77+80	
TA-1-165	TRANSFORMER STA. 165	N. 92+30 E. 77+80	
TA-1-166	TRANSFORMER STA. 166	N. 97+30 E. 77+80	
TA-1-167	TRANSFORMER STA. 167	N. 97+30 E. 77+80	
TA-1-168	THRU TA-1-197	MISC. MANHOLES	
TA-1-196	MANHOLE		
TA-1-197	MANHOLE		
TA-1-198	THRU TA-1-218	MISC. MANHOLES	
TA-1-211	MANHOLE		
TA-1-218	THRU TA-1-238	MISC. MANHOLES	
TA-1-219	DRUM STORAGE		
TA-1-220	DRUM STORAGE		
TA-1-239	STORAGE SHED		
TA-1-240	FUEL TANK		
TA-1-241	THRU TA-1-245	MISC. MANHOLES	
TA-1-246	MANHOLE		
TA-1-247	BUILDING 247		
TA-1-248	THRU TA-1-257	TRANS. STATIONS	
TA-1-234	MANHOLE	N. 93+00 E. 90+00	
TA-1-235	VALVE BOX	N. 93+30 E. 77+80	
TA-1-258	RETAINING WALL	N. 92+30 E. 78+50	
TA-1-259	MANHOLE	N. 87+30 E. 78+50	
TA-1-260	RESERVE		
TA-1-261	RETAINING WALL	N. 93+80 E. 87+50	
TA-1-262	RESERVE		
TA-1-263	RESERVE		
TA-1-264	RETAINING WALL	N. 100+00 E. 90+00	
TA-1-265	RETAINING WALL	N. 100+00 E. 87+50	
TA-1-266	SEPTIC TANK	N. 97+30 E. 83+50	
TA-1-267	SEPTIC TANK	N. 92+80 E. 77+50	ABANDONED
TA-1-270	RESERVE		
TA-1-271	RESERVE		
TA-1-272	BUILDING TP		NOT BUILT
TA-1-273	TANK NO. 273		NOT BUILT
TA-1-274	MANHOLE	N. 96+00 E. 85+00	ABANDONED
TA-1-275	SEPTIC TANK	N. 93+00 E. 88+00	ABANDONED
TA-1-276	SEPTIC TANK	N. 97+30 E. 90+00	ABANDONED
TA-1-277	TRANSFORMER STA.	N. 97+30 E. 77+50	
TA-1-278	MANHOLE	N. 92+00 E. 77+00	
TA-1-279	WATER TANK		REMOVED
TA-1-280	WATER TANK		REMOVED
TA-1-281	WATER TANK		REMOVED
TA-1-282	WATER TANK		REMOVED
TA-1-283	RETAINING WALL	N. 93+00 E. 88+00	
TA-1-284	BUILDING 284		REMOVED
TA-1-285	BUILDING 285		REMOVED
TA-1-286	TRANSFORMER STA.	N. 97+30 E. 83+00	
TA-1-287	GUARD TOWER		REMOVED
TA-1-288	GUARD STATION	N. 100+00 E. 82+50	
TA-1-289	OFFICE BUILDING		NOT BUILT
TA-1-290	SUBSTATION	N. 85+00 E. 85+00	

NOTE

INDICATES STRUCTURES REMOVED

ER ID # 23446

AUTHORIZED FOR	LOS ALAMOS SCIENTIFIC LABORATORY ENGINEERING DEPARTMENT	
HEALTH, SAFETY, FIRE PR., CONSU, SEC.	TECH. AREA NO. 1 MAIN TECHNICAL AREA UNDERGROUND UTILITIES	
REV.	SCALE 1"=50' DRAWN BY J.A.S.&M.S. CHKD. BY APPVD. BY	DATE 10/21/58 DATE DATE DWG. NO. 6005-78-83

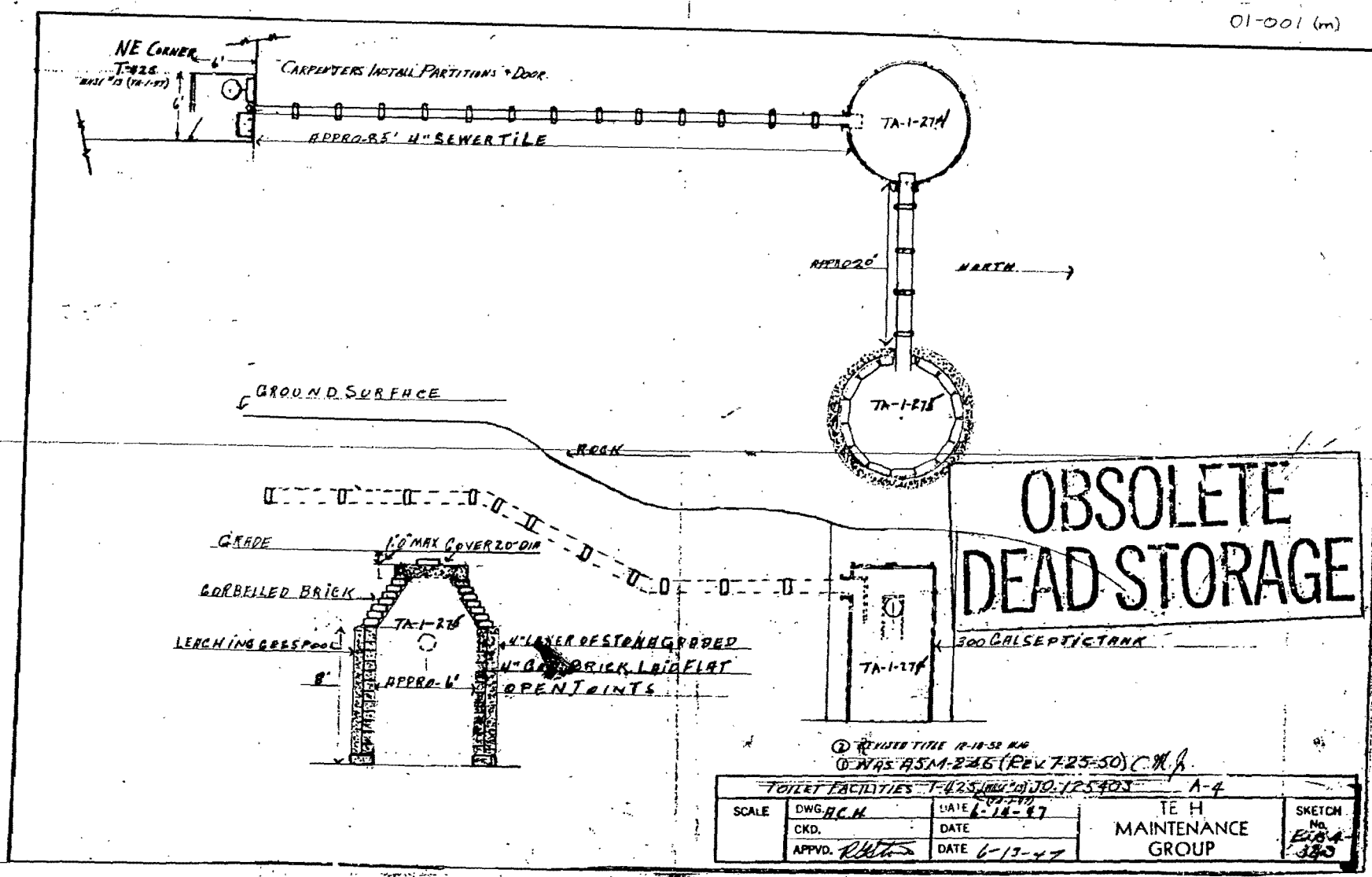
F2

Attachment B

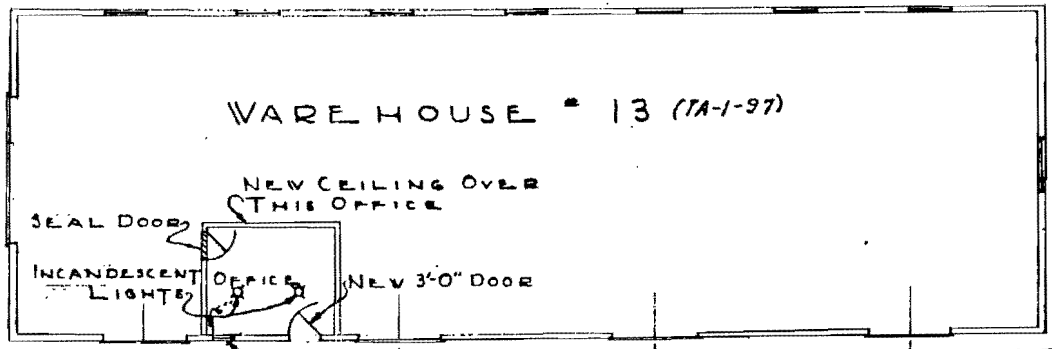
01-001(m)

Attachment C

01-001 (m)



Attachment D
01-001(m)



NOTES:
1. HEIGHT OF CEILING - 10'-10"
2. PAINT TO MATCH.

OBSOLETE
DEAD STORAGE

3A | 5/18/83 Rec. No Revision. As Built Status Vol.
1 | WAS ASM-491 (REV 0-7-50) C.M.J.

RECORD DRAWING--AS BUILT CONSTRUCTION		
SUBMITTED:	RECOMMENDED:	APPROVED:
FOR THE LAB. DIR.	A.E.C.	A.E.C.

REVISED TITLE 12/18/62

AUTHORIZED:

LOS ALAMOS SCIENTIFIC LABORATORY
DEPARTMENT OF ENGINEERING — CONSTRUCTION & MAINTENANCE GROUP

INSTALL CEILING, DOOR & WINDOW IN OFFICE ON WHSE. # 13 - (T.A.- 1-97)

ISSUED:
SAFETY: Comp. Engineer
FIRE PR: F.P.E.
COMM.
PROC.: J. Lawrence
SEC.: Gr-A-4

J.O. 137472 Gr-A-4

SCALE: NOT TO SCALE
DRAWN BY: L. G. M.
CHKD. BY: C. S.
APPVD. BY:
DATE: 4-20-48
DATE: 4-21-48
DATE: 4-27-48
DWG. NO. ENG4-538

Attachment E

01-001(m)

Date: 11/3/00

To: Memo to file

From: Terry Rust, Townsites Teamleader TR

Subject: Interview with Mr. Rollin Jones regarding PRS 1-001(m) aka Septic Tank 275

On April 5, 2000 I met with Mr. Rollin Jones, the property owner, to discuss his needs prior to redeveloping the site where PRS 1-001(m) was reported to be. Also in attendance were Ms. Valerie Rhodes (LANL) and Mr. John Young (NMED-HWB).

Mr. Jones provided us with a site conceptual sketch for his development, indicating which areas would likely be impacted and the significance of that impact. During the discussion, Mr. Jones mentioned that when he first developed the site (current conditions) in the early 1980s an existing foundation, floor and stem wall existed in the location that would have served as the former TA-1 "Warehouse 13", identified as the source for Septic Tank 275 and it's associated leeching pit [PRS 1-001(m)]. Mr. Jones went on to say that his company then used these existing features for the first of his self storage buildings (currently in use), simply erecting walls and cutting out the stem wall where necessary to facilitate additional doorways. Mr. Jones had no recollection of any plumbing penetrations or signs of plugged penetrations or concrete patching in the concrete slab floor or stem wall that might have indicated plumbing. Arrangements were made to revisit the building when access could be granted to verify the integrity of the flooring in the area where the Warehouse 13 toilet facilities were alleged to have been installed.

Attachment F

01-001(m)

Date: 11/3/00

To: Memo to File

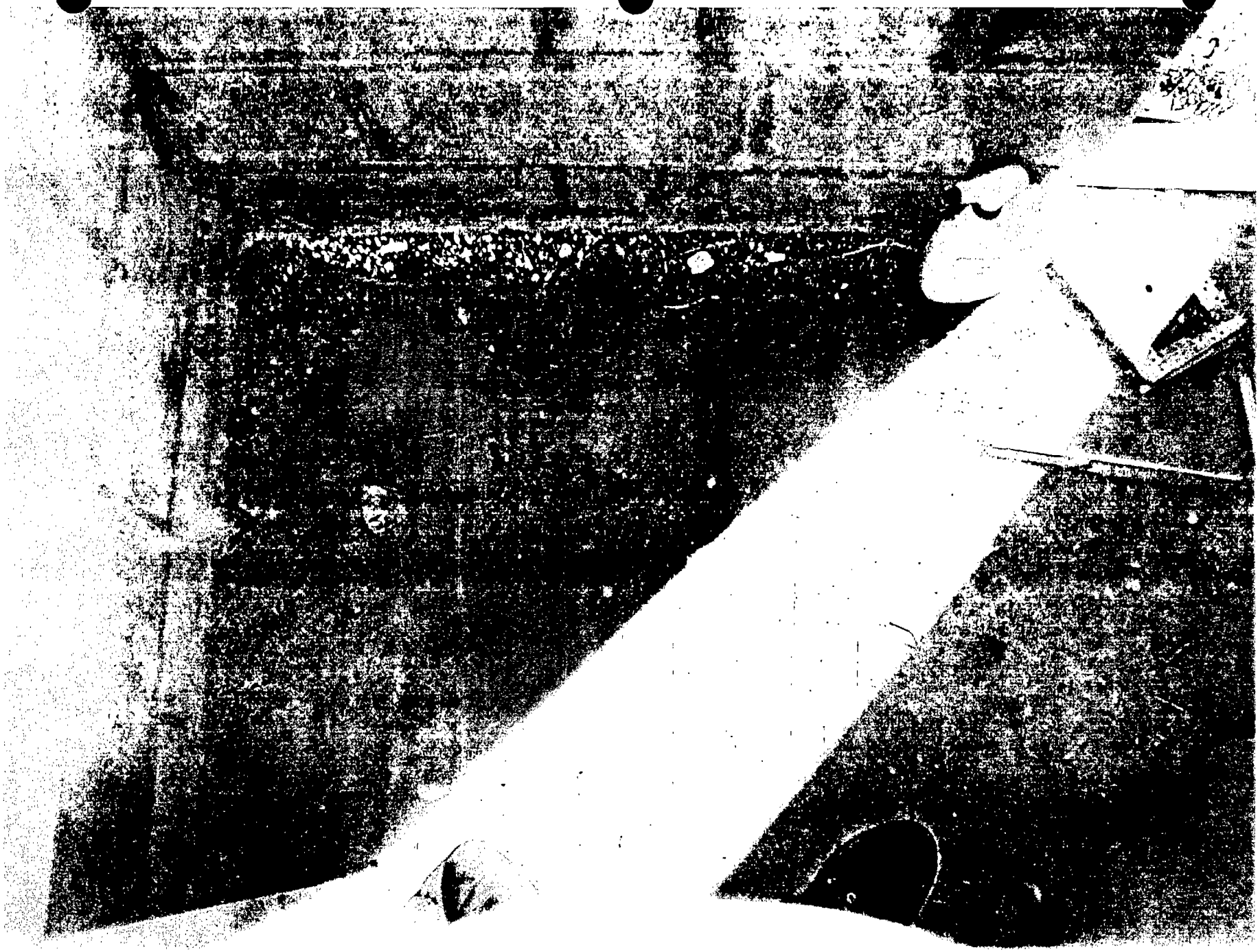
From Terry Rust, Townsites Teamleader TR

Subject: Site Visit to Los Alamos Self-Storage (Mr. Rollin Jones owner) regarding PRS 1-001(m) aka Septic Tank 275

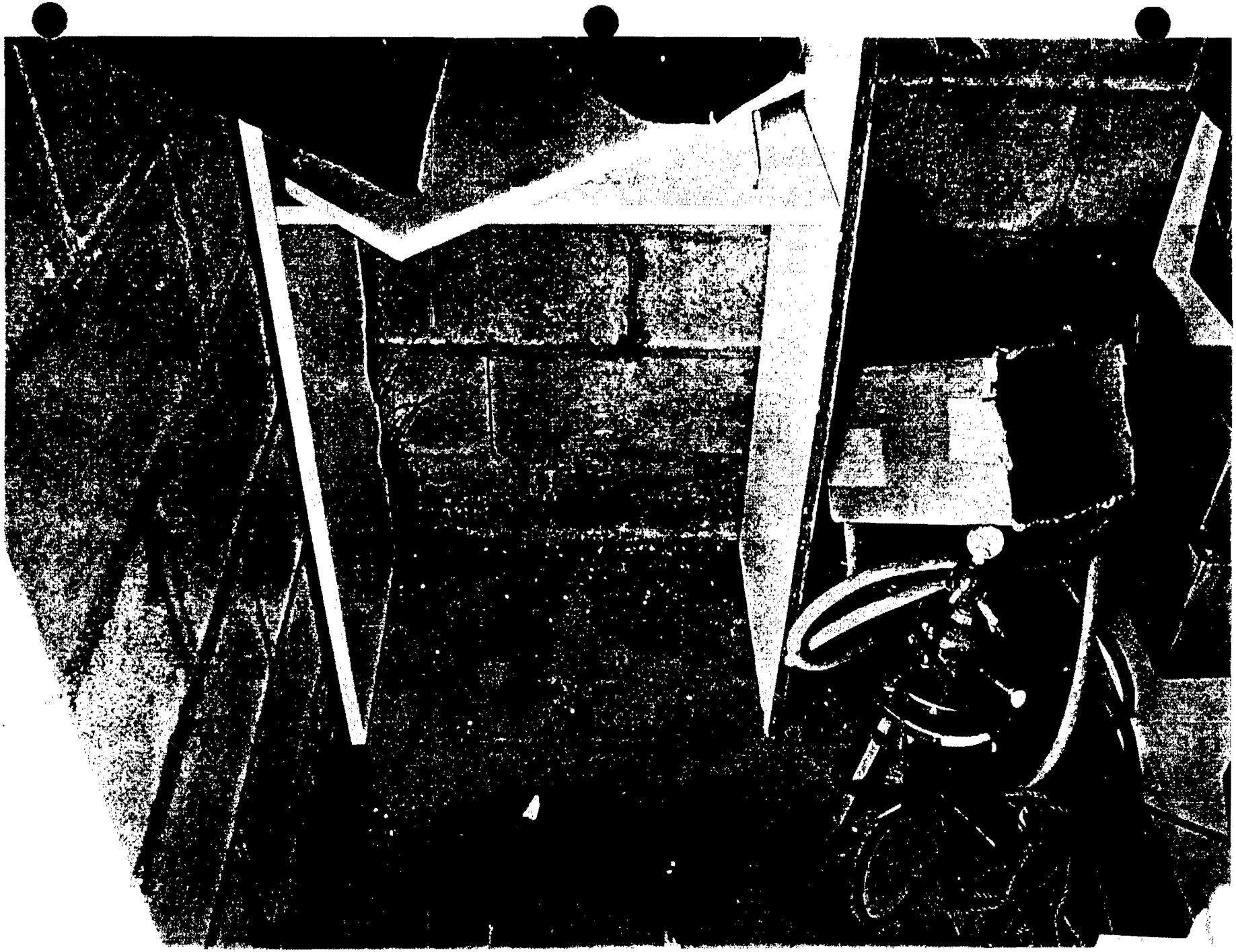
On August 9, 2000 I revisited Mr. Jones' property to enter storage unit #3 to attempt to document the existence, or absence, of plumbing penetrations that may have been associated with PRS 1-001(m). This was the second attempt to gain access; earlier attempts had been unsuccessful when the unit renter had forgotten to unlock the door. Also in attendance were Ms. Valerie Rhodes (LANL).

After carefully removing and stacking the contents of the unit, the floor and stem wall was inspected for signs of penetrations and/or patching. The floor was intact and in original condition with no sign of toilet facilities having been installed. The stem wall was intact with the exception of the area of the door, which appeared to have been broken out for the doorframe. Six digital photographs were taken of the floor, walls and doorway to document the condition. All of the unit's contents were then returned to their approximate original location and the unit was locked with the renter's lock.

Photograph #1. PRS 1-001(m), doorway of storage unit cut/broken out of existing concrete stem wall.



Photograph #2. PRS 1-001(m), northwest corner of storage unit showing floor and stem walls.



Photograph #3. PRS 1-001(m), northeast corner of storage unit showing floor and stem walls (proposed location of Warehouse 13 restroom)

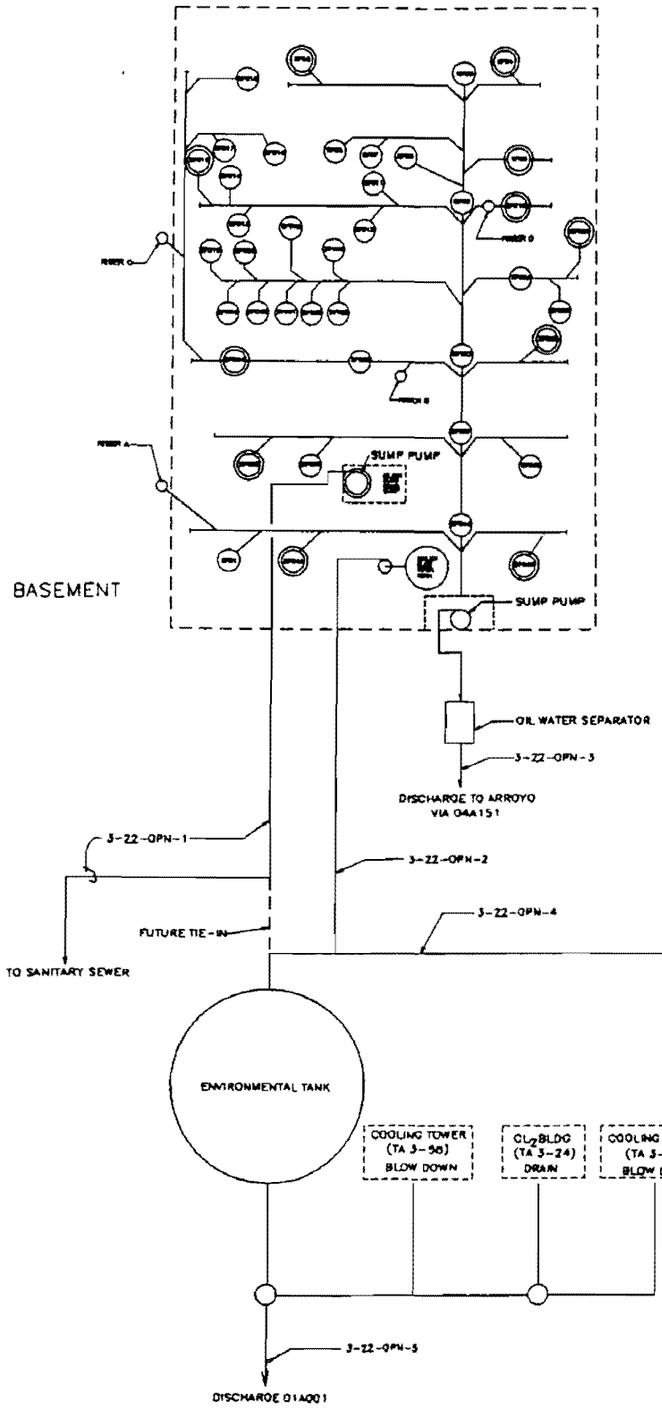
LANL Structure History Book: TA-01

Attachment G

01-001(m)

STRUCTURE NUMBER	DESIGNATION AND TITLE	GROUP ASSIGN.	DATE ASSIGN.	GENERAL INFORMATION	W.O. J.O. E.S.	LAB JOB NUMBERS
TA-1-97	WAREHOUSE 13	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) Built approx. July 1945. Wood frame construction, 48'-0" x 120'-0" x 18'-0" high. Cost $ 13,951.00 Removed on Contract AT(2941)-1444, Contractor: Bert G. Clark, 954 Site Clearing Program, Phase "A", Lot #14.		
TA-1-98	BUILDING K-1	LASL ZIA	6-30-50 10-6-64	Proposed ☐ Requested by: _____ (Name & Group) Built on Contract AT(29-1)-819, Contractor; D.W. Falls, Started 10-21-49, Completed 6-2-50, lab Jobs 95 and 153. Steelcraft building, 40'-0" x 100'-0" with a concrete floor. Built on Lab Jobs 95, 153, 1296, & 1680. Cost $ 32,828.99 Transferred to Zia on AO-5 C.V. No. 10-5031, 10-6-64. Removed by Bureau of Indian Affairs, March 1965.		15 & 19
TA-1-99	WAREHOUSE 15	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) T-424 AEC-212-20 Formerly 151-19th Street. Built approx. July 1945. Wood frame construction, 48'-0" x 160'-0" x 18'-0" high. Cost $ 45,464.00 Removed by the Sandia View Academy, 12-7-55.		
TA-1-100	WAREHOUSE 16	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) T-436 AEC-412-22 Formerly 43-19th Street. Built approx. July 1945. Wood frame construction, 32'-0" x 110'-0" x 18'-0" high. Cost $ 32,261.00 Removed by the Sandia View Academy, 12-7-55.		

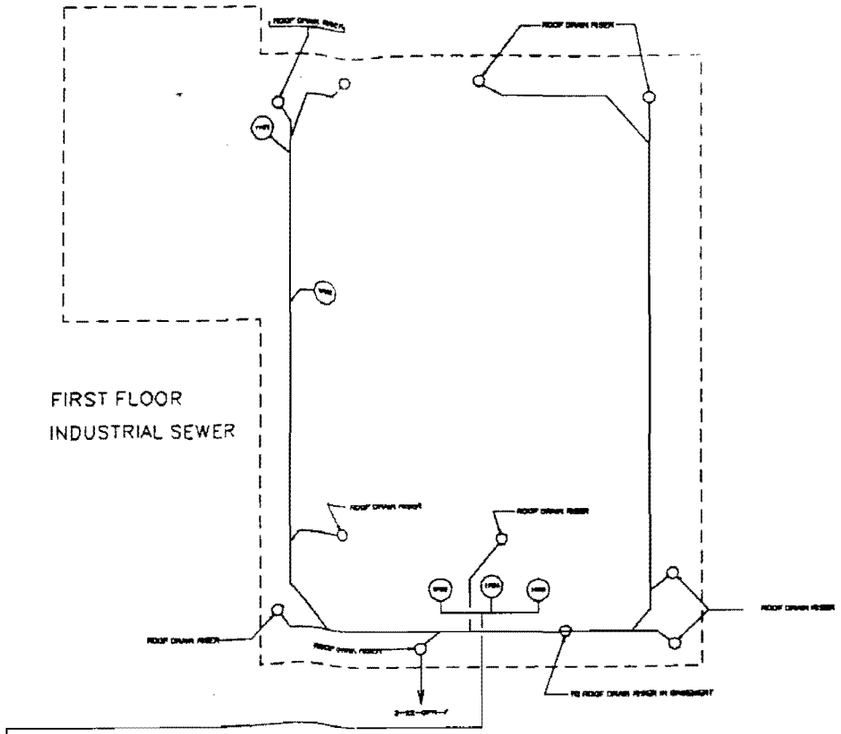
	STRUCTURE NUMBER	DESIGNATION AND TITLE	GROUP ASSIGN.	DATE ASSIGN.	GENERAL INFORMATION	W.O. J.O. E.S.	LAB JOB NUMBERS
	TA-1-101	WAREHOUSE 17	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) Built approx. July 1945. Foremerly located at 202-19th Street. Wood frame construction, 20'-0" x 15'-0" x 10'-0" high. Cost $ 17,405.00 Removed on Contract AT(29-1)-1444, Contractor: Bert G. Clark, 1954.		
	TA-1-102	WAREHOUSE 18	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) Built approx. July 1945. Formerly located at 64-19th Street. Wood frame construction, 20'-0" x 50'-0" x 10'-0" high. Cost $ 10,967.00 Removed on Contract AT(29-1)-1444, Contractor: Bert G. Clark, 1954. Lab Job 102, 740		
	TA-1-103	WAREHOUSE 19	LASL ZIA	6-30-49 10-6-64	Proposed ☐ Requested by: _____ (Name & Group) AEC-314-32 Built on Contract AT(29-1)-GEN-509, Contractor: R.E. McKee, Started 9-22-48, Completed 6-17-49, Lab Job 124. Steelcraft building, 40'-0" x 100'-0" x 17'-0" high. Cost $ 48,682.94 Transferred to Zia on AO-5 C.V. No. 10-5031, 10-6-64. Removed by Bureau of Indian Affairs, March 1965. Lab Jobs 71, 124, 214, 253, 815, 971, 1006, 2144, 2187, 2312, 2412.		
	TA-1-104	SHEET METAL SHOP	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-314-32 Built on Contract AT(29-1)-GEN-509, Contractor: R.E. McKee, Started 9-22-48, Completed 6-17-49, Lab Job 124. Steelcraft building, 40'-0" x 100'-0" x 17'-0" high. Lab Jobs 71, 124, 1018, 1184, 2144, 2312, 2412 Cost $ 50,760.69 Transferred to Zia on AO-5 C.V. No. 10-5031, 10-6-64. Removed by Bureau of Indian Affairs March 1965		

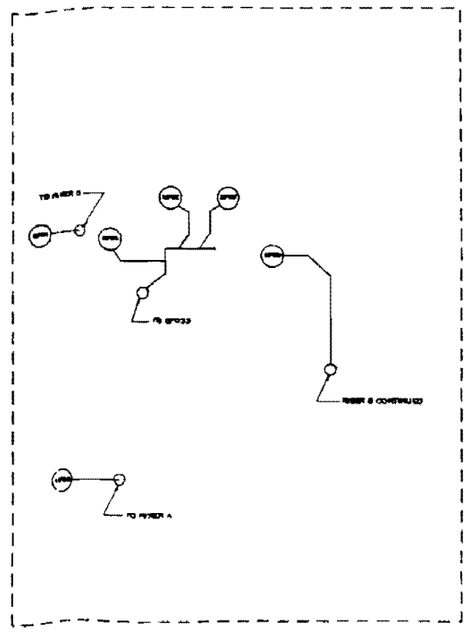


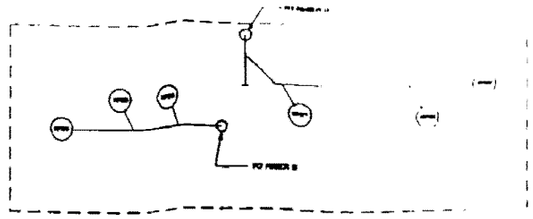
LEGEND:
FD – FLOOR DRAIN
LV – LAVATORY
RD – ROOF DRAIN
SD – SINK DRAIN
SH – SHOWER
TL – TOILET
UR – URINAL
WF – WATER FOUNTAIN
DYE TESTED DRAIN

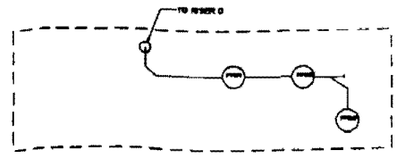
NOTES:
NOTE 1 – PIPING LAYOUT FROM DRAWINGS:
C-28672, C-28673, C-28674, C-28675, C-28677, C-28678, C-28680, C-28699, C-28709, C-28710, C-31637, C-31640, C-31641, C-34837, C-45085, R-3397 & R-5398 AND SITE VISIT

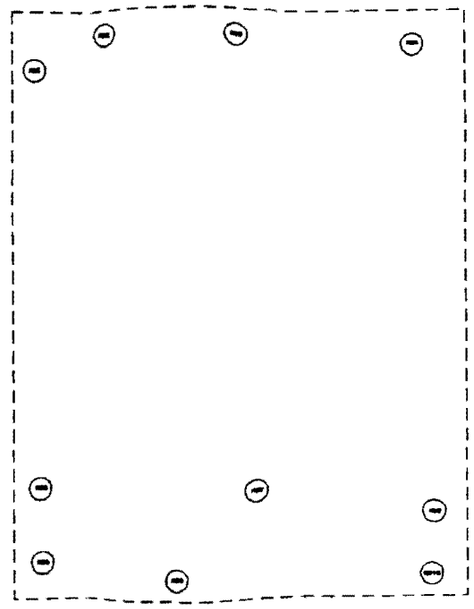
NOTE 2 – PIPING VERIFIED BY SITE VISIT & DYE STUDY

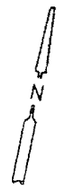












SANTA FE ENGINEERING, LTD.

TA 3-22
DRAIN SCHEMATIC

DRAWN	PCD
DESIGN	PCD
CHECKED	LBM
APPROVED	
DATE	6/11/96

Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545

ENGINEERING GROUP EM-8	LAB JOB NO. 11056-1	DRAWING NO. FIGURE 2

NOTE: The enclosures to Attachment H for SWMU 01-001(m) are included as Attachments B, C, D, and F for Section 3.0 of this request for permit modification and therefore are not included again in Attachment H.

Attachment H

01-001(m)

Environmental Restoration
University of California
Environmental Science and Waste Technology (E)
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-667-0808/FAX 505-665-4747

U.S. Department of Energy
Los Alamos Area Office, MS A316
Environmental Restoration Program
Los Alamos, New Mexico 87544
505-667-7203/FAX 505-665-4504

Date: October 23, 2000
Refer to: ER2000-0581

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
2044 A Galisteo
Santa Fe, NM 87502

SUBJECT: ADDITIONAL INFORMATION FOR POTENTIAL RELEASE SITE (PRS) 01-001(m), SEPTIC TANK 275, ON ROLLIN JONES PROPERTY

Dear Mr. Young:

The purpose of this letter is to provide further information to support a no further action (NFA) recommendation for PRS 01-001(m), Septic Tank 275. As you are aware, this PRS is located on private property currently owned by Mr. Rollin Jones, who operates Los Alamos Self Storage and is finalizing plans for further business development on the property.

The Los Alamos National Laboratory (LANL) Environmental Restoration (ER) Project recently completed an additional investigation associated with PRS 01-001(m) that was discussed with you and Mr. Jones on April 5, 2000. Information obtained during this investigation indicates that Septic Tank 275 was never installed. The following items present sufficient site background and newly obtained information to support the LANL ER Project's position that Septic Tank 275 was never installed:

- PRS 01-001(m), Septic Tank 275, was identified in (two) preliminary drawings as a 300-gallon septic tank that serviced Warehouse 13 from 1944 to 1946. Warehouse 13 was removed in 1954; Septic Tank 275 was reportedly abandoned or not located. The preliminary drawings are included in Attachment A.

- Several documents, "Radiological Survey and Decontamination of the Former Main Technical Area (TA)-1 at Los Alamos, New Mexico," (Aldrich, et.al., 1977) and the Operable Unit 1078 Work Plan (LANL, 1992) surmised that Septic Tank 275 was removed prior to the 1970s TA-1 decommissioning and decontamination (D&D) efforts. This assumption was made based on the preliminary drawings and because the tank was not discovered during D&D activities which indicated that the existing ground elevation was (and still is) below the elevation of the tank depicted in the drawings.

- The preliminary drawings identifying Septic Tank 275 show a proposed rest room to be added to Warehouse 13. However, a newly obtained "As Built" engineering drawing (REF) shows that no rest room or other facility requiring plumbing was installed in Warehouse 13; the "As-Built" engineering drawing is also included in Attachment A.

- Although no specific details were located on removal of Warehouse 13, the property owner reports that the original floor and foundation remained on site when the property was purchased. The property owner also reports that the original floor, foundation, and stem walls were from Warehouse 13 were used for the construction of his first storage building. The "As Built" drawing of Warehouse 13 confirms that the dimensions of the existing storage building are consistent with those of Warehouse 13. Additionally, visual inspection of the existing storage building indicates that the storage building doorways were cut and/or broken out of existing concrete stem walls, as opposed to being designed as part of concrete stem walls specific the existing storage building.

- The property owner also reports that there were no open or plugged floor penetrations in the floor, foundation, or stem walls when the storage building was constructed using the floor, foundation, and stem walls of former Warehouse 13. On August 9, 2000, with the permission of the property owner and tenant of the storage unit, LANL ER Project personnel searched the storage unit located where the restroom for Warehouse 13 was proposed. After removing all stored materials, visual inspection identified no open or plugged penetrations in the floor, foundation, and stem walls, no water staining, no evidence of tiling or flooring, and no other indication that any water or plumbing serviced the former Warehouse 13. Photographs taken during investigation of the storage unit are included in Attachment B.

Based on the above information, the LANL ER Project has determined that PRS 01-001(m), Septic Tank 275, was never installed to service Warehouse 13. Therefore, the LANL ER Project will be recommending PRS 01-001(m), Septic Tank 275, for NFA under Criterion 1 in a future permit modification request.

Sincerely,

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

Theodore J. Taylor, Project Manager
Department of Energy
Los Alamos Area Office

JC/TT/VR/ev

Enclosures: 1) Attachment A – Drawings for PRS 01-001(m)
2) Attachment B – Photographs for PRS 01-001(m)

Cy (w/encs.):
M. Buksa, E/ET, MS M992
J. Mose, LAAO, MS A316
D. Neleigh, US EPA (2 copies)
N. Riebe, E/ET, MS M992
T. Taylor, LAAO, MS A316
J. Davis, NMED-SWQB
M. Leavitt, NMED-GWQB
J. Parker, NMED-DOE OB
S. Yanicak, NMED-DOE OB, MS J993
J. Young, NMED-HWB (2 copies)
E/ER File, MS M992
RPF, MS M707

Cy (w/o encs.):
J. Canepa, E/ER, MS M992
D. McInroy, E/ER, MS M992
W. Neff, E/ET, MS M992
V. Rhodes, Aurora, MS M992
G. Turner, LAAO, MS A316
J. Bearzi, NMED-HWB
R. Dinwiddie, NMED-HWB
D. Gaering, NMED-DOE OB
J. Kieling, NMED-HWB

ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2044 A Galisteo, P.O. Box 26110
Santa Fe, New Mexico 87502-6110
Telephone (505) 827-1557
Fax (505) 827-1544
www.nmenv.state.nm

GARY E. JOHNSON
GOVERNOR

PETER MAGGIORE
SECRETARY

PAUL R. RITZMA
DEPUTY SECRETARY

Attachment I
01-001(m)

REV'D 12/1/00

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

November 29, 2000

John C. Browne, Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop A100
Los Alamos, NM 87545

Theodore J. Taylor, Project Manager
Los Alamos Area Office
Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

RE: APPROVAL OF NO FURTHER ACTION FOR POTENTIAL RELEASE SITE 01-001(m), SEPTIC TANK 275
LOS ALAMOS NATIONAL LABORATORY
NM 0890010515
HWB-LANL-00-014

Dear Dr. Browne and Mr. Taylor:

The Hazardous Waste Bureau (HWB) of New Mexico Environment Department has received the "Additional Information for Potential Release Site (PRS) 01-001(m), Septic Tank 275, on Rollin Jones Property" dated October 23, 2000 and referenced by ER2000-0581. HWB has reviewed the information provided and concurs with the Los Alamos National Laboratory Environment Restoration Project's position that Septic Tank 275 was never installed. The septic tank is appropriate for a no further action recommendation under criterion 1.

If you have any questions please contact me at (505) 827-1558 extension 1036 or Neelam Dhawan at extension 1018.

Sincerely,

John R. Young,
Corrective Action Project leader
RCRA Permits Management Program

JRY:nmd

cc: P. Allen, NMED HWB
J. Bearzi, NMED HWB
J. Kieling, NMED HWB
C. Will, NMED HWB
J. Parker, NMED DOE-OB
S. Yanicak, NMED DOE-OB
J. Davis, NMED SWQB
M. Leavitt, NMED GWQB
D. Neleigh, EPA 6PD-N
J.Vozella, DOE LAAO, MS-A316
J. Canepa, LANL E/ER, MS-M992
M. Kirsch, LANL EM/ER, MS-M992
D. McInroy, LANL E/ER, MS-M992
File: HSWA LANL, 1/1078/1

4.0 SWMU 03-046
ACTIVE ABOVEGROUND WASTEWATER TANK

4.1 Summary

SWMU 03-046 is an active aboveground wastewater neutralization tank located in TA-3 near the Laboratory's steam plant. The function of the tank is to collect wastewater from boilers, softeners, and a demineralization tank located at the steam plant and to ensure that the effluents from this equipment meet National Pollutant Discharge Elimination System (NPDES) permit discharge requirements by adjusting pH, as needed. The tank discharges to Sandia Canyon via a NPDES-permitted outfall. No documented releases from the tank have occurred. The contents of the tank (water from steam plant boilers, softeners, and a demineralization tank) are discharged to an outfall that is subject to NPDES discharge requirements, but the contents do not meet the definition of a RCRA solid waste provided in the federal Solid Waste Disposal Act and the New Mexico Hazardous Waste Act. Therefore, the tank does not meet the definition of a SWMU. SWMU 03-046 is being proposed for NFA under NFA Criterion 2 (the site has never been used for the management of RCRA solid or hazardous wastes and/or constituents).

4.2 Description and Operational History

4.2.1 Site Description

SWMU 03-046 is an active aboveground wastewater neutralization tank located in TA-3 approximately 60 ft southeast of Building TA-3-22, the Laboratory's steam plant (Figure 4.2-1). The tank is fiberglass and has a capacity of 10,000 gal. It is completely enclosed in a 14.6- by 14.6- by 12-ft-deep concrete secondary containment area with a concrete floor and walls that are approximately 1 ft thick. A photograph of the neutralization tank and its containment is included as Attachment A (LANL 1993, 68058).

There is an access space between the tank and the walls of the containment area surrounding the tank to allow for visual inspection of the tank. Visual inspections for integrity are conducted daily by steam plant operations and maintenance personnel and monthly by ESH-18 Water Quality Program personnel as mandated under the Storm Water Pollution Prevention Plan for the TA-3-22 Steam Plant (Zimmerly 1999, 69790 (Attachment B).

4.2.2 Operational History

The sole function of the SWMU 03-046 tank is to collect the wastewater from boilers, softeners, and a demineralization tank located at the TA-3-22 steam plant and to ensure that the effluents from this equipment meet NPDES-permit discharge requirements by adjusting pH, as needed. The pH adjustment is made using either sulfuric acid or sodium hydroxide. When the wastewater in the tank is adjusted to the proper pH, it is released to a drain that subsequently receives discharges from two cooling towers and a chlorine building (Santa Fe Engineering 1994, 70001) (Attachment C). The drain discharges to Sandia Canyon via an NPDES-permitted outfall, 01A001, subject to the NPDES discharge requirements of Subsection 1342 of the Clean Water Act (US Code: Title 33, Chapter 26, Subchapter IV). The outfall is designated as a separate SWMU [03-045(b)] and is included as part of consolidated unit PRS 03-012(b)-00.

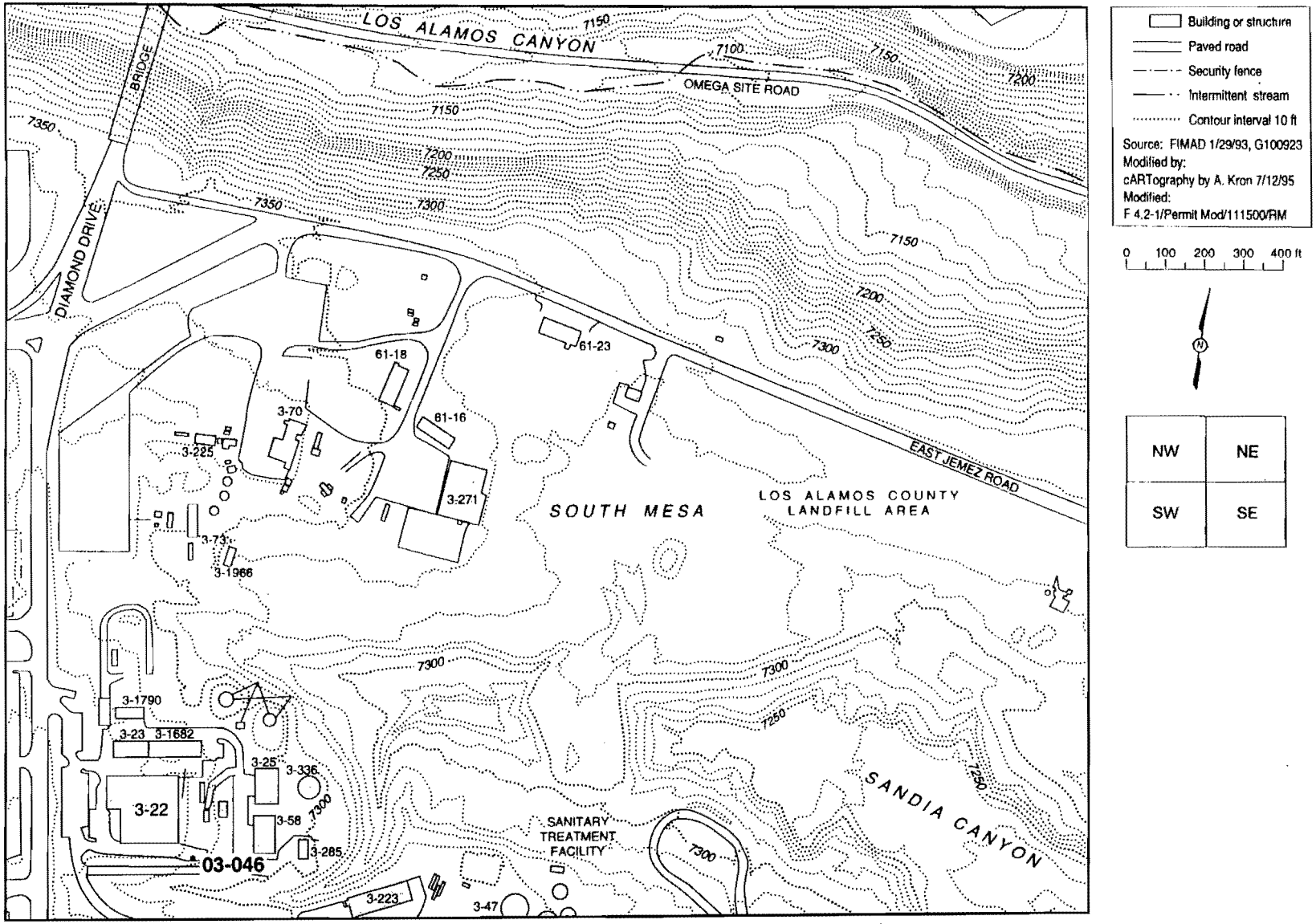


Figure 4.2-1. Topographic map of TA-3 (NE quadrant) showing location of SWMU 03-046

Archival search resulted in no record of a release from the SWMU 03-046 tank. However, between May 20 and 21, 1990, three releases occurred that were related to the SWMU 03-012(b) outfall. The three NPDES incidents involved the uncontrolled release of sulfuric acid to the neutralization tank and resulted in the discharge of acidic wastewater (i.e., with a pH below the NPDES permit limit of 6.0–9.0 pH) to the outfall (and, subsequently, to a portion of Sandia Canyon). In each instance, soda ash was added to the effluent to neutralize the release, the spills were reported to EPA Region 6, and the affected area of Sandia Canyon was neutralized with soda ash. The EPA Water Management Division and the NMED Surface Water Quality Bureau approved the spill reports and corrective action plan as implemented. Both agencies concurred with the actions taken by the Laboratory for these releases and closed the incident.

4.3 Land Use

4.3.1 Current

TA-3 is an industrial area containing the core of the Laboratory's operational facilities, including its principal administrative buildings, cafeteria, library, workshops, and warehouses. The SWMU 03-046 wastewater treatment tank is located approximately 60 ft southeast of Building TA-3-22, the Laboratory's power plant. The tank's location is in an industrial area with high-security restricted access. A chain-link fence topped with barbed wire encloses the portion of the technical area where this SWMU is located. Access through the fence is obtained only by passing through a guard gate. These security measures effectively eliminate the possibility of inadvertent site intrusion.

4.3.2 Future/Proposed

The Laboratory does not anticipate any change from industrial use with restricted access of this portion of TA-3 for the operational life of the Laboratory (LANL 1995, 57224, pp.11–12) (Appendix D, Attachment 1).

4.4 No Further Action Proposal

4.4.1 Rationale

The contents of the tank do not meet the definition of a RCRA solid waste provided in the federal Solid Waste Disposal Act included in NMED's RPMP Document Requirement Guide, page 7, Section II.A.1.f (NMED 1998, 57897) and the New Mexico Hazardous Waste Act. Therefore, the tank does not meet the definition of a SWMU provided in Module VIII of the Laboratory's Hazardous Waste Facility Permit (Section A, p. 3).

The Laboratory ER Project is proposing SWMU 03-046 for NFA based on

- the sole purpose of the tank is to collect wastewater from TA-3-22 steam plant equipment (water boilers, softeners, and a demineralization tank) and to ensure that these effluents meet NPDES-permit discharge requirements by adjusting pH, as needed;
- the contents of the tank are discharged to an outfall that is subject to the NPDES discharge requirements of Subsection 1342 of the Clean Water Act (US Code: Title 33, Chapter 26, Subchapter IV);
- the contents of the tank do not meet the definition of a RCRA solid waste provided in the amended Solid Waste Disposal Act included in NMED's RPMP Document Requirement Guide, page 7, Section II.A.1.f (NMED 1998, 57897) and the New Mexico Hazardous Waste Act.

Therefore, the tank does not meet the definition of a SWMU provided in Module VIII of the Laboratory's Hazardous Waste Facility Permit (Section A, p. 3); and

- no releases occurred from the tank.

4.4.2 Criterion

Based on the information presented in Sections 4.2 through 4.4, SWMU 03-046 is being proposed for NFA under Criterion 2.

4.5 Supporting Documentation Attached

Attachment A: Photograph of SWMU 03-046 neutralization tank. (LANL 1993, 68058)

Attachment B: Relevant pages from Storm Water Pollution Prevention Plan for TA-3-22. (Zimmerly 1999, 69790)

Attachment C: Relevant pages from Wastewater Stream Characterization Study for TA-3-22. (Santa Fe Engineering 1994, 70001)

4.6 Reference Used for Text of the Request for Permit Modification for SWMU 03-046

LANL (Los Alamos National Laboratory), July 1995. "RFI Work Plan for Operable Unit 1114, Addendum 1," Los Alamos National Laboratory Report LA-UR-95-731, Los Alamos, New Mexico, p. 6-39. (LANL 1995, 57590)

NMED (New Mexico Environment Department), March 1998. "RPMP Document Requirement Guide," Hazardous and Radioactive Materials Bureau, RCRA Permits Management Program, Santa Fe, New Mexico. (NMED 1998, 57897)

4.7 History of Regulatory Deliverables

LANL, July 1995: RFI work plan for OU 1114, Addendum 1 submitted to EPA. (LANL 1995, 57590)

EPA, November 1, 1995: NOD for OU 1114 RFI work plan, Addendum 1. (EPA 1995, 55161.49)

LANL, February 8, 1996: Response to NOD for OU 1114 RFI work plan, Addendum 1. (LANL 1996, 54088)

NMED, August 26, 1996: Disapprovals of OU 1114 RFI work plan [Addendum 1] and LANL response to NOD. (NMED 1996, 65591)

LANL, November 6, 1996: Request for clarification of disapproval letter for NOD response for RFI work plan for OU 1114, Addendum 1. (LANL 1996, 55188)

4.7.1 References for Regulatory Deliverables

LANL (Los Alamos National Laboratory), July 1995. "RFI Work Plan for Operable Unit 1114, Addendum 1," Los Alamos National Laboratory Report LA-UR-95-731, Los Alamos, New Mexico, p. 6-61–6-63 (LANL 1995, 57590).

EPA (US Environmental Protection Agency, November 1, 1995. "Notice of Deficiency Addendum 1 to Work Plan for Operable Unit (OU) 1114, Los Alamos National Laboratory (NM0890010515)," US

Environmental Protection Agency (Region 6) letter to T. Taylor (DOE Program Manager) from D. W. Neleigh (EPA Region 6 Chief, New Mexico Federal Facilities Section), Dallas, Texas. (EPA 1995, 55161.49)

LANL (Los Alamos National Laboratory), February 8, 1996. "Response to the Notice of Deficiency for the RFI Work Plan for Operable Unit 1114, Addendum 1," Field Unit 1, Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL 1996, 54088)

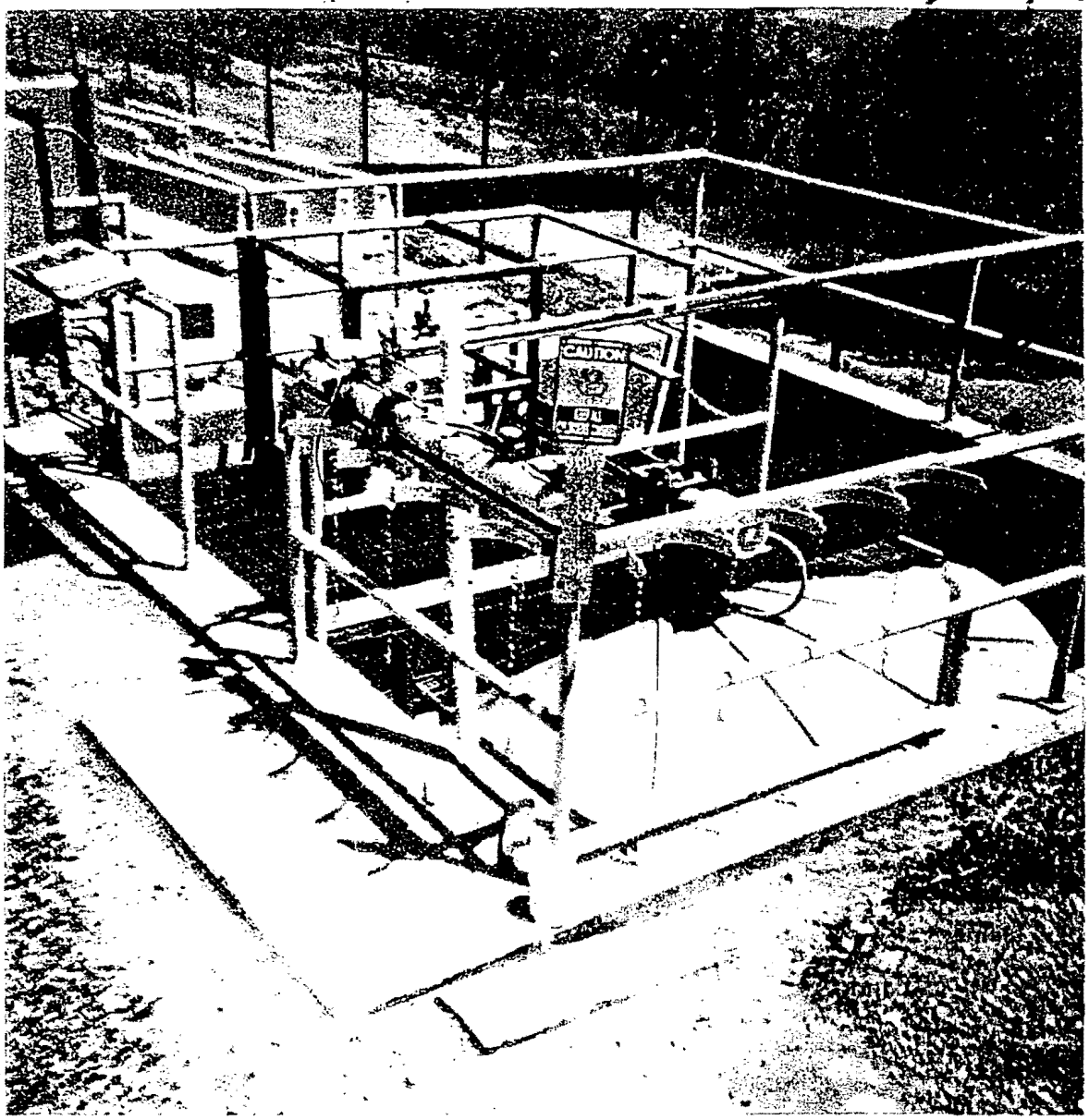
NMED (New Mexico Environment Department), August 26, 1996. "Disapproval of the RCRA Facility Investigation Work Plan for Operable Unit 1114, Los Alamos National Laboratory (NM0890010515)," NMED letter to G.T. Todd (DOE/LAAO) from E. Kelley (NMED-HRMB), Santa Fe, New Mexico. (NMED 1996, 65591)

LANL (Los Alamos National Laboratory), November 6, 1996. "Clarification Request for the EPA Disapproval Letter for OU 1114 Work Plan, Addendum 1, " Los Alamos National Laboratory letter EM/ER:96-573 to E. Kelley (NMED-HRMB) from J. Jansen (LANL ER Program), Los Alamos, New Mexico. (LANL 1996, 55188)

03-046

ATTACHMENTS

5/13/93



V=S ENV. TANK – (NO STRUCTURE #)
FIBERGLASS
SWMU 3-046
Assoc. Structure TA-3-22

Attachment B

03-046

MULTI-SECTOR STORM WATER POLLUTION PREVENTION PLAN FOR TECHNICAL AREA 3 BUILDING 22 POWER PLANT (TA-3, SM-22)

October 18, 1999

MULTI-SECTOR
STORM WATER POLLUTION PREVENTION PLAN
FOR TECHNICAL AREA 3 BUILDING 22
POWER PLANT (TA-3, SM-22)

October 18, 1999

Prepared by: _____ Date 10-26-99
Tim Zimmerly, HENV

Reviewed by: _____ Date 10-26-99
Suzanne Moore, HENV

Table 3.1 Summary of Exposed Materials and Potential Sources

Significant Activities and Materials Exposed (see site map, Appendix B)	Capacity (gallons)	Containment Information
Environmental Tank (Drainage Area E)	10,000	Material: Holds Process water from plant, possible acid/caustic pH conditions, electronic pH metering equipment provided. Containment: Primary containment is fiberglass tank, designed for low pH materials (acid). Primary containment is concrete structure >10,000 gallons. No discharge valve for containment.
Chemical Storage Tanks (Drainage Area F)	2 @ 4500	Material: Previously stored Fungicide and Algaecide for cooling tower maintenance. Comments: Tanks are not in use and there are no plans to use them. Containment: Steel tanks: BETZ 562C tank and BETZ 2020 tank. Secondary containment for each tank is concrete curb. Containment discharges through locked valves.
Oil Bearing Transformers and Switch gear Area Transformers TA-3-230 (Drainage Area A) Transformers TA-3-233 (Drainage Area B) Capacitor Bank TA-3-1188 (Drainage Area B)	Minimal	Material: Non-PCB oil. Containment: Curb around TA-3-230 and 233, gravel and level grades.
Loading /Unloading Area (Dechlorination Building #24) (Drainage Area F)	NA	Material: Sodium Bisulfite, Garratt-Callahan Formula #159 in 55 gallon drums. Formula #2010 transferred by hoses Containment: Secondary containment is provided in building for chemical containers. Spill prevention controls used during transfer operations.

Spill prevention practices at TA-3 SM-22 include good housekeeping, the use of secondary containment for chemicals and fuels, proper handling and storage of material in drums and other containers, drip pans under dispensing valves and connections, the placement and use of spill kits at selected locations, and others. Spill kits are available in TA-3 SM-22, and additional absorbent material is available at the outside drum storage area and the loading zones. Spill prevention techniques used during loading and unloading operations were described in Section 4.3 above. If any additional plans or requirements are forthcoming which will affect response to spills of materials at the Power Plant, this plan will be modified to reflect the new plans or requirements.

In general, the approach to spill clean-up is to first contain the spill by securing the spill source and deploying spill containment materials. In many cases, the secondary containment structures will contain the spill. Small spills are responded to by the operator involved in the spill or in the vicinity. For incidental releases, absorbents are used to pick-up free liquids and the contaminated absorbents are properly disposed. Standard procedures for spill containment and clean up include the use of spill control kits, sorbent pillows, socks, sheets, and granules. Clean-up residues are managed as hazardous waste, as appropriate, and as determined by the facility waste coordinator and spill coordinator. Larger spills require that a spill coordinator be contacted to respond to the spill, securing the spill area and contacting the Laboratory's EM&R Team.

4.5 Inspections

Visual inspections implemented at this facility include the monthly and annual inspection by the Pollution Prevention Team and the daily walk-arounds conducted by the operations and maintenance staff as part of the routine operations. The walk-arounds by the Power Plant operations personnel include noting spill issues, potential storm water pollution sources, and looking for evidence of erosion or clogged stormwater conveyances. In addition, operations personnel note the conditions and level of water contained in containment basins and earthen berms. Potential problems that are noted are brought to the attention of the spill coordinator or the Plant Engineer for further action.

The annual evaluation includes a visual inspection of storm water dikes, catchment basins, and conveyances, as well as the material storage areas and loading dock areas. See Section 5.0 for additional information.

Monthly inspections are conducted in the following areas: loading/unloading areas, switchyards, fueling areas, maintenance areas, liquid storage tanks, and long term and short term material storage areas.

4.6 Employee Training, Record Keeping and Internal Reporting

Employees who handle hazardous materials are required to have training on the hazards of the materials with which they are working. Additionally, material safety data sheets (MSDSs) are available for the chemicals in use at the facility. Employees who handle waste chemicals also must have training in the Laboratory's procedures for waste generation and disposal. In addition,

APPENDIX A

POLLUTION PREVENTION TEAM WORKSHEET

TA-3 SM-22 Power Plant Storm Water Pollution Prevention Team Roster

SWPP Team Leader	Gary Blauert, Manager, Electric and Steam Systems
Inspectors	Paul Parker, PE, Plant Engineer Supervisor Bobby Montano, Cogeneration Supervisor Joe Ortiz, Spill Coordinator Mike Alexander, ESH-18 Water Quality Program Tim Zimmerly, HENV

Attachment C

03-046

WASTEWATER STREAM CHARACTERIZATION FOR CATEGORIES 01A (TA 3-22, 3-24, 3-25 & 3-58) AND 02A (TA 16-540 & TA 21-357) PLUS BUILDINGS TA 3-23, 3-26, 3-27, 3-55, 3-57, 3-144, 3-230, 3-231, 3-232, 3-233, 3-251, 3-336, 3-1188, 3-1535, 3-1651, 3-1790, 3-2042, 16-457 & 16-542

at
Los Alamos National Laboratory

ENVIRONMENTAL STUDY

CHARACTERIZATION REPORT # 1

ENVIRONMENTAL MANAGEMENT DIVISION
Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Los Alamos National Laboratory is operated by the University of California for the United States Department of Energy

3.0 RECOMMENDATIONS FOR TA-3 POWER PLANT

Tables 1, 2, 3, 4, 5, 6 and 7 are lists of the drains to the outfalls for the buildings in the TA-3 Power Plant Area and Figures 2, 3, 4, 5, 6, 7, 8 and 9 are schematics of the piping. The table lists the drains that connect to each outfall pipe and includes recommendations for changes to the drain piping. The discussion below gives the reasoning for the recommendations.

3.1 Outfall 3-22-OPN-1

This outfall receives flow from a boiler feed water filter system. The water flows to the sanitary sewer system that is connected to the TA-3 sanitary treatment plant that discharges as 01S. The flow from this outfall will be high in Total Suspended Solids (TSS) from the diatomaceous earth used in the filters. This outfall should be repiped to the environmental tank so that it will be discharged through the 01A001 outfall to eliminate the solids loading to the TA-3 sanitary treatment plant. This outfall will be part of the 01A001 outfall. A revised EPA Form 2C was prepared for outfall 01A001.

3.2 Outfall 3-22-OPN-2

This outfall receives blow down from the boilers and is pumped to the environmental tank. No changes are recommended for this outfall. This outfall is included in the EPA Form 2C for 01A001.

3.3 Outfall 3-22-OPN-3

This outfall receives flow from floor drains in the basement, on the first floor, on the mezzanine, on the heater floor and on the platform and discharges to the arroyo. Any oil that might be spilled will be caught in the pump suction sump. This sump should be regularly checked for oil. Better lighting would be helpful to find any oil floating in the sump. Secondary

containment is needed around the batteries near floor drain MFD1 to eliminate the possibility of low pH water being discharged. This outfall is permitted as 04A151. The types of water received are steam condensate and floor washings. The flow of steam condensate is the major flow. During the site visit, steam condensate was the only flow. Repiping of this outfall to the environmental tank is recommended as the flow is primarily condensate, not cooling water as indicated by the category 04A. All needed repiping could be done inside the building. A revised EPA Form 2C was prepared for outfall 04A151

3.4 Outfall 3-22-OPN-4

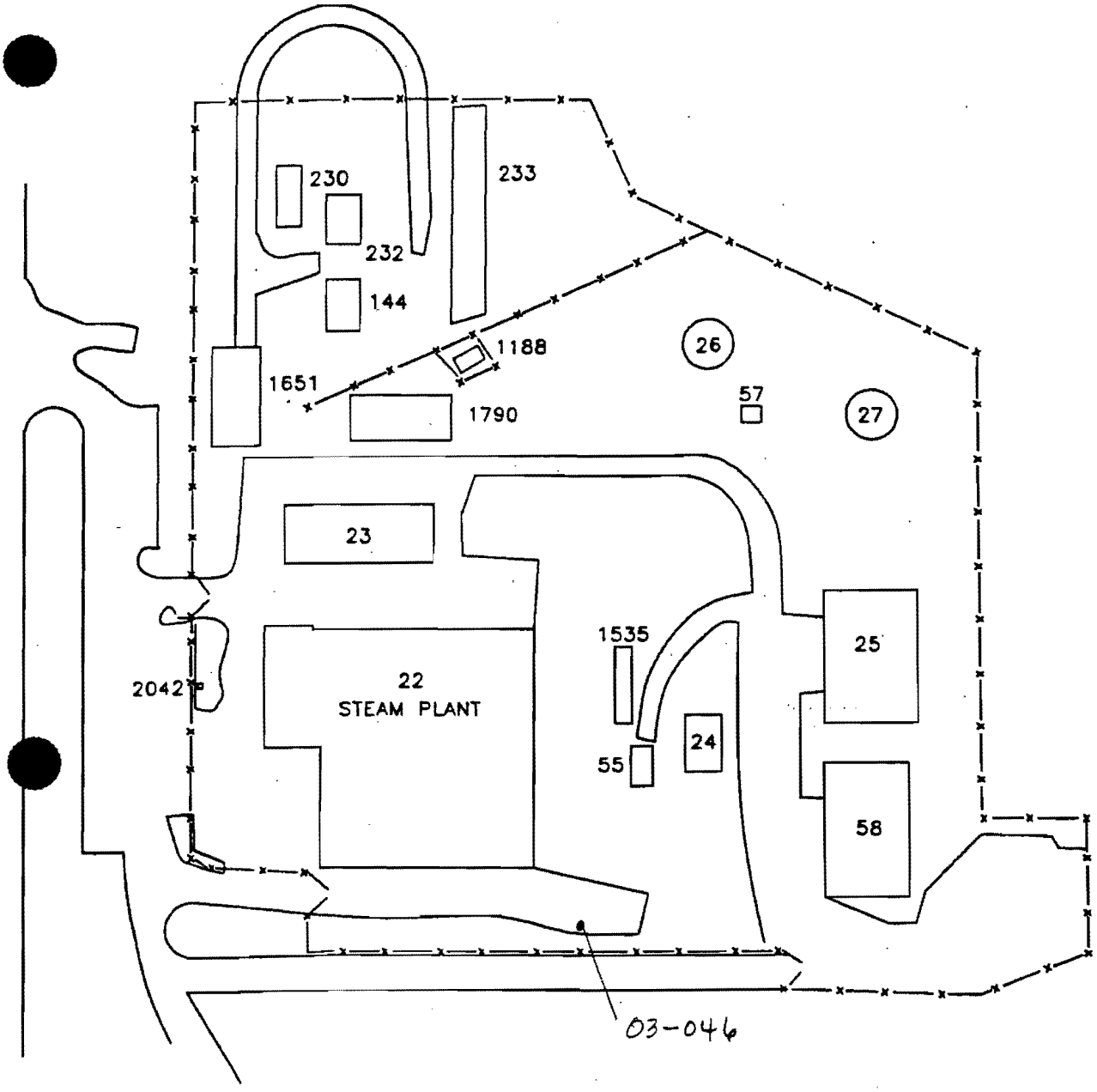
This outfall receives water from the chemical treating area and flows to the environmental tank. No changes are recommended. This outfall is included in the EPA Form 2C prepared for outfall 01A001.

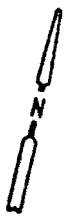
3.5 Outfall 3-22-OPN-5

This outfall can receive water from the environmental tank, two cooling towers and the chlorine building and flows to the arroyo. This outfall is permitted as 01A001. An EPA Form 2C is attached for this outfall.

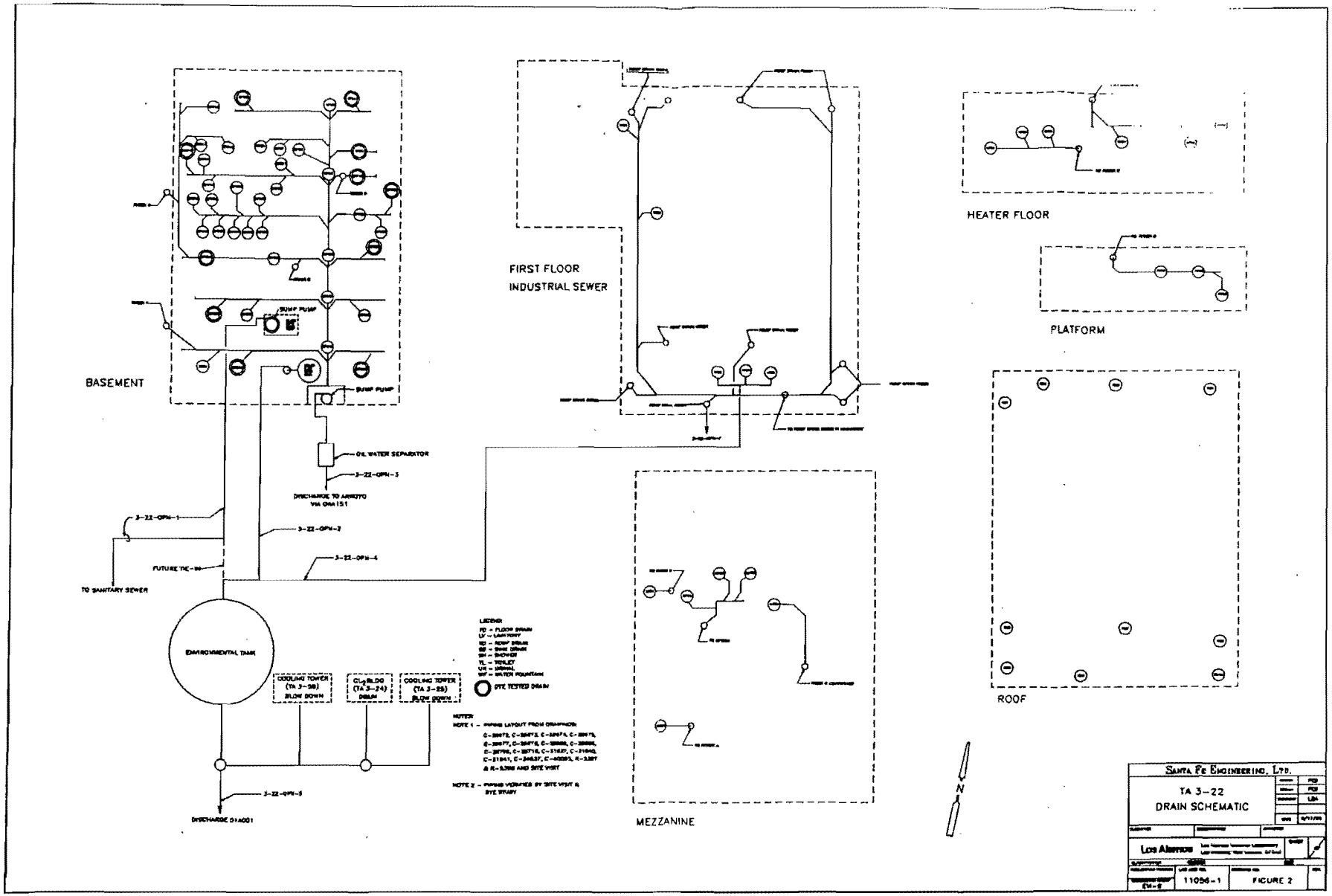
3.6 Outfall 3-22-OPN-6

This outfall receives flow from the sanitary facilities in the building. All flows are appropriate for the sanitary sewer system. The flow goes to the TA-3 treatment plant which discharges as 01S. It is recommended that the sink in the Test Lab be labeled "NO CHEMICAL DISPOSAL". No permitting is recommended. No EPA forms were prepared.





SANTA FE ENGINEERING, LTD.		
TA-3 POWER PLANT BUILDING COMPLEX	DRAWN	MSC
	DESIGN	MSC
	CHECKED	PEB
	DATE	6/17/92
SUBMITTED	RECOMMENDED	APPROVED
Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545	SHEET	OF
CLASSIFICATION	REVIEWER	DATE
REQUESTING DIVISION / REQUESTING GROUP: EM-8	LAB JOB NO.: 11056-1	DRAWING NO.: FIGURE 1 — REV.


BASEMENT
FIRST FLOOR
INDUSTRIAL SEWER
HEATER FLOOR
PLATFORM
ROOF
MEZZANINE
SUMP PUMP
SUMP PUMP
OIL WATER SEPARATOR
3-22-OPN-3
DISCHARGE TO ARROYO
VIA OMA151
3-22-OPN-1
3-22-OPN-2
3-22-OPN-4
FUTURE TIE-IN
TO SANITARY SEWER
ENVIRONMENTAL TANK
COOLING TOWER
(TA 3-38)
BLOW DOWN
Cl2 BLDG
(TA 3-24)
DRAIN
COOLING TOWER
(TA 3-25)
BLOW DOWN
3-22-OPN-5
DISCHARGE 01A001
LEGEND:
FD = FLOOR DRAIN
LV = LAVATORY
RD = ROOF DRAIN
SD = SINK DRAIN
SH = SHOWER
TL = TOILET
UR = URINAL
WF = WATER FOUNTAIN
DYE TESTED DRAIN
NOTES:
NOTE 1 – PIPING LAYOUT FROM DRAWINGS
C-30972, C-30973, C-30974, C-30975,
C-30977, C-30978, C-30988, C-30989,
C-30798, C-30716, C-31107, C-31040,
C-31041, C-24637, C-40593, K-3397
& K-3398 AND SITE VISIT
NOTE 2 – PIPING VERIFIED BY SITE VISIT &
DYE STUDY
N
SANTA FE ENGINEERING, LTD.
TA 3-22
DRAIN SCHEMATIC
Los Alamos
11096-1
FIGURE 2

5.0 SWMU 08-005
FORMER CRYSTAL INCUBATOR

5.1 Summary

SWMU 08-005 was an inactive incubator used to grow crystals for photographic equipment experiments. Prior to VCA activities, a sample was collected from the residue that remained in the interior of the incubator. The VCA for this SWMU included removal of the incubator and confirmatory soil sampling beneath the incubator by the ER Project. Confirmatory sampling verified that no release of contaminants occurred from the interior of the incubator to the surrounding soil. The VCA completion report describing the removal of, and the confirmatory sampling conducted for this SWMU, was submitted to NMED on April 19, 1996. SWMU 08-005 is being proposed for NFA under Criterion 3 (no release).

5.2 Description and Operational History

5.2.1 Site Description

SWMU 08-005 was an inactive 4- by 4- by 4-ft metal incubator (LANL 1993, 69675) (Attachment A) located approximately 40 ft northwest of Building TA-8-2, a machine shop and storage building (Figure 5.2-1). The lid of the incubator contained two windows. The interior of the incubator had a gasket and strap consisting of a nonfriable asbestos-containing material. The exterior was rusted from several years of exposure to the elements.

5.2.2 Operational History

TA-8 is an inactive technical area formerly used for nondestructive explosives and weapons testing and administration. Structures formerly located in this technical area included a laboratory and office building containing a large photographic facility. Many structures at TA-8 have been decontaminated and decommissioned.

The SWMU 08-005 incubator was used in the 1950s by the Laboratory Field Test Division's J-16 group to grow crystals for photographic experiments (LANL 1993, 20949, p. 5-28; LANL 1996, 54328). The crystal-growth experiments were conducted in Building TA-8-1, an underground control bunker that has been inactive for at least 20 years. At an unknown date, the incubator was removed from Building TA-8-1 and placed outdoors approximately 40 ft northwest of the building where it remained inoperative until its removal in 1994. It is possible that the incubator was removed from Building TA-8-1 and placed near Building TA-8-2 during the execution of a decontamination activity conducted in 1972 (Courtright 1972, 14934)(Attachment B).

Chemicals used in the growth experiments were terphenyl, alpha naphthyl oxazole, styrene, methyl chloroform, and thallous iodide (DOE 1987, 08663). During a visual inspection of the incubator conducted by the investigating field team prior to the VCA, a crystallized residue (naphthalene) was observed on the interior bottom of the incubator. A brown sludge-like material was found beneath the crystallized naphthalene (Attachment A); (LANL1993, 52111) (Attachment C, Part 1). The incubator was standing upright and no staining was observed on the ground surrounding the vessel (LANL 1993, 20949, p. 5-28). Prior to the VCA, a sample was taken from the brown sludge-like material within the incubator (Attachment C, Part 1). The analytical results for this sample are included in Attachment C, Part 2 (LANL 2000, 69648) and discussed in the Determination of No Release section of this request for permit modification. As part of the VCA, the incubator was removed from TA-8 on September 30, 1994, and transported to the Laboratory's salvage yard.

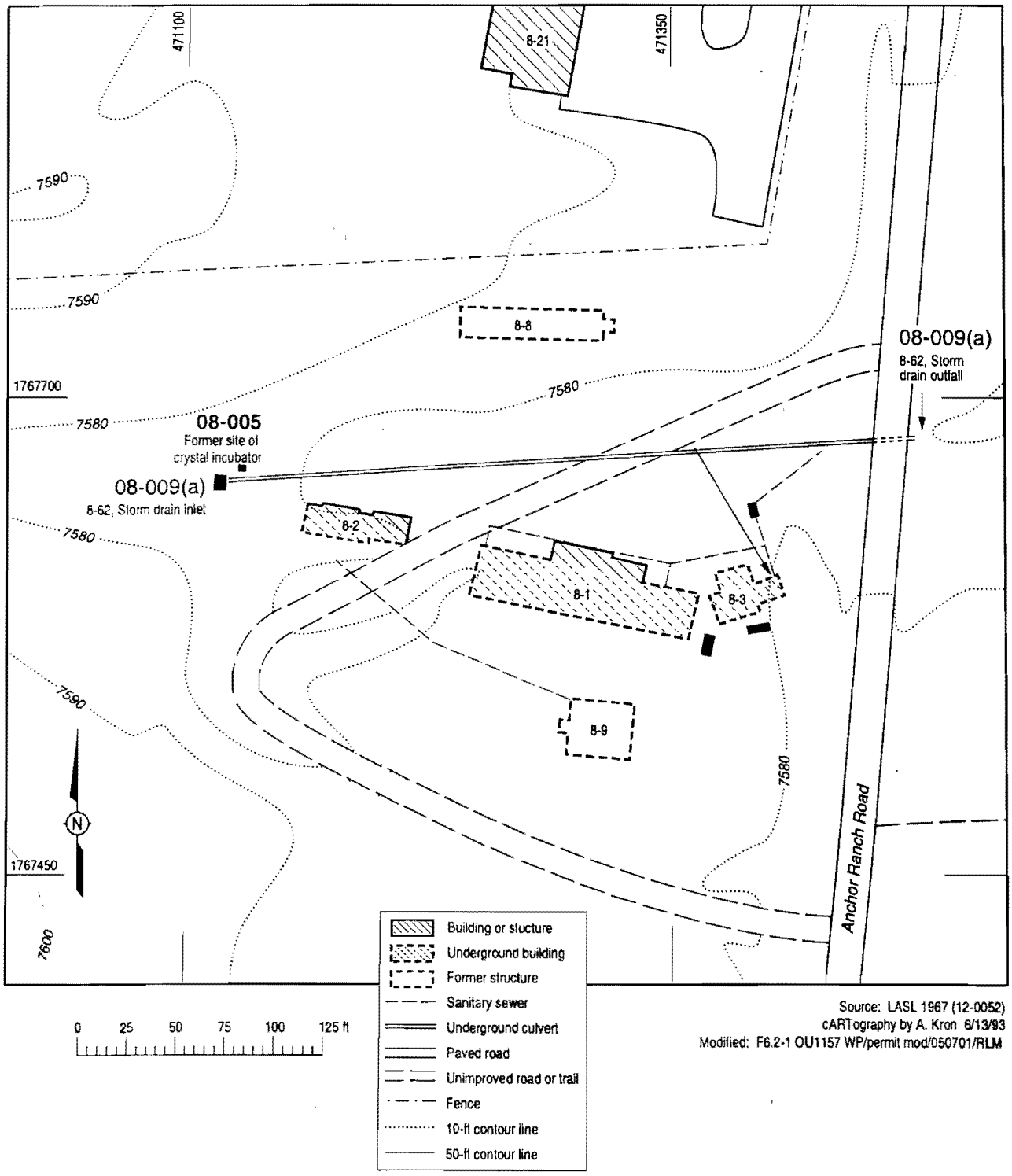


Figure 5.2-1. Locations of SWMU 08-005 and nearby SWMUs

VCA Activities

The RFI work plan for OU 1157 recommended SWMU 08-005 for a VCA and includes a sampling and analysis strategy for this SWMU (pp. 6-53 through 6-56). The VCA is described in a memorandum (Harry 1995, 49326) and a brief VCA report (LANL 1996, 54328); the memorandum and VCA report are included as Attachment D, Parts 1 and 2, respectively.

VCA activities were initiated on September 20, 1994, and completed on August 7, 1995. Field screening indicated that radiation and HE were not present on the interior or exterior of the incubator. Approximately 1 ft^3 of naphthalene residue was removed from the interior of the incubator, placed in a suitable container, and disposed of appropriately. The Johnson Controls World Services, Inc. (JCI) asbestos abatement crew removed the asbestos strap and gasket from the incubator and disposed of the asbestos appropriately. On September 30, 1994, the incubator was transported to the Laboratory's on-site salvage yard for recycling. A visual inspection of the incubator was made at the salvage yard. No holes or cracks were visible on the exterior of the incubator.

After the incubator was removed, a visual inspection of the surrounding soil was made. The soil beneath the incubator was hard, dry, and rocky, and rust stains were visible where the incubator had rested on the ground. A cord that had been beneath the incubator was inspected by the JCI asbestos abatement crew, was found to contain nonfriable asbestos insulation, and was disposed of appropriately.

In October 1994, the soil beneath the incubator was screened with radiation and organic chemical field instruments. No elevated readings were measured. On July 26, 1995, a surface soil sample was taken at the former location of the incubator. The sample was analyzed for SVOCs by method SW 846-8270, for percent solids by method 2540-G, and for RCRA metals by SW 846-6010, -6010A, -7060A, -7471, -7740, and -7841. VCA sample results are included in the VCA report (Attachment D, Part 2).

The vegetation on and surrounding the area on which the incubator had rested showed no evidence of stress. No site restoration was required because the site was undisturbed by VCA activities.

Determination of No Release

The analytical results for the sample of brown sludge taken from within the incubator prior to the VCA (Attachment C, Part 2) indicated that anthracene, methylnaphthalene[-2], and naphthalene were present in the incubator at concentrations of 9200, 220, and 75,000 mg/kg, respectively. These constituents are consistent with the chemicals used for the crystal growth experiments formerly conducted in the incubator.

In the soil beneath the incubator, zinc was detected at a concentration of 170 mg/kg (the current soil BV for zinc is 48.8 mg/kg), and bis-2-ethylhexylphthalate was detected at a concentration of 0.33 mg/kg (Attachment D, Part 2). None of the analytes detected within the incubator are present in the results from the soil beneath the incubator, thus indicating that no release of the contents from within the interior of the incubator occurred.

The presence of zinc and bis-2-ethylhexylphthalate in the soil beneath the incubator is unrelated to the contamination found within the crystal incubator. Zinc may be present due to the weathering of the exterior of the incubator. Bis-2-ethylhexylphthalate is a common contaminant often introduced (at trace levels) via sample collection and/or analytical laboratory analyses. Additionally, the bis-2-ethylhexylphthalate detected at this site does not meet the definition of a RCRA listed hazardous waste under 40 CFR 261.32 or 261.33. Both the zinc concentration and the bis-2-ethylhexylphthalate concentration are well below current Laboratory human health screening action levels (23,000 mg/kg and 35 mg/kg, respectively), derived in accordance with the ER Project's current installation work plan (LANL 2000, 66802), and ecological

screening levels found in the 2000 version of the ER Project's ECORISK database (LANL 2000, 67822, which is part of LANL ER Records Package 186).

5.3 Land Use

5.3.1 Current

SWMU 08-005 was located in the central portion of TA-8, near its southern boundary. TA-8 is an industrial area with high-security restricted access. A chain-link fence topped with barbed wire encloses this technical area. Access through the fence is obtained only by passing through a guard gate. These security measures effectively eliminate the possibility of inadvertent site intrusion.

5.3.2 Future/Proposed

The Laboratory does not anticipate any change from the industrial use with restricted access of TA-8 for the operational life of the Laboratory (LANL 1995, 57224, pp.11–12) (Appendix D, Attachment 1). Thus, this area will remain under institutional control.

5.4 No Further Action Proposal

5.4.1 Rationale

After removal from Building TA-8-1, the crystal incubator was placed outside the building where it remained inoperative until its VCA removal in 1994. A sample was collected from the brown residue within the incubator prior to the VCA for SWMU 08-005. The VCA consisted of removing the crystal incubator and collecting a soil sample from beneath it to determine whether any residual contamination (metals and/or SVOCs) was present. None of the analytes present in the contents of the incubator were present in the soil beneath the incubator. Thus, sample results verify that no release occurred from the incubator during the period it remained outside the building.

The Laboratory ER Project submitted to NMED a VCA completion report for SWMU 08-005 on April 19, 1996 (LANL 1996, 54328). The VCA completion report

- documents all cleanup activities and sampling results;
- provides information that no release from SWMU 08-005 occurred; and
- proposes that this SWMU be considered for NFA.

The presence of the zinc and bis-2-ethylhexylphthalate detected at this SWMU is not related to the contamination found within the incubator.

Thus the ER Project has demonstrated that there has been no release of RCRA solid or hazardous wastes and/or constituents to the environment from SWMU 08-005. The term "release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment.

5.4.2 Criterion

Based on the information presented in Sections 5.2 through 5.4, SWMU 08-005 is being proposed for NFA under Criterion 3.

5.5 Supporting Documentation Attached

Attachment A: Exterior and interior photographs of incubator. (LANL 1993, 69675)

Attachment B: SOP, dated July 12, 1972. (Courtright 1972, 14934)

Attachment C: Relevant excerpts from Daily Activity Log (LANL1993, 52111) and analytical results for sample AAB0761. (LANL 2000, 69648)

Attachment D: EES memorandum (Harry 1995, 49326) and VCA report. (LANL 1995, 54328)

Appendix D, Attachment 1: LANL site development plan, annual update 1995, pp. 11–12. (LANL 1995, 57224)

5.6 References Used for Text of the Request for Permit Modification for SWMU 08-005

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1157," Los Alamos National Laboratory report LA-UR-93-1230, Los Alamos, New Mexico. (LANL 1993, 20949)

Environmental Restoration Project, February 27, 1996. "Voluntary Corrective Action Plan Completion Report for Potential Release Site 8-005, Former Waste Storage Vessel," Revision 1, Los Alamos National Laboratory report LA-UR-96-468, Los Alamos, New Mexico. (Environmental Restoration Project 1996, 54328)

Harry, J., June 26, 1995. "Removal of Storage Vessel from TA-8," Los Alamos National Laboratory memorandum EES-5:95-290, Los Alamos, New Mexico. (LANL 1995, 49326)

References Cited in Text

DOE (US Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Volume 1 of 2, (draft), Comprehensive Environmental Assessment and Response Program, Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 1987, 08663)

LANL (Los Alamos National Laboratory), September 2000. "LANL ECORISK Database," Los Alamos National Laboratory CD disk, LANL ER Records Package 186, Los Alamos, New Mexico. (LANL 2000, 67822)

LANL (Los Alamos National Laboratory), March 2000. "Installation Work Plan for Environmental Restoration Project, Revision 8," Draft (pending approval of administrative authority), Los Alamos National Laboratory report LA-UR-00-1336, Los Alamos, New Mexico. (LANL 2000, 66802)

5.7 History of Regulatory Deliverables

LANL, July 15, 1993:	RFI work plan for OU 1157 submitted to EPA Region 6. (LANL 1993, 20949)
EPA, April 5, 1994:	NOD for OU 1157 RFI work plan (EPA 1994, 35231). Comment 13 applies to SWMU 08-005.
LANL, May 20, 1994:	Response to NOD for OU 1157 RFI work plan. (ER Project 1994, 38539)
EPA (via DOE-LAAO), July 21, 1994:	Draft list of modifications for OU 1157 RFI work plan. (DOE 1994, 39957)

LANL, September 20, 1994: Response to draft list of modifications for OU 1157 RFI work plan. (ER Project 1994, 41184)

EPA, October 7, 1994: Approval of OU 1157 RFI work plan and LANL response to NOD. (EPA 1994, 43549)

LANL, April 19, 1996: VCA completion report for SWMU 08-005 submitted to NMED. (ER Project 1996, 53775)

5.7.1 References for Regulatory Deliverables

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1157," Los Alamos National Laboratory report LA-UR-93-1230, Los Alamos, New Mexico. (LANL 1993, 20949)

EPA (US Environmental Protection Agency), April 5,1994. "Notice of Deficiency, Operable Unit 1157, Los Alamos National Laboratory, NM0890010515," US Environmental Protection Agency letter to J. Vozella (Chief, Environment, Health, and Safety Branch, DOE-LAAO) from W. Honker (Chief, RCRA Permits Branch, EPA Region 6), Dallas, Texas. (EPA 1994, 35231)

LANL (Los Alamos National Laboratory), May 20, 1994. "Response to Notice of Deficiency Concerning Operable Unit 1157 Field Investigation Work Plan, Work Breakdown Structure Number 1.4.2.6.1.28.1.2," Los Alamos National Laboratory letter EM/ER:94-J219 to J. Vozella (Chief, Environment, Safety, and Health Branch, DOE-LAAO) from D. McInroy (LANL ER Program Acting Program Manager), Los Alamos, New Mexico. (LANL 1994, 38539)

DOE (US Department of Energy), July 21, 1994. "EPA Comments on Work Plans," US Department of Energy letter LESH:TJT:WORKPLAN:1.4.2.6.1 to H. Jansen (LANL ER Program Manager) from T. Taylor (DOE-LAAO ER Program Manager), Los Alamos, New Mexico. (DOE 1994, 39957)

LANL (Los Alamos National Laboratory), September 20, 1994. "Response to the Envrionmental Protection Agency's (EPA's) Draft List of Modifications on the Notice of Deficiency (NOD) Response for Operable Unit (OU) 1157," Los Alamos National Laboratory letter ER:94-J380 to T. Taylor (DOE-LAAO Program Manager) from J. Jansen (LANL ER Project Manager), Los Alamos, New Mexico. (LANL 1994, 41184)

EPA (US Environmental Protection Agency), October 7,1994. EPA review and approval of RFI work plan for Operable Unit 1157, US Environmental Protection Agency letter to J. Vozella (Chief, Environment, Safety, and Health Branch, DOE-LAAO) from A. Davis (Director, Hazardous Waste Management Division, EPA Region 6), Dallas, Texas. (EPA 1994, 43549)

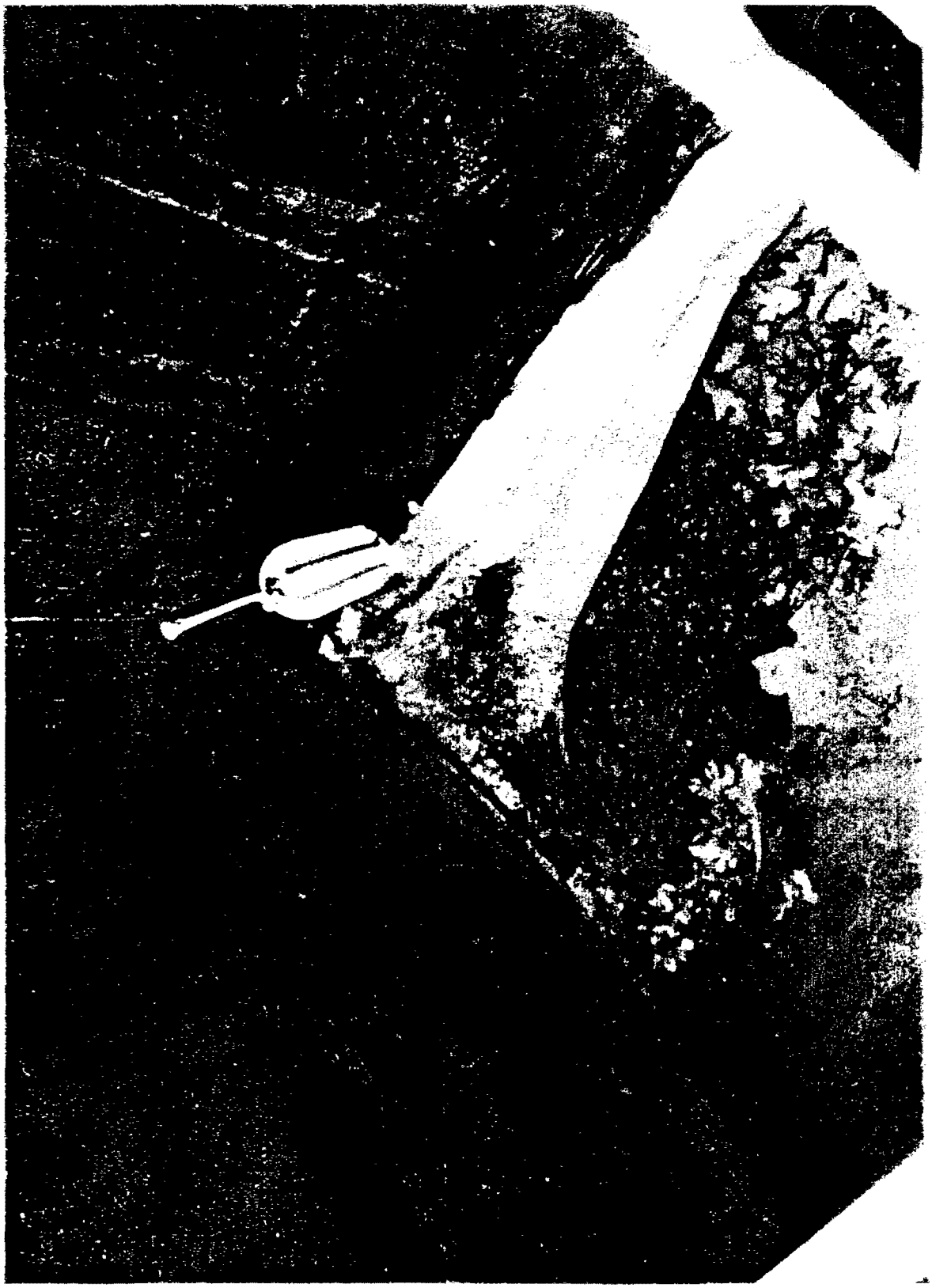
Environmental Restoration Project, April 19, 1996. "Final Accelerated Cleanup Reports," Los Alamos National Laboratory letter EM/ER:96-220 to B. Garcia (NMED-HRMB) from J. Jansen (LANL ER Program Manager) and T. Taylor (DOE-LAAO Program Manager), Los Alamos, New Mexico. (Environmental Restoration Project 1996, 53775)

08-005

ATTACHMENTS

NOTE: Several attachments and references for SWMU 08-005 refer to the SWMU as a former waste storage vessel. The SWMU is actually an inactive crystal incubator.

Photograph 1. Exterior view of crystal incubator (SWMU 08-005)



Photograph 2. Interior view of crystal incubator (SWMU 08-005) showing residue sampled

Attachment B

Los Alamos Environmental Restoration Records Processing Facility

08-005

ER Record I.D.# 0014934

LOS ALAMOS

LOS ALAMOS NATIONAL LABORATORY

ENVIRONMENTAL RESTORATION
Records Processing Facility
ER Record Index Form
Page 1 of 2

DATE RECEIVED: 05/13/93 PROCESSOR: YCG

Part I: Complete all fields; indicate if not applicable or appropriate; please write legibly.

DOCUMENT TO: Roy Owen DOCUMENT DATE: 07/12/72

ORIGINATOR NAME: W. C. Courtright ORGANIZATION: —

SYMBOL: HS PAGE COUNT: 3

SUBJECT/TITLE: SOP for Work at TA-8, Buildings 1, 2, and 3.

RECORD TYPE (Circle relevant type for primary record; type of attachments should be selected on Keywords List):

Analytical Data, Chain-of-Custody, Computer Output, Core Box, Engineering Sketch/Drawing, FAX, Figure, Form, Interview, Letter, Logbook, Map, Memo, Microform, Notebook, Personal Notes, Photo, Plan, Procedure, Purchase Request, Receipt Acknowledgment, Report, Review, Study, Telephone Record, Transcription, Video, Work Plan, Other

RECORD CATEGORY: P (P for Programmatic or R for Reference)

RECORD PACKAGE #: —

RECORD FILMED (Y/N): Y

RECORD LOCATION: — (Indicate location of record if not filmed.)

Part II: Complete all fields; indicate if not applicable or appropriate; please write legibly. Use *ER Record Index Form, Attachment Sheet* if needed.

ATTACHMENTS FILMED (Y/N): Y (Were attachments to this record filmed?)

LOCATION: — (Indicate location of attachments.)

TECH AREA(S)	ADS NO(S)	WBS NO(S)	STRUCTURE NO(S)/MDA
LIST RELEVANT TECH AREA(S).	LIST RELEVANT ADS NO(S).	LIST RELEVANT WBS NO(S).	LIST RELEVANT STRUCTURE NO(S)/MDA.
8	1157	1.4.2.6.1.28	8-1 8-2 8-3 8-73

OFFICE MEMORANDUM

TO : Roy Owen

12-0012

DATE: July

FROM : W. C. Courtright

SUBJECT: SOP FOR WORK AT TA-8, BUILDINGS 1, 2, AND 3

SYMBOL: H-3

References : (1) Memorandum to R. J. Van Gemert from W. C. Courtright, dated May 17, 1972, subject "Use of Buildings 1, 2, 3, and 73, TA-8";
(2) Memorandum to C. A. Reynolds from G. W. Heinze, dated June 8, 1972, subject "Cleaning of Buildings AW-1 and AW-2 at TA-8"

To comply with the reference memoranda, the following procedures should be followed:

1. Scrub down with water the ceiling, walls, and floors of the insides of Buildings 1, 2, and 3 including equipment rooms.

2. Fill the small floor drain in the chemistry lab of Building 1 with silicone elastomer.

3. Fill the floor drain and seal the plate around the floor opening in each bay of Building 3 with silicone elastomer.

4. Place a permanent sign on the wall near both of the above locations with the following words:

   Caution: No heat or impact--Possible Explosive Contaminated Under-Floor Drains .

5. Place two signs with same wording on the outside wall just above the dock level near the two outside sumps of Building 3.

6. Place a sign with same wording on the wall near the drain that enters the floor in east bay of Building 2.

7. Because of the presence of thallous iodide, it is necessary to remove the duct work and exhaust fan that served the hoods in the west end of Building 1. No heat is to be used in removing these items. The open ends of the ducts and fans should be closed with plastic and tape as soon as possible to avoid spilling any of the contents. Personnel working on these should wear half masks until they are removed and sealed and should wear gloves for all handling.

LA7200077A

3. Dispose of the duct work and fans by taking to Building TA-[illegible] to be steamed and washed. The duct work and fans should then be sent to the County landfill.

W. C. Courtright

W. C. Courtright

WCC/ps

cc: H. F. Schulte
R. J. Van Gemert
J. Aragon
R. W. Drake
E. W. Fullman
File

3. [illegible]

Attachment C

08-005

(3)

Los Alamos National Laboratory Environmental Restoration
DAILY ACTIVITY LOG

Date: 19-APR-93-1230 Sheet 1. of 3

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Ste Marie Y. Olsen, D.A.O.S.

AD, FTL

Comments:

We arrived at Station 502 with Albert Uya, Don Conrad, Janet Harris, Kellie Yontsy Consuelo Montoya & Ste Marie Y. Olsen at 8:05. We then signed in at DX we went to the EM-8 ~~recontact~~ sample trailer & began setting up our equipment. Our first sample location is OP-3003 Acetic test Contents. Don Vandevel & Claire Trujillo served as the Health & Safety Officers. Conductivity Meter YSI Model 33, Serial #92203718. Dress: Rubber. Albert gave tailgate brief at 8:33. Don continued tailgate safety meetings. Claire did Rad Screening & Don screen for organics & combustables & H2S with an Ex-Tox, H2: Hydrogen Sulfide Tramer, Betty Harris arrived at 8:47. No Visible Crystals in Acetic Tank NO H.E. Positive Hits on either liquid or sludge using HE Vast Kit. In First Photo of Acetic Tank Sludge Ron's finger points to top of Sludge. 3 ft 2 in from top of tank to top of water. 7 ft. from top of tank to Bottom of Tank. We completed (Trip Blanks & Field Blanks) at this location. At 9:40 we went to OP-3000 the storage vessel. Don & Albert Cut the lid off with a S.S. Hammer. There is a large

☐ CHECK HERE IF CONTINUED ON BACK OF THIS SHEET.

Los Alamos National Laboratory Environmental Restoration
DAILY ACTIVITY LOG

Date: 19-APR-94 Sheet 2 of 9

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Stephanie L Cowan, D.A.O.S.
RD, FTL

Comments:

substance on bottom (strong naphthalene smell) in tank. The storage vessel was lined w/a fibrous material, possibly asbestos. We will not analyze for gross α,β on this sample. Dimensions 40" x 40" x 40" (We sent wrong version) (10:20) the intent to OF-3010 & OF-3011. By the way, Ron dropped a polyethylene glove in the septic tank. Then the helicopter Betty uncovered a ~~tar~~ metal. Could that Claire had observed & came up w/nothing unusual. We also observed the sample points. Albert did an HF test kit on a chunk that Betty brought him. It was negative. We next went to the firing site at 11:00. (RFS-9-001a30) Claire's FSP-1 property #0424. Manny Lopez from ENG-5 came at 11:25 and went to sediment outfalls. Ron left site at 11:30. Photos: started at frame 1 on a 36 exp. roll. Roll #2 is 24 exp. By the way Lekesha Minor came to help Betty Harris at 9:30 and they both left at 11:00. At the septic tank sediment outfall a metal rod was identified and LOS personnel observed believing it may have served as a missing rod. Manny Lopez, ENG-5, does not believe it's industrial type. Claire screened us all out at 11:45. We cleaned up & returned some materials.

☐ CHECK HERE IF CONTINUED ON BACK OF THIS SHEET.

Los Alamos National Laboratory Environmental Restoration
DAILY ACTIVITY LOG

Date: 19-APR-94 Sheet 3 of 3

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Ltt Dianne Y. Allen, D.A.O.S

Comments:

to the ESH-8 Vampole (trailer) We signed out at DX-16 at 11:55 Ltt Dianne used the facilities of Consuelo and Ben escort. We returned to DH-1 at 12:15 and put out the samples to dry. We cleaned up most of our equipment. We will analyze for Alpha, Beta & submit samples after lunch.

Additional comments by A. Dye

The "waxy" material in the bottom of the storage vessel was "L" shaped apparently because it conformed to the southeast corner of the box. The material was actually crystalline in texture rather than waxy. The material remained intact as it was moved away from the southeast corner. Underneath the material was a brown sludge. The sample collected was from the brown sludge material. However a piece of the white "naphthalene" crystalline material was collected and given to Betty Harris of DX-16.

Albert Dye FTL

☐ CHECK HERE IF CONTINUED ON BACK OF THIS SHEET.

Los Alamos National Laboratory Environmental Restoration
SAMPLE COLLECTION LOG

Date: 19-APR-94 Time (24 hour clock) 9:45 Sheet 14 of 22

Technical Area 08 Operable Unit 1157

Site Work Plan LA-UR-93-230

Signature Stephanie V. Warn, QA QS

AAB0781

Control No. 01890 Sample Type Sludge

Sample Location PRS 8-005 Storage Vessel Contents Site ID No 08-3000

Composite _____ Yes X No

Composite Type N/A

Depth of Sample N/A

Weather Sunny & Warm

Containers Used	Amount Collected
1-125ml Glass	125ml
1-125ml Poly	110ml

COMMENTS

Beta/Gamma: CPM

Waxy material on bottom of the vessel Underlid Sludge. Beneath Waxy Matl.

NO HE REACTIONS USING HE SPOT Kit on Crystals

Crystals present on south side of tank. (Strong Nevertheless)

Sludge

No Gross Alpha, Beta Analysis will be done DHO.

HE SPOT KIT ON SLUDGE INSIDE Carrier No Color w/ Reagent 1, 2, 3, 4

Porous Insulation

LEGEND

1. A sample collection log is to be completed for samples in each sampling interval and read'x stickers to forms when the sample label is prepared.
2. Date: Use DD-MMM-YY; e.g., 01-JAN-91.
3. Time: Use 24-hour clock; i.e., 1835 for 6:35 PM.
4. All entries on the log form to be completed. If not applicable, mark N/A.
5. Page: Each sample form should number sheet ___ of ___ for the day's activities for all sheets prepared on a single day, i.e., if there is a total of 24 pages, number 1 of 24, 2 of 24, etc.
6. Control No.: obtain from chain of custody/request for analysis form.
7. Sample Location: Use boring or monitor well number, grid location (transect), sample station I.D., or coordinate to physical features with distances. Include sketch in comment section, if necessary.
8. Sample Type: Use the following - soil; water (surface or ground); air (filter, tubes, ambient, personnel); sludge, drum contents; oil; vegetation; wipe; sample.
9. Site ID No. FIMAD supplied unique site designation.
10. Composite Type: i.e., 24-hour, list sample numbers in composite, spatial composite.
11. Depth of Sample: Give units, write out units such as feet.
12. Weather: Approximate temperature, sun, and moisture conditions.
13. Containers Used: List each container type as number, volume, material type (e.g., 2 - 1L glass, 4 - 40 ml glass vial, 1 - 400 ml plastic, 1 - 3 inch steel tube, 1 - 8 oz. glass jar).
14. Amount Collected: Volume of container.

Analytical Results for Sample AAB0761, Location ID 08-03000

ANALYTE	RESULT (mg/kg)	QUALIFIER
Acenaphthene	88	U *
Acenaphthylene	88	U
Aniline	88	U
Anthracene	9200	
Azobenzene	88	U
Benzidine	440	U
Benzo(a)anthracene	88	U
Benzo(a)pyrene	88	U
Benzo(b)fluoranthene	88	U
Benzo(g,h,i)perylene	88	U
Benzo(k)fluoranthene	88	U
Benzoic Acid	440	U
Benzyl Alcohol	88	U
Bis(2-chloroethoxy)methane	88	U
Bis(2-chloroethyl)ether	88	U
Bis(2-ethylhexyl)phthalate	88	U
Bromophenyl-phenylether[4-]	88	U
Butylbenzylphthalate	88	U
Chloro-3-methylphenol[4-]	88	U
Chloroaniline[4-]	88	U
Chloronaphthalene[2-]	88	U
Chlorophenol[2-]	88	U
Chlorophenyl-phenyl[4-] Ether	88	U
Chrysene	88	U
Di-n-butylphthalate	88	U
Di-n-octylphthalate	88	U
Dibenz(a,h)anthracene	88	U
Dibenzofuran	88	U
Dichlorobenzene[1,2-]	88	U
Dichlorobenzene[1,3-]	88	U
Dichlorobenzene[1,4-]	88	U
Dichlorobenzidine[3,3'-]	220	U
Dichlorophenol[2,4-]	88	U
Diethylphthalate	88	U
Dimethyl Phthalate	88	U
Dimethylphenol[2,4-]	88	U
Dinitro-2-methylphenol[4,6-]	440	U
Dinitrophenol[2,4-]	440	U
Dinitrotoluene[2,4-]	88	U
Dinitrotoluene[2,6-]	88	U
Fluoranthene	88	U
Fluorene	88	U
Hexachlorobenzene	88	U
Hexachlorobutadiene	88	U
Hexachlorocyclopentadiene	88	U
Hexachloroethane	88	U
Indeno(1,2,3-cd)pyrene	88	U
Isophorone	88	U

* U = undetected

Analytical Results for Sample AAB0761, Location ID 08-03000

ANALYTE	RESULT (mg/kg)	QUALIFIER
Methylnaphthalene[2-]	220	
Methylphenol[2-]	88	U
Methylphenol[4-]	88	U
Naphthalene	75000	
Nitroaniline[2-]	440	U
Nitroaniline[3-]	440	U
Nitroaniline[4-]	440	U
Nitrobenzene	88	U
Nitrophenol[2-]	88	U
Nitrophenol[4-]	440	U
Nitroso-di-n-propylamine[N-]	88	U
Nitrosodimethylamine[N-]	88	U
Nitrosodiphenylamine[N-]	88	U
Oxybis(1-chloropropane)[2,2'-]	88	U
Pentachlorophenol	440	U
Phenanthrene	88	U
Phenol	88	U
Pyrene	88	U
Trichlorobenzene[1,2,4-]	88	U
Trichlorophenol[2,4,5-]	440	U
Trichlorophenol[2,4,6-]	88	U

Attachment D -/

08-005

Los Alamos
NATIONAL LABORATORY
memorandum

Earth and Environmental Sciences
Geoanalysis Group

EES-5
Los Alamos, New Mexico 87545

To/MS: Albert Dye, ESH-19, MS K490
From/MS: Janet Harry, EES-5, MS M992
Phone/FAX: 7-1637/5-4747
Symbol: EES-5:95-290
Date: June 26, 1995

SUBJECT: REMOVAL OF STORAGE VESSEL FROM TA-8

In the Fall of 1994, an old 4 ft. by 4 ft. metal vessel located west of TA-8-2 was removed in support of the Environmental Restoration Project. This vessel is listed as potential release site (PRS) 8-005 and was being investigated as part of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). The vessel was an abandoned oven used for crystal growth experiments in the 1950s. Sample analysis from inside the vessel indicated the presence of naphthalene. Due to preliminary field investigations, it was determined that this vessel could be removed safely and possibly salvaged once hazardous constituents were removed. George Clines from JCI Asbestos Abatement confirmed the presence of asbestos in the form of a gasket and strap on the vessel. Field screening indicated that radiation and high explosives were not present in or on the vessel. Landlords of the technical area had no objections to the removal.

Joe Richardson from JCI JENV assisted in the removal of the vessel. Three tasks were involved. First, on September 20, 1994, approximately one cubic foot of solid naphthalene was removed from the vessel, placed in a suitable container, and disposed of by CST-7. Next, the JCI Asbestos Abatement crew removed an asbestos strap and gasket from the vessel and disposed of it in accordance with CST-7. Finally, on September 30, 1994, after all hazardous materials (naphthalene and asbestos) were removed, JCI's rigging crew transported the vessel to salvage.

Betty Harris and I inspected the ground where the vessel had been to look for evidence of a release. There were slight rust stains where the corners of the vessel had been at the south side. This would be expected because of the many years the vessel sat at this location unprotected from the elements. The soil where the vessel sat was hard, dry and rocky. Vegetation surrounding the site did not show evidence of ecological stress. A cord that had been under the vessel was inspected by JCI Asbestos Abatement and removed because it contained asbestos. At the salvage yard, Betty Harris and I had the vessel lifted so that we could look for cracks or holes on the underside of the vessel. None were found. In October 1994, the OU 1157 Field Team also inspected the site and took soil samples at the former location of the vessel.

I have paper work associated with this removal. If you need copies or additional information please let me know.

Cy:

G. Clines, JCI CPMB, MS A199
T. Glatzmaier, DDEES, MS M992
B. Harris, DX-16, MS M992
J. Richardson, JCI JENV, MS A199
C. Rofer, EES-1, MS D462
M. Shepherd, JCI SPRM, MS A199
RPF, MS M707

EES-5 File, MS F665

JUL 1995

Attachment D-2

08-005

Voluntary Corrective Action Completion Report for

Potential Release Site
8-005
Former Waste Storage Vessel

Field Unit 5

Environmental
Restoration
Project

February 1996
Revision 1

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-468

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1.0 DESCRIPTION

ential Release Site 8-005, a 4 ft. by 4 ft. metal vessel, was an abandoned oven used in the 1950s for crystal growth experiments. The inside of the vessel was contaminated with naphthalene and asbestos. This site is included in the Hazardous and Solid Waste Amendments module to the Los Alamos National Laboratory, Resource Conservation and Recovery Act, EPA I.D. NM0890010515.

This square-shaped storage vessel was located on the ground outside the west end of Building TA-8-2, a machine shop and storage building (see Figures 1 and 2). Group J-16 used the vessel to conduct crystal-growth experiments in the now-abandoned bunker buildings. Crystal growth residue from photographic equipment crystal experiments at Building TA-8-1 (next to TA-8-2) was contained in this storage vessel. Other chemicals used were terphenyl, alpha naphthyl oxazole, styrene, methyl chloroform, and thallous iodide. Residue with a strong camphor-like odor was found at the bottom of the vessel, and sample analysis indicated the presence of naphthalene. There were no visible signs of stained ground around the vessel.

The Johnson Controls Asbestos Abatement team confirmed the presence of asbestos in the form of a gasket and strap on the vessel (LANL 1995, EES-5:95-290). There was also a cord under the essel which was found to contain asbestos. Field screening indicated that dioactive contaminants and high explosives were not present in or on the vessel.

The landlords of the technical area had no objections to removing this vessel, and it was recommended that this work be done as a voluntary corrective action (LANL 1995, EES-5:95-290; LANL 1993, 1092).

2.0 CORRECTIVE ACTION

The cleanup was completed as a voluntary corrective action as referenced in the RFI Work Plan for OU 1157. Activities began on 20 September, 1994 and ended on 7 August, 1995.

Preliminary field investigations determined that the storage vessel could be removed safely, and possibly salvaged once the hazardous constituents were removed. Four steps were involved in the remediation of this site. First, on 20 September, 1994, approximately one cubic foot of solid naphthalene was removed from the vessel, placed in an appropriate container, and disposed of by the Laboratory's Waste Services Group (LANL 1995, EES-5:95-290). The next step was to remove and dispose of an asbestos strap and gasket from the vessel. A cord that had been under the vessel was lso removed, and disposed of because it contained asbestos. Then, on 30 September, 1994, the

Laboratory contractor's rigging crew transported the vessel to the salvage yard, where it was inspected, and found to contain no cracks or holes. In October 1994, the site was inspected and a site reconnaissance was done with radiation and organic field instruments at the location of the vessel. No elevated readings were detected. Finally, on July 26, 1995 a surface soil sample was taken at the former location of the vessel.

The sampling data were reviewed, and no contaminants were found. Analytical results are presented in Tables 1 through 3. These data are available and will be provided upon request.

The sample was analyzed for semivolatile organics by method SW846-8270, percent solids by SW2540-G, and RCRA metals by SW846-6010, -6010A, -7060A, -7471, -7740, and -7841. Screening Action Levels (SALs) are conservative, risk-based levels (primarily based on RCRA Subpart S) that are used for preliminary screening of data. Appendix K of the installation work plan (LANL 1993, 1017) provides an in-depth explanation of how SALs are derived. All the analytes for the sample taken at Potential Release Site 8-005 were below SALs.

No site restoration was needed because the surrounding vegetation did not show any evidence of stress.

This report serves as the formal request for regulator concurrence to remove PRS 8-005 from the HSWA Module.

3.0 REFERENCES

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1157", Final Report, Los Alamos National Laboratory Report LA-UR-93-1230, Los Alamos, New Mexico. (LANL 1993, 1092)

LANL (Los Alamos National Laboratory), November 1993. "Installation Work Plan for Environmental Restoration", Revision 3, Los Alamos National Laboratory Report LA-UR-93-3987, Los Alamos, New Mexico. (LANL 1993, 1017)

LANL (Los Alamos National Laboratory), June 1995. "Removal of Storage Vessel from TA-8", Los Alamos National Laboratory Memorandum EES-5:95-290, Los Alamos, New Mexico. (LANL 1995, EES-5:95-290)

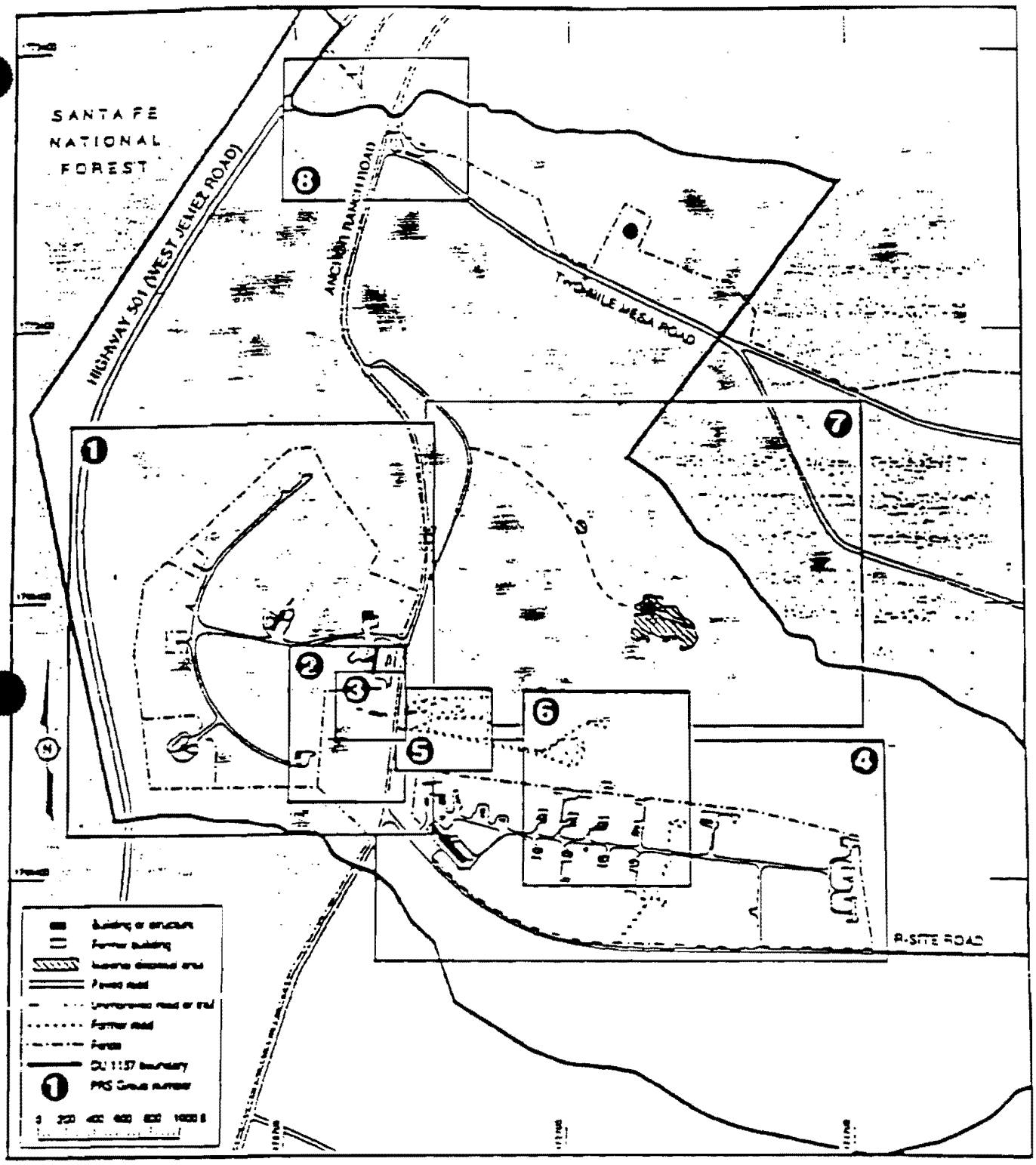

Figure 1 Location of PRS Groups.

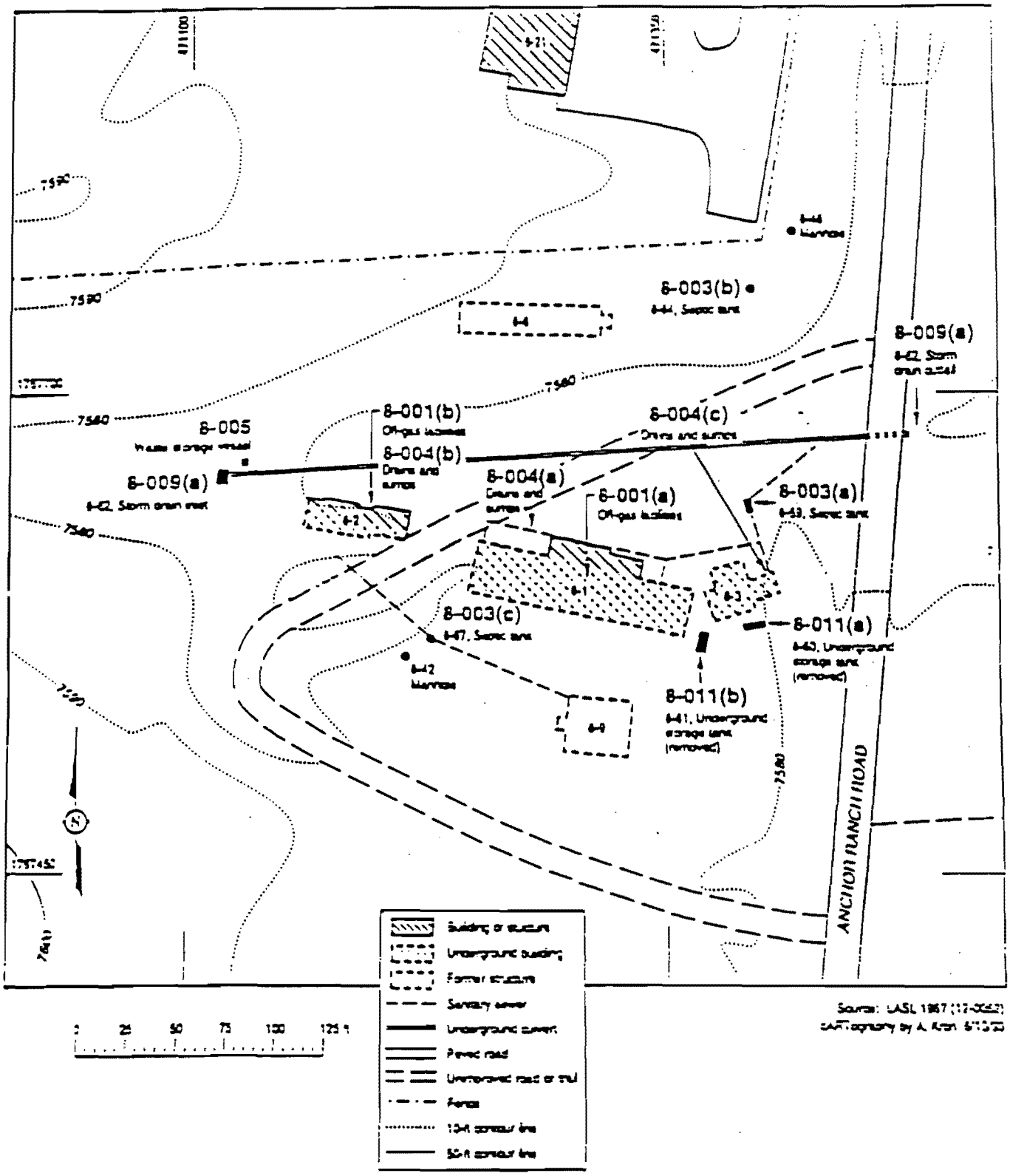

Figure 2 Location of PRSs in Group 3, abandoned bunker site.

Order # N5-07-445
August 8, 1995 16:40

KEMRON ENVIRONMENTAL SERVICES
RESULTS BY SAMPLE

This is to certify that the following samples were analyzed using good laboratory practices to show the following results.

SAMPLE ID: 01 0508-95-0008/02 Collected: 07/26/95 Category: SOIL

TEST DESCRIPTION	RESULT	DETECTION LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	94	1	% wt.	07/28/95	PJH	SW2540-G

SAMPLE ID: 02 0508-95-0008/01 Collected: 07/26/95 Category: SOIL

TEST DESCRIPTION	RESULT	DETECTION LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	94	1	% wt.	07/28/95	PJH	SW2540-G
Aluminum, Total	7800	43	mg/kg Al	07/31/95	JYH	6010A
Antimony, Total	<13	13	mg/kg Sb	07/31/95	JYH	6010A
Arsenic, Total	<2.1	2.1	mg/kg As	08/01/95	TNO	7060A
Barium, Total	180	43	mg/kg Ba	07/31/95	JYH	6010A
Beryllium, Total	<1.1	1.1	mg/kg Be	07/31/95	JYH	6010A
Cadmium, Total	<1.1	1.1	mg/kg Cd	07/31/95	JYH	6010A
Calcium, Total	1800	1100	mg/kg Ca	07/31/95	JYH	6010A
Chromium, Total	7.4	2.1	mg/kg Cr	07/31/95	JYH	6010
Cobalt, Total	<11	11	mg/kg Co	07/31/95	JYH	6010A
Copper, Total	8.5	5.3	mg/kg Cu	07/31/95	JYH	6010
Iron, Total	10000	21	mg/kg Fe	07/31/95	JYH	6010A
Lead, Total	29	5.3	mg/kg Pb	07/31/95	JYH	6010A
Magnesium, Total	1500	1100	mg/kg Mg	07/31/95	JYH	6010
Manganese, Total	310	3.2	mg/kg Mn	07/31/95	JYH	6010
Mercury, Total	<0.11	0.11	mg/kg Hg	08/02/95	KRA	7471
Nickel, Total	<8.5	8.5	mg/kg Ni	07/31/95	JYH	6010
Potassium, Total	1400	1100	mg/kg K	07/31/95	JYH	6010A
Selenium, Total	<1.1	1.1	mg/kg Se	07/31/95	TNO	7740
Silver, Total	<2.1	2.1	mg/kg Ag	07/31/95	JYH	6010A
Sodium, Total	<1100	1100	mg/kg Na	07/31/95	JYH	6010
Thallium, Total	<2.1	2.1	mg/kg Tl	07/31/95	AJS	7841
Vanadium, Total	16	11	mg/kg V	07/31/95	JYH	6010A
Zinc, Total	170	4.3	mg/kg Zn	07/31/95	JYH	6010A

Table 1: Priority Release Site 08-005 Surface Soil Sampling Data

Order # N5-07-445
August 8, 1995 16:40

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Test Code: LA8270 Lab No: 01A Collected: 07/26/95
Sample Description: 0508-95-0008/02 Category: SOIL
Test Description: Semivolatile Compounds Method: 8270

Analyst: MDC Extracted: 07/27/95 File #: LA03056
Instrument: HPMS_3 Injected: 08/01/95 Factor: 33 Units: ug/kg Verified: SDT

CAS#	COMPOUND	RESULT	DETECTION LIMIT
108-95-2	Phenol	ND	170
111-44-4	bis(2-Chloroethyl)ether	ND	170
95-57-8	2-Chlorophenol	ND	170
541-73-1	1,3-Dichlorobenzene	ND	170
106-46-7	1,4-Dichlorobenzene	ND	170
100-51-6	Benzyl alcohol	ND	350
95-50-1	1,2-Dichlorobenzene	ND	170
95-48-7	2-Methylphenol	ND	170
106-44-5	4-Methylphenol	ND	170
621-64-7	N-Nitroso-di-n-propylamine	ND	170
67-72-1	Hexachloroethane	ND	170
98-95-3	Nitrobenzene	ND	170
78-59-1	Isophorone	ND	170
88-75-5	2-Nitrophenol	ND	170
105-67-9	2,4-Dimethylphenol	ND	170
65-85-0	Benzoic acid	ND	870
111-91-1	bis(2-Chloroethoxy)methane	ND	170
120-83-2	2,4-Dichlorophenol	ND	170
120-82-1	1,2,4-Trichlorobenzene	ND	170
91-20-3	Naphthalene	ND	170
106-47-8	4-Chloroaniline	ND	350
87-68-3	Hexachlorobutadiene	ND	170
59-50-7	4-Chloro-3-methylphenol	ND	350
91-57-6	2-Methylnaphthalene	ND	170
77-47-4	Hexachlorocyclopentadiene	ND	170
88-06-2	2,4,6-Trichlorophenol	ND	170
95-95-4	2,4,5-Trichlorophenol	ND	870
91-58-7	2-Chloronaphthalene	ND	170
88-74-4	2-Nitroaniline	ND	870
131-11-3	Dimethylphthalate	ND	170
208-96-8	Acenaphthylene	ND	170
606-20-2	2,6-Dinitrotoluene	ND	170
99-09-2	3-Nitroaniline	ND	870
83-32-9	Acenaphthene	ND	170
51-28-5	2,4-Dinitrophenol	ND	870
100-02-7	4-Nitrophenol	ND	870
132-64-9	Dibenzofuran	ND	170
121-14-2	2,4-Dinitrotoluene	ND	170
84-66-2	Diethylphthalate	ND	170
7005-72-3	4-Chlorophenyl-phenyl ether	ND	170
86-73-7	Fluorene	ND	170
100-01-6	4-Nitroaniline	ND	350
534-52-1	4,6-Dinitro-2-methylphenol	ND	870
86-30-6	N-Nitrosodiphenylamine	ND	170
101-55-3	4-Bromophenyl-phenylether	ND	170
118-74-1	Hexachlorobenzene	ND	170
87-86-5	Pentachlorophenol	ND	870
85-01-8	Phenanthrene	ND	170
120-12-7	Anthracene	ND	170
84-74-2	Di-n-butylphthalate	ND	170
206-44-0	Fluoranthene	ND	170
129-00-0	Pyrene	ND	170
85-68-7	Butylbenzylphthalate	ND	170
91-94-1	3,3'-Dichlorobenzidine	ND	350
56-55-3	Benzo(a)anthracene	ND	170
218-01-9	Chrysene	ND	170
117-81-7	bis(2-Ethylhexyl)phthalate	330	170
117-84-0	Di-n-octylphthalate	ND	170
103-33-3	Azobenzene	ND	170
205-99-2	Benzo(b)fluoranthene	ND	170
207-08-9	Benzo(k)fluoranthene	ND	170

Table 2: Priority Release Site 08-005 Surface Soil Sampling Data

Order # N5-07-445
August 8, 1995 16:40

KEMRON ENVIRONMENTAL SERVICES
TEST RESULTS BY SAMPLE

Test Code: LA8270 Lab No: 01A Collected: 07/26/95
Sample Description: 0508-95-0008/02 Category: SOIL
Test Description: Semivolatile Compounds Method: 8270

Analyst: MDC Extracted: 07/27/95 File #: LA03056
Instrument: HPMS_3 Injected: 08/01/95 Factor: 33 Units: ug/kg Verified: SDT

CAS#	COMPOUND	RESULT	DETECTION LIMIT
50-32-8	Benzo(a)pyrene	ND	170
193-39-5	Indeno(1,2,3-cd)pyrene	ND	170
53-70-3	Dibenzo(a,h)anthracene	ND	170
191-24-2	Benzo(g,h,i)perylene	ND	170
62-53-3	Aniline	ND	170
62-75-9	N-Nitrosodimethylamine	ND	170

LIBRARY SEARCH COMPOUNDS:

CAS#	COMPOUND	RESULT
108-60-1	2,2'-Oxybis(1-Chloropropane)	NF

SURROGATES:

2-Fluorophenol	46	% Recovery (25% - 121%)
2-Fluorobiphenyl	44	% Recovery (30% - 115%)
Phenol-d6	54	% Recovery (24% - 113%)
2,4,6-Tribromophenol	71	% Recovery (19% - 122%)
Nitrobenzene-d5	40	% Recovery (23% - 120%)
p-Terphenyl-d14	85	% Recovery (18% - 137%)

NOTES AND DEFINITIONS FOR THIS SAMPLE
ND = NOT DETECTED AT OR ABOVE THE METHOD DETECTION LIMIT (MDL)
NA = NOT ANALYZED
DL = DILUTED OUT
NF = NOT FOUND

Table 3: Priority Release Site 08-005 Surface Soil Sampling Data

6.0 SWMU C-08-010
SITE OF A FORMER DRUM STORAGE STRUCTURE

6.1 Summary

SWMU C-08-010 is the location of a former drum storage area. The site was originally designated as an area of concern rather than a SWMU; but was added to the Laboratory's Hazardous Waste Facility Permit (Table A) in 1994. The RFI for this site included sampling of the soil beneath the former storage area. Analytical results verified that no release of contaminants to the surrounding soil occurred. The RFI report describing the sampling conducted for this SWMU was submitted to NMED on March 15, 1996. SWMU C-08-010 is being proposed for NFA under Criterion 3 (no release).

6.2 Description and Operational History

6.2.1 Site Description

SWMU C-08-010 is the former location of a 6- by 12-ft structure (TA-8-34) that was used for drum storage. The type of structure (i.e., wooden shed; roofed but without walls; pad only) is unknown (LANL ER Records Package 740) (Attachment A).

The drum storage structure was located in TA-8 at Anchor Ranch Site West, approximately 100 ft north of Building TA-8-1, which housed a laboratory and shop (Figure 6.2-1). The drum structure was located at the foot of a stairway that once connected Building TA-8-8, a carpenter shop, with TA-8-1. The storage structure was located immediately east of the stairway and immediately north of an existing storm sewer (Figure 6.2-2).

6.2.2 Operational History

The Anchor Ranch site was the location of some of the earliest Manhattan Project facilities built at Los Alamos. TA-8 (Anchor Ranch Site West) was used in the early to mid-1940s for development of the nuclear weapon known as Little Boy. Structures at TA-8 included buried concrete bunkers and wooden structures used for office space, laboratories, storage, and a carpenter's shop. When TA-8 was established (1949–1950), original ranch buildings were removed to make way for the new construction or were abandoned in place. The technical area was used for gun-firing experiments, x-ray measurements, and explosives development and testing activities.

The exact date of construction of the TA-8-34 drum storage structure is not known. Nearby Building TA-8-1 was constructed in October 1943, and nearby Building TA-8-8 was constructed in March 1944 (Attachment A). It is reasonable to assume that TA-8-34 was built in the same time frame. The structure was removed in approximately 1947 (Attachment A).

TA-8-34 was used for drum storage [Attachment A; Blackwell 1983, 14968 (Attachment B); LASL 1950, 23769 (Attachment C)], but it is not known what the drums contained, if anything. Roy F. Weston, Inc., speculated that the drums contained liquids, such as oils or solvents (DOE 1989, 11971)(Attachment D), and if the drums leaked, semivolatile organic compounds might have been released to the soil. However, a 1983 Health, Safety, and Environment (HSE) Division memorandum (Attachment B) concerning structures removed from TA-8 states that no hazardous materials were stored in structure TA-8-34.

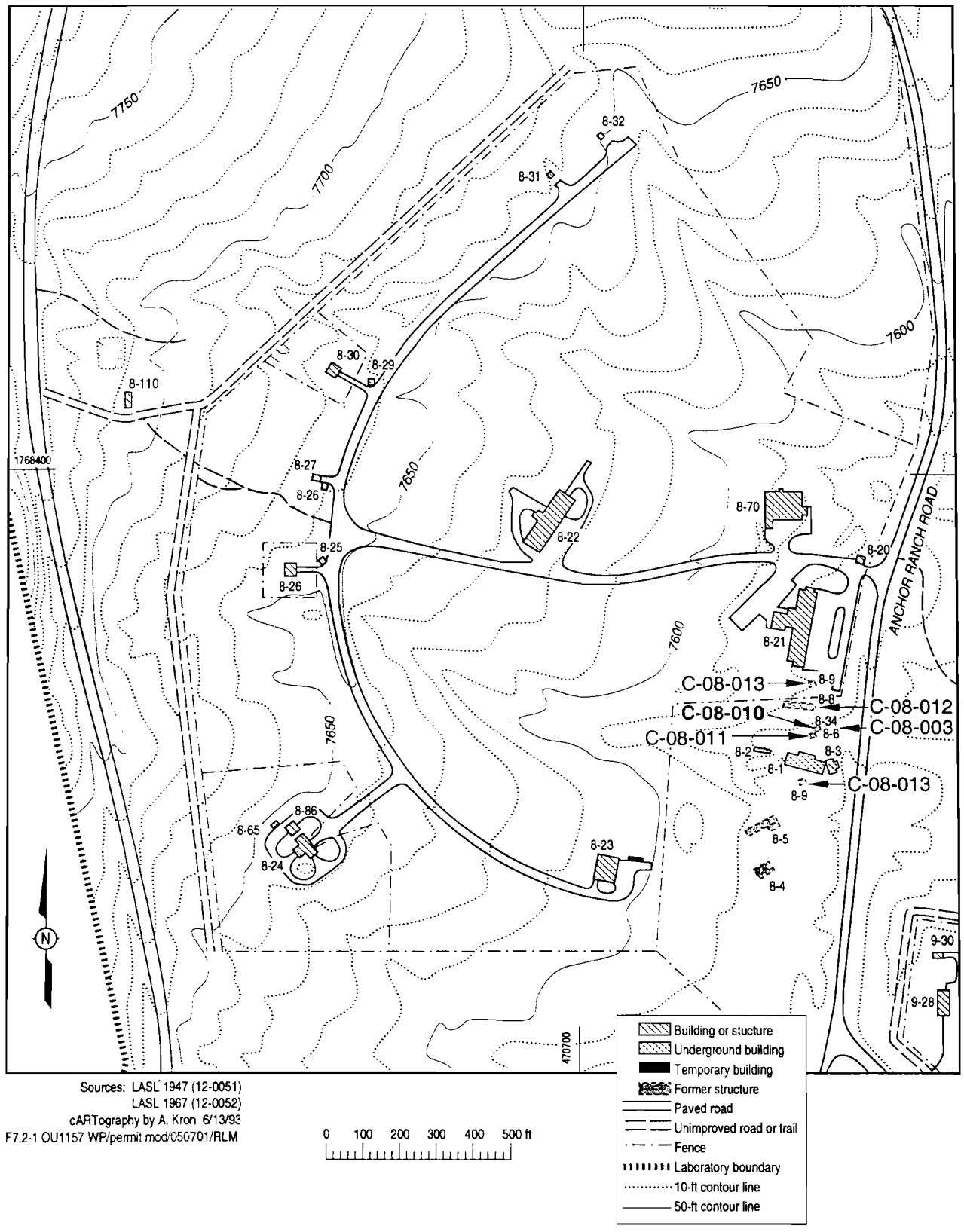

Figure 6.2-1. Locations of SWMU C-08-010 and nearby areas of concern

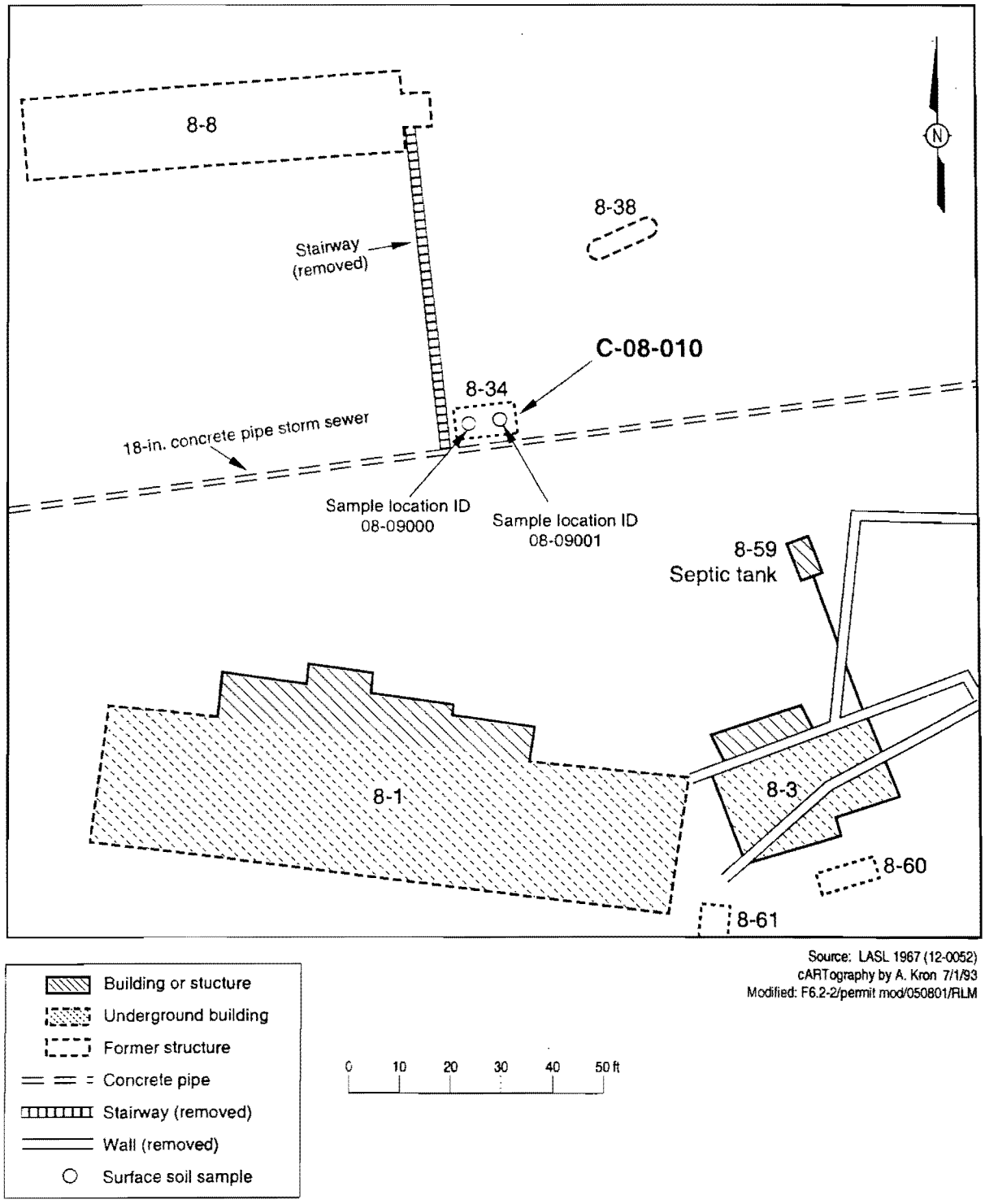

Figure 6.2-2. Location of SWMU C-08-010 and associated sample locations

RFI Activities

The RFI work plan for OU 1157 included a sampling and analysis strategy for SWMU C-08-010 (LANL 1993, 20949 pp. 6-151 through 6-159). The work plan called for four near-surface soil samples (plus 1 field duplicate and 1 field blank) to be taken from two locations. Because the COPCs thought to be present at SWMU C-08-010 included petroleum hydrocarbons and organic chemicals, the work plan specified that the samples be analyzed for total petroleum hydrocarbons (TPH), VOCs, and SVOCs. The samples to be analyzed for TPH and SVOCs were to be collected from a depth interval of 12 to 24 in., and the samples to be analyzed for VOCs were to be collected from a depth of approximately 24 in. Samples were not to be collected from the first 12 in. of soil/sediment because this interval was believed to contain silts/sediments deposited at the site during the forty-plus years since the structure had been removed.

The objective of the RFI for SWMU C-08-010 was to determine whether contamination was present from the possible release of petroleum hydrocarbons and/or organic chemicals. RFI activities conducted for this SWMU are described in detail in the RFI report for TAs-8 and -9 (LANL 1996, 54586).

Four near-surface soil samples (and appropriate quality assurance [QA] samples) were collected on May 5, 1994, from two sample locations (08-09000 and 08-09001) within the boundary of SWMU C-08-010 (Figure 6.2-2). The location of the former drum storage area was covered with a layer of silt approximately 8 to 9 in. thick, which had accumulated over the site since the structure was removed in 1947. A heavy clay soil layer and a few small pieces of asphalt were found below the silt. Because the silt layer was 8 to 9 in. deep, rather than 12 in. deep as speculated in the work plan, adjustments were made in the field to the sampling depths specified in the work plan to compensate for the difference between the actual depth of the silt layer and the speculated depth. As specified in the work plan, the silt layer was removed from both sample locations prior to sample collection. Samples from both locations were collected from the clay layer located beneath the silt layer. The first sample at each location was collected from a depth of approximately 0–4 in. beneath the top surface of the clay layer (8–13 in. beneath the top of the silt layer). The second sample at each location was collected from a depth of approximately 0–6 in. beneath the top surface of the clay layer (8–15 in. beneath the top of the silt layer). All four samples were submitted for SVOC analyses, while only the shallow sample from location 08-09000 and deeper sample from location 08-09001 were submitted for VOC analyses. Field photo iozination screening (PID) detected no VOCs.

TPH was not included in the analytical suite as prescribed in the OU 1157 work plan because the VOC and SVOC analyses would detect the individual volatile and semivolatile components associated with a potential release of petroleum hydrocarbons or organic chemicals. Additionally, there was no odor or visible evidence of hydrocarbon contamination observed at the site during the RFI.

All samples were analyzed using EPA SW-846 methods, or equivalent. Sample results are included as Attachment E (LANL 1994, 52121; LANL 2000, 69656).

Determination of No Release

Analytical results for SWMU C-08-010 (Attachment E) show that VOCs and SVOCs were not detected (i.e., designated by a "U" qualifier which signifies a nondetect), thus indicating that no release from the drum storage area occurred. If residual contamination were present at the site, a number of SVOCs would have been detected because many TPH-related SVOCs do not biodegrade and are persistent in the environment.

NOTE:
On April 5, 1994, EPA gave the RFI work plan a notice of deficiency (NOD) for SWMU C-08-010 (EPA 1994, 35231) because EPA believed that the Laboratory should sample at a depth greater than

24 in. On May 20, 1994, the Laboratory responded that because the exact depth of the sediments deposited since the removal of the building was unknown, sampling would continue at 1-ft intervals as long as field screening instruments continued to detect the presence of COPCs. The Laboratory further responded that the 24-in. depth given in the work plan was a reasonable estimate based on initial visual inspection and actual field conditions. On October 7, 1994, EPA approved the work plan for OU 1157 and the May 20, 1994, response to NOD (EPA 1994, 43549).

On March 11, 1997, NMED issued an NOD (NMED 1997, 57663.5) on the RFI report for SWMU C-08-010 because the depths of the samples collected by the RFI field team varied from sample depths specified in the OU 1157 RFI work plan. On April 16, 1997, the Laboratory provided a response similar to the response previously provided to EPA (which had been acceptable to EPA). However, on November 6, 1997, NMED requested additional sampling at SWMU C-08-010.

As stated in the response to the NMED's request for additional information (RSI) (for which no NMED response was received), the ER Project maintains that no additional sampling is required (ER Project 1998, 57663.3). The 12- to 24-in. sampling depth for SVOCs and the 24-in. sampling depth for VOCs specified in the OU 1157 work plan were based on an estimation of the depth of sediment at this site to be 12 in. The work plan specified that "samples will not be taken from the upper 12 inches of soil because this interval may contain sediments deposited on the site since the building was removed." The intent of the work plan was to sample below the sediment regardless of the actual depth of the sediment. The field investigation found the depth of sediment to vary from 8 to 9 in. Based on actual field information, the depths at which the samples were to be collected were modified in the field. This modification meets the intent of the sampling approach in the work plan because samples were collected in the clay soil found below the deposit of sediments, which accumulated during the 40-plus years since structure TA-8-34 was removed. Because no VOCs or SVOCs were encountered at depths of 13 and 15 in., there is no reason to suspect that COPCs would exist at depths of greater than 15 in. Thus the ER Project has determined that no additional sampling is required because it has demonstrated that there is no indication of a release.

6.3 Land Use

6.3.1 Current

SWMU C-08-010 was located in the central portion of TA-8, an industrial area with high-security restricted access. A chain-link fence topped with barbed wire encloses this technical area. Access through the fence is obtained only by passing through a guard gate. These security measures effectively eliminate the possibility of inadvertent site intrusion.

6.3.2 Future/Proposed

The Laboratory does not anticipate any change from the industrial use with restricted access of TA-8 for the operational life of the Laboratory (LANL 1995, 57224, pp.11–12) (Appendix D, Attachment 1). Thus, this area will remain under institutional control.

6.4 No Further Action Proposal

6.4.1 Rationale

The RFI for SWMU C-08-010 consisted of collecting samples from the soil beneath the site of former structure TA-8-34 to determine whether any contamination was present from a potential leak that may

have occurred from the drums formerly stored at this location. No COPCs were detected in the soils sampled at the former location of structure TA-8-34, SWMU C-08-010.

The Laboratory ER Project submitted to NMED an RFI report for SWMU C-08-010, dated March 15, 1996 (LANL 1996, 54586). The RFI report

- documents all sampling results;
- provides information that no release from SWMU C-08-010 occurred; and
- proposes that this SWMU be considered for NFA.

The Laboratory ER Project received an NOD from NMED because samples were collected from depths of 12 or 15 in. below ground surface rather than the 24-in.-sampling depth specified in the RFI Work Plan for OU 1157. However, adjustments to sampling depths were made in the field to compensate for the difference between the actual depth of the silt layer and the depth speculated in the work plan, and there is no reason to suspect that COPCs exist at a depth greater than 15 in.

Thus the ER Project has demonstrated SWMU C-08-010 has not released RCRA solid or hazardous wastes and/or constituents to the environment. The term "release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment.

6.4.2 Criterion

Based on the information presented in Sections 6.2 through 6.4, SWMU C-08-010 is being proposed for NFA under Criterion 3.

6.5 Supporting Documentation Attached

Attachment A: Pages from TA-8 structure history book that include Buildings TA-8-1, TA-8-8, TA-8-34. (LANL ER Records Package 740).

Attachment B: October 31, 1983 memo from Charles D. Blackwell to John Ahlquist. (Blackwell 1983, 14968).

Attachment C: Engineering Drawing R-122, dated 1950. (LASL 1950, 23769)

Attachment D: Site Database, Task 36, Record 16, pp. 49–51. (DOE 1989, 11971)

Attachment E: Relevant excerpts from daily activity log (LANL1994, 52121) and analytical results for samples AAB0888, AAB0889, AAB0890, and AAB0891. (LANL 2000, 69656)

Appendix D, Attachment 1: LANL site development plan, annual update 1995, pp. 11–12. (LANL 1995, 57224)

6.6 References Used for Text of the Request for Permit Modification for SWMU C-08-010

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1157," Los Alamos National Laboratory report LA-UR-93-1230, Los Alamos, New Mexico. (LANL 1993, 20949)

Environmental Restoration Project, March 1996. "RFI Report for Potential Release Sites at TA-8 and TA-9 (located in former Operable Unit 1157) Field Unit 5," Los Alamos National Laboratory report LA-UR-96-418, Los Alamos, New Mexico. (LANL 1996, 54586)

Reference Cited in Text

EPA (US Environmental Protection Agency), April 5,1994. "Notice of Deficiency, Operable Unit 1157, Los Alamos National Laboratory, NM0890010515," US Environmental Protection Agency letter to J. Vozella (Chief, Environment, Health, and Safety Branch, DOE-LAAO) from W. Honker (Chief, RCRA Permits Branch, EPA Region 6), Dallas, Texas. (EPA 1994, 35231)

EPA (US Environmental Protection Agency), October 7,1994. EPA review and approval of RFI work plan for Operable Unit 1157, US Environmental Protection Agency letter to J. Vozella (Chief, Environment, Safety, and Health Branch, DOE-LAAO) from A. Davis (Director, Hazardous Waste Management Division, EPA Region 6), Dallas, Texas. (EPA 1994, 43549)

6.7 History of Regulatory Deliverables

SWMU C-08-010, the location of a former drum storage area, was added to the Laboratory's Hazardous Waste Facility Permit (Table A) in 1994.

LANL, July 23, 1993:	RFI work plan for OU 1157 submitted to EPA Region 6. (LANL 1993, 20949)
EPA, April 5, 1994:	NOD for OU 1157 RFI work plan (EPA 1994, 35231). Comment 27 applies to SWMU C-08-010.
LANL, May 20, 1994:	Response to NOD for OU 1157 RFI work plan (LANL 1994, 38539). Response 27 applies to SWMU C-08-010.
EPA (via DOE-LAAO), July 21, 1994:	Draft list of modifications for OU 1157 RFI work plan. (DOE 1994, 39957)
LANL, September 20, 1994:	Response to draft list of modifications for OU 1157 RFI work plan. (LANL 1994, 41184)
EPA, October 7, 1994:	Approval of OU 1157 RFI work plan and LANL response to NOD. (EPA 1994, 43549)
LANL, March 15, 1996:	RFI report that includes SWMU C-08-010 submitted to NMED. (ER Project 1996, 54586)
NMED, March 11, 1997:	NOD on RFI report that includes SWMU C-08-010 (NMED 1997, 57663.5). Single deficiency applies to SWMU C-08-010.
LANL, April 16, 1997:	Response to NOD on RFI report that includes SWMU C-08-010. (ER Project 1997, 55647)
NMED, November 6, 1997:	RSI for RFI report that includes SWMU C-08-010 (NMED 1997, 56933). Single deficiency applies to SWMU C-08-010.
LANL, January 12, 1998:	Response to RSI on RFI report that includes SWMU C-08-010. (ER Project 1998, 57663)

6.7.1 References for Regulatory Deliverables

LANL (Los Alamos National Laboratory), July 1993. "RFI Work Plan for Operable Unit 1157," Los Alamos National Laboratory Report LA-UR-93-1230, Los Alamos, New Mexico. (LANL 1993, 20949)

EPA (US Environmental Protection Agency), April 5,1994. "Notice of Deficiency, Operable Unit 1157, Los Alamos National Laboratory, NM0890010515," US Environmental Protection Agency letter to J. Vozella (Chief, Environment, Health, and Safety Branch, DOE-LAAO) from W. Honker (Chief, RCRA Permits Branch, EPA Region 6), Dallas, Texas. (EPA 1994, 35231)

LANL (Los Alamos National Laboratory), May 20, 1994. "Response to Notice of Deficiency Concerning Operable Unit 1157 Field Investigation Work Plan, Work Breakdown Structure Number 1.4.2.6.1.28.1.2," Los Alamos National Laboratory letter EM/ER:94-J219 to J. Vozella (Chief, Environment, Safety, and Health Branch, DOE-LAAO) from D. McInroy (LANL ER Program Acting Program Manager), Los Alamos, New Mexico. (LANL 1994, 38539)

DOE (US Department of Energy), July 21, 1994. "EPA Comments on Work Plans," US Department of Energy letter LESH:TJT:WORKPLAN:1.4.2.6.1 to H. Jansen (LANL, EM/ER Program Manager) from T. Taylor (DOE-LAAO ER Program Manager), Los Alamos, New Mexico. (DOE 1994, 39957)

LANL (Los Alamos National Laboratory), September 20, 1994. "Response to the Envrionmental Protection Agency's (EPA's) Draft List of Modifications on the Notice of Deficiency (NOD) Response for Operable Unit (OU) 1157," Los Alamos National Laboratory letter ER:94-J380 to T. Taylor (DOE-LAAO Program Manager) from J. Jansen (LANL ER Project Manager), Los Alamos, New Mexico. (LANL 1994, 41184)

EPA (US Environmental Protection Agency), October 7,1994. EPA review and approval of RFI work plan for Operable Unit 1157, US Environmental Protection Agency letter to J. Vozella (Chief, Environment, Safety, and Health Branch, DOE-LAAO) from A. Davis (Director, Hazardous Waste Management Division, EPA Region 6), Dallas, Texas. (EPA 1994, 43549)

Environmental Restoration Project, March 1996. "RFI Report for Potential Release Sites at TA-8 and TA-9 (located in former Operable Unit 1157), Field Unit 5," Los Alamos National Laboratory report LA-UR-96-418, Los Alamos, New Mexico. (Environmental Restoration Project 1996, 54586)

NMED (New Mexico Environment Department, March 11, 1997. "Notice of Deficiency, RCRA Facility Investigation Report for Potential Release Sites in Technical Areas 8 and 9 Los Alamos National Laboartory,NM0890010515," New Mexico Environment Department letter, Santa Fe, New Mexico. (New Mexico Environmental Department 1997, 57663.5)

Environmental Restoration Project, April 16, 1997. "Response to the NOD for the RFI Report for TAs-8 and 9 PRS C-8-010 (Former Operable Unit 1157," Los Alamos National Laboratory letter EM/ER:97-111, Los Alamos, New Mexico. (Environmental Restoration Project 1997, 55647)

NMED (New Mexico Environment Department, November 6, 1997. "Request for Supplemental Information, RCRA Facility Investigation Report, Technical Areas 8 and 9 Los Alamos National Laboartory, NM0890010515," New Mexico Environment Department letter, Santa Fe, New Mexico. (New Mexico Environmental Department 1997, 56933)

Environmental Restoration Project, January 12, 1998. "Response to Request for Supplemental Information on the RFI Report for TAs-8 and 9 (Former OU 1157)," Los Alamos National Laboratory letter EM/ER:98-103, Los Alamos, New Mexico. (Environmental Restoration Project 1998 57663)

C-08-010

ATTACHMENTS

LANL Structure History Book; TA-8

Attachment A-1
C-08-010

STRUCTURE NUMBER	DESIGNATION AND TITLE	GROUP ASSIGN.	DATE ASSIGN.	GENERAL INFORMATION	W.O. J.O. E.S.	LAB JOB NUMBERS
TA-8-33	AW-33 BARRICADE	LASL	6-30-55	Proposed ☐ Requested by: _____ (Name & Group) Built on JO 229925, January 1951, Lab Job 731. Timber construction 15'-6" long x 15' high x 3' thick, set in concrete pumice fill. COST: $2,409.12 LOCATION: Near Building AW-3.		
TA-8-34	AW-34 DRUM STORAGE REMOVED			Proposed ☐ Requested by: _____ (Name & Group) No information available. Removed approximately July 1947.		
TA-8-35	AW-35 TRANSFORMER STATION	ZIA	NOV. 1953 6-10-85	Proposed ☐ Requested by: _____ (Name & Group) Built on Contract AT(29-1)-762, Contractor: Haddock Engineers Limited, started 7-25-49, completed 6-28-50, Lab Job 200, Phase "A". 5-16-73: Three 75-kVA, single-phase transformers, rack mounted, on poles #548 and 549, voltage 13200/480 fed from Circuit S-17, from power plant switchgear SM-23, TA-3, Serial W60316, W60317 and W60318. Manufacturer, Uptegraff. LOCATION: 15' N of SM-21, TA-8. REF. DWGS.: ENG-R-959 through R-988. Replaced a 75KVA UPTEGRAFF, Serial #W60318, which burned-up and was sent to salvage. W.O. #4253-00		
TA-8-36	AW-36 TRANSFORMER STATION	ZIA	NOV. 1953	Proposed ☐ Requested by: _____ (Name & Group) Built on Contract AT(29-1)-762, Contractor: Haddock Engineers Limited, started 7-25-49, completed 6-28-50, Lab Job 200, Phase "A". REF. DWGS.: ENG-R-959 through R-988 5-17-73 - Three 50 kVA, single-phase transformers, rack mounted on poles 564 and 565, voltage 14400/240/480, fed from Circuit S-17 from power plant switchgear SM-23, TA-3, Serial #44301, 4430-2, 4430-3, Manufacturer, Sierra. LOCATION: 80' SW of SM-22, TA-8.		4126-0

The structure assignment sheet is written for "Identification Purposes Only"

The structure assignment sheet is written for "Identification Purposes Only"

LANL Structure History Book: TA-8

Attachment A-2
c-09-010

STRUCTURE NUMBER	DESIGNATION AND TITLE	GROUP ASSIGN.	DATE ASSIGN.	GENERAL INFORMATION	W.O. J.O. E.S.	LAB JOB NUMBERS
TA-8-1	AW-1 LABORATORY AND SHOP BUILDING	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-316-37 Built on Contract W(911)-ENG-1667, Contractor: N. M. Sundt & Sons. Completed approximately October 1943 (formerly Building A-1.) Reinforced concrete construction 30' x 110' x 14' with a wood frame tower, 12' x 12' x 46' high. COST: $98,615.00 Only the tower was removed approximately July 1955.		777 1588 1500 1495 2156 4754
TA-8-2	AW-2 SHOP & STORAGE BUILDING	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-316-1 Built on Contract W(911)-ENG-1667, Contractor: N. M. Sundt & Sons. Completed approximately October 1943 (formerly Building A-1-A). Reinforced concrete construction 15' x 35' x 12' high. COST: $25,065.00 Described as Process Building prior to 12-27-65.		367 2156 4754
TA-8-3	AW-3 LABORATORY BUILDING	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-316-37 Built on Contract W(911)-ENG-1667, Contractor: N. M. Sundt & Sons. Completed approximately October 1943 (formerly Building A-1-B. COST: 26,450.00 Reinforced concrete construction 20' x 35' x 14' high. New loading dock added, Lab Job 731. COST: $829.68 Described as Press Building prior to 12-27-65.		222 731 2156 2052 2292 3355 4754
TA-8-4	AW-4 GUN BUILDING	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-321-5 Built approximately February 1944 (formerly Building A-4). Wood frame construction on wheels and track, 20' x 39' x 12' high. Ref. Dwg.: ENG-C-12337 COST: $11,860.00 Dismantled and removed in 1950. Retired on AO-5 CW 2-164 dated 2-12-54.		

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LANL Structure History Book; TA-8

Attachment A-3
C-08-010

STRUCTURE NUMBER	DESIGNATION AND TITLE	GROUP ASSIGN.	DATE ASSIGN.	GENERAL INFORMATION	W.O. J.O. E.S.	LAB JOB NUMBERS
TA-8-5	AW-5 GUN BUILDING REMOVED	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-321-5 #5105 Built on Contract W(911)-ENG-1667, Contractor: N. M. Sundt & Sons. Completed approximately October 1943 (formerly Building A-5). Wood frame construction on wheels and track, 20' x 45' x 12' high. Ref. Dwg.: ENG-C-12337. COST: $11,060.00 Dismantled and removed in 1950. Retired on AO-5 CV 2-164, dated 2-12-54.		
TA-8-6	AW-6 OLD CARPENTER SHOP REMOVED	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-312-27 #5115 Built March 1944 by Hired Labor (formerly Building TA-8-A-8). Eight Texas prefab structures, butted together, 32' x 64' x 8' high. EST. COST: $750.00 Removed to T-Site on JO 157102 and 157234, approximately July 1948; redesignated TA-16-496.		
TA-8-7	AW-7 STORAGE BUILDING REMOVED			Proposed ☐ Requested by: _____ (Name & Group) AEC-321-6 Built December 1944 by Hired Labor (formerly Building TA-8-A-9). Wood frame construction 16' x 16' x 15' high. COST: $485.00 Removed on WD 545812, September 1955.		
TA-8-8	AW-8 SHOP & STORAGE BUILDING	LASL	6-30-49	Proposed ☐ Requested by: _____ (Name & Group) AEC-312-14 Built approximately March 1944 by Hired Labor (formerly Building A-10). Wood frame construction 16' x 64' x 12 high. COST: $10,240.00 Described as Carpenter Shop prior to 12-27-65. Assigned to the Department of Health, Education and Welfare for the Penitentiary of New Mexico. The building was removed by their resident trustees and all debris		

Attachment B

C-08-010.

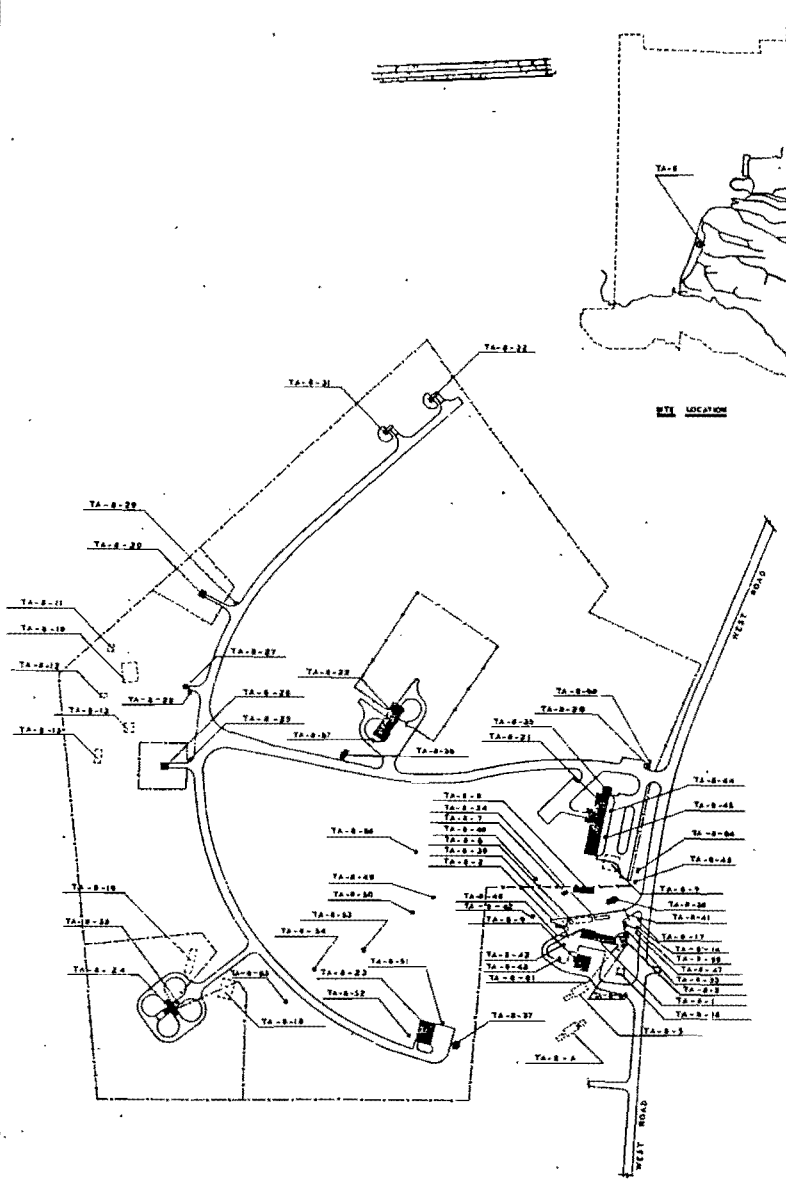
A. John Ahlquist, HSE-8
Charles D. Blackwell, HSE-1

October 31, 1983

STRUCTURES REMOVED FROM TA-8

This report covers only those structures removed from TA-8. Listed below are structure numbers, building nomenclature, removal date, structure use and/or hazardous materials used in each area if known.

Structure Number	Structure Nomenclature	Removal Date	Structure Use and/or Hazardous Material Use
TA-8-4	Gun Bldg.	1950	HE, ^{238}U
TA-8-5	Gun Bldg.	1950	HE, ^{238}U
TA-8-6	Old Carpenter Shop	1948	None
TA-8-7	Storage Bldg.	1955	None
TA-8-8	Carpenter Shop	1968	None
TA-8-9	Office Bldg.	1968	None
TA-8-10	Ranch Main House	1950	None
TA-8-11	Guest House	1950	None
TA-8-12	Guest House	1950	None
TA-8-13	Bunk House	1950	None
TA-8-14	Electrical Housing	1955	None
TA-8-15	Ranch Barn	1950	None
TA-8-16	Guard Tower A	1949	None
TA-8-18	Ranch Barn	1950	None
TA-8-19	Equipment Shed	1949	None
TA-8-34	Drum Storage	1947	None
TA-8-38	Transformer Station	1968	None
TA-8-39	Road Block	1955	None
TA-8-41	Road Block	1955	None
TA-8-57	Sanitary Manhole	1965	None



TA-8

SITE LOCATION

STRUCTURE NUMBER	DESIGNATION	REMARKS
TA-8-60	AW-60	TANK (FUEL)
TA-8-61	AW-61	TANK (FUEL)
TA-8-62	AW-62	MANHOLE
TA-8-63	AW-63	MANHOLE
TA-8-64	AW-64	SEPTIC TANK (ABANDONED)

STRUCTURE NUMBER	DESIGNATION	REMARKS
TA-8-1	AW-1	MAIN OFFICE BLDG. ,FORMERLY A-1
TA-8-2	AW-2	PROCESS BLDG. ,FORMERLY A-1-A
TA-8-3	AW-3	PRESS BLDG. ,FORMERLY A-1-B
TA-8-4	AW-4	GUN BLDG. ,FORMERLY A-4, REMOVED
TA-8-5	AW-5	GUN BLDG. ,FORMERLY A-5, REMOVED
TA-8-6	AW-6	OLD CARPENTER SHOP ,FORMERLY A-6, REMOVED
TA-8-7	AW-7	STORAGE BLDG. ,FORMERLY A-9
TA-8-8	AW-8	CARPENTER SHOP ,FORMERLY A-10
TA-8-9	AW-9	OFFICE BLDG. ,FORMERLY A-11, RELOCATED
TA-8-10	AW-10	RANCH MAIN HOUSE ,RETIRED
TA-8-11	AW-11	GUEST HOUSE ,RETIRED
TA-8-12	AW-12	GUEST HOUSE ,REMOVED
TA-8-13	AW-13	BUNK HOUSE ,REMOVED
TA-8-14	AW-14	ELECTRICAL HOUSING
TA-8-15	AW-15	RANCH BARN ,REMOVED
TA-8-16	AW-16	GUARD TOWER A ,REMOVED
TA-8-17	AW-17	WATER HOUSING
TA-8-18	AW-18	RANCH BARN ,REMOVED
TA-8-19	AW-19	EQUIPMENT SHED ,REMOVED
TA-8-20	AW-20	GUARD HOUSE ,CONSTR. NO 89 STATION 373
TA-8-21	AW-21	LABORATORY ,CONSTR. NO 88
TA-8-22	AW-22	X-RAY BLDG. ,CONSTR. NO. 81
TA-8-23	AW-23	RETATRON BLDG. ,CONSTR NO 62
TA-8-24	AW-24	ISOTOPE BLDG. ,CONSTR. NO. 83
TA-8-25	AW-25	UTILITY BLDG. ,CONSTR. NO. 84-A-1
TA-8-26	AW-26	RADIATION LABORATORY ,CONSTR. NO. 84-A
TA-8-27	AW-27	RADIATION LABORATORY ,CONSTR. NO 85
TA-8-28	AW-28	GUARD HOUSE STATION 413-A
TA-8-29	AW-29	UTILITY BLDG. ,CONSTR. NO 84-B-1
TA-8-30	AW-30	RADIATION LABORATORY ,CONSTR NO 84-B
TA-8-31	AW-31	MAGAZINE ,CONSTR. NO. 88-A
TA-8-32	AW-32	MAGAZINE ,CONSTR. NO 88-B
TA-8-33	AW-33	BARRICADE
TA-8-34	AW-34	DRUM STORAGE
TA-8-35	AW-35	TRANSFORMER STATION
TA-8-36	AW-36	TRANSFORMER STATION
TA-8-37	AW-37	TRANSFORMER STATION
TA-8-38	AW-38	TRANSFORMER STATION
TA-8-39	AW-39	ROAD BLOCK
TA-8-40	AW-40	POST BLOCK
TA-8-41	AW-41	ROAD BLOCK
TA-8-42	AW-42	MANHOLE
TA-8-43	AW-43	MANHOLE
TA-8-44	AW-44	MANHOLE
TA-8-45	AW-45	MANHOLE
TA-8-46	AW-46	MANHOLE
TA-8-47	AW-47	MANHOLE
TA-8-48	AW-48	MANHOLE
TA-8-49	AW-49	MANHOLE
TA-8-50	AW-50	MANHOLE
TA-8-51	AW-51	MANHOLE
TA-8-52	AW-52	MANHOLE
TA-8-53	AW-53	MANHOLE
TA-8-54	AW-54	MANHOLE
TA-8-55	AW-55	MANHOLE
TA-8-56	AW-56	MANHOLE
TA-8-57	AW-57	MANHOLE
TA-8-58	AW-58	MANHOLE
TA-8-59	AW-59	SEPTIC TANK

VERIFIED UNCLASSIFIED
PUBLICLY RELEASABLE
LANL Classification Group
P. Lang 5-14-2001

(Classification cancelled or changed to ...
by authority of the U.S. Atomic Energy Commission)
R.C. SMITH 10-4-54
(Official Position Title of Person making change in Classification) (Date)
By Ruben N. Linares SEP 30 1955
(Signature of person making the change, and date)

~~CONFIDENTIAL~~

NORTH (MAGNETIC)

Attachment C
C-08-010

375

1-0712590

Los Alamos Environmental Restoration Records Processing Facility
ER Record I.D.# 0023769

REV	GENERAL REVISIONS TO STATUS OF JAN. 1, 1955 DWG.	REQUIRED NO REV TO STATUS OF JAN. 1, 1955	GENERAL REVISION TO STATUS OF JAN. 1, 1955 A.E.C.	GENERAL REVISIONS TO STATUS OF JAN. 1, 1955 A.E.C.	GENERAL REVISIONS TO STATUS OF JAN. 1, 1955 A.E.C.
	4-1-55			7-11-57	

AUTHORIZED FOR

HEALTH
SAFETY
FIRE PR
COMM
PROC.
SEC.

LOS ALAMOS SCIENTIFIC LABORATORY
ENGINEERING DEPARTMENT

STRUCTURE LOCATION PLAN
TA-8
ANCHOR SITE WEST

SCALE 1" = 200' | DRAWN BY: J. BLAINE | DATE 2-11-55 | CHKD BY: | DATE 3-1-55 | APPVD BY: | DATE 4-4-55 | DWG. NO. ENG R 122

Environmental Restoration Program

Attachment D

Site Database Task 36 TA-8, -9, and -23

Los Alamos National Laboratory
Los Alamos, New Mexico

Working Draft

Prepared by
Roy F. Weston, Inc.

For
U.S. Department of Energy
Albuquerque Operations Office

Environmental Restoration Program
Technical Support Office
Los Alamos National Laboratory

September 1989

1. Project Name : ER PROGRAM

2. Installation : LOS ALAMOS NATIONAL LABORATORY

4. Task Number : AL-LA-036

5. Phase 1 Heading : Not identified

6. Release Site Descriptor : TA-08-06-010-0034

7. Installation Identifier : TA-8-2-34

8. Alternative Identifier : Not identified

9. Site Description :
Drum storage building at Anchor Site West; removed in 1947(R02e). Drums may have contained oil or solvents.

10. Site Location:
Coordinate system and units : LANL Coordinate System / Feet / R01e
The site has not been surveyed; coordinates are estimated from available maps and drawings
North coordinate : 12+50
West coordinate : 50+00
Elevation : Not identified

11. Program Phase : RI Scoping

12. Program Phase Rationale :
RI Scoping activities (R01s) indicate that the site should be investigated further.

13. Current Operational Status : Not Operational
Current Owner/Operating Group : Not identified

14. Site Type : Drum storage bldg; rmvd; and any assoc. soil contamination

15. Potential Pathways : Not identified

16. Generic Waste Type : Not identified

17. EPA Waste Characteristics : Not identified

18. EPA Waste Types : Not identified

19. Contaminants of Concern:

Name of contaminant	Data Quality	Index Type	Index Number	Reference
VOLATILES	U	ERP	VOL	R01s
SEMI-VOLATILES	U	ERP	SEMIVOL	R01s

21. Chronological Events:

Description	Date	Reference
•Drum Storage Building removed	1947	R02e
•DOE Environmental Survey	1988	R01r
•ER Program Site Visit	11/21/88	R01s

22. Comments:

This was a drum storage building which was removed in 1947(R02e). Leaky drums containing possible hydrocarbons or solvents may have been released to the environment(R01s). A DOE Environmental Survey was conducted at TA-8 in 1988(R01r). This site was located in November 1988 during an ER Program Site Visit(R01s).

23. Information Resources

Engineering Drawings

- Reference R01e
  Title : ENG R122
  Author : LAML
  Date : 10/24/50
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

- Reference R02e
  Title : ENG R5106
  Author : LANL
  Date : 08/18/83
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

Photographs

- Reference R01p
  Title : ER Program Site Visit, Picture #72
  Author : Roy F. Weston
  Date : 11/21/88
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

Reports

- Reference R01r
  Title : DOE Environmental Survey
  Author : DOE
  Date : 1988
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

Site Visits

- Reference R01s
  Title : ER Program Site Visit
  Author : Roy F. Weston
  Date : 11/21/88
  Location: Field Notebook Control #69, ER Program Document Control Files, Roy F. Weston, Albuq., NM

Attachment E

Data Summary for PRS C-8-010

Request	Sample	Location ID	Depth (ft)	Analyte	Result (mg/kg)	Qualifier
17441	AAB0888	08-09000	0.67 - 1	Acenaphthene	0.75	U *
17441	AAB0888	08-09000	0.67 - 1	Acenaphthylene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Aniline	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Anthracene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Benzidine	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Benzo(a)anthracene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Benzo(a)pyrene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Benzo(b)fluoranthene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Benzo(g,h,i)perylene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Benzo(k)fluoranthene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Benzoic Acid	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Benzyl Alcohol	1.5	U
17441	AAB0888	08-09000	0.67 - 1	Bis(2-chloroethoxy)methane	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Bis(2-chloroethyl)ether	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Bis(2-ethylhexyl)phthalate	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Bromophenyl-phenylether(4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Butylbenzylphthalate	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Chloro-3-methylphenol(4-)	1.5	U
17441	AAB0888	08-09000	0.67 - 1	Chloroaniline(4-)	1.5	U
17441	AAB0888	08-09000	0.67 - 1	Chloronaphthalene(2-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Chlorophenol(2-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Chlorophenyl-phenyl(4-) Ether	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Chrysene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dibenz(a,h)anthracene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dibenzofuran	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dichlorobenzene(1,2-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dichlorobenzene(1,3-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dichlorobenzene(1,4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dichlorobenzidine(3,3'-)	1.5	U
17441	AAB0888	08-09000	0.67 - 1	Dichlorophenol(2,4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Diethylphthalate	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dimethyl Phthalate	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dimethylphenol(2,4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Di-n-butylphthalate	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dinitro-2-methylphenol(4,6-)	3.9	U
17441	AAB0888	08-09000	0.67 - 1	Dinitrophenol(2,4-)	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Dinitrotoluene(2,4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Dinitrotoluene(2,6-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Di-n-octylphthalate	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Fluoranthene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Fluorene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Hexachlorobenzene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Hexachlorobutadiene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Hexachlorocyclopentadiene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Hexachloroethane	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Indeno(1,2,3-cd)pyrene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Isophorone	0.75	U

* U = undetected.

Request	Sample	Location ID	Depth (ft)	Analyte	Result (mg/kg)	Qualifier
17441	AAB0888	08-09000	0.67 - 1	Methylnaphthalene(2-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Methylphenol(2-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Methylphenol(4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Naphthalene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Nitroaniline(2-)	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Nitroaniline(3-)	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Nitroaniline(4-)	1.9	U
17441	AAB0888	08-09000	0.67 - 1	Nitrobenzene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Nitrophenol(2-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Nitrophenol(4-)	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Nitrosodimethylamine(N-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Nitroso-di-n-propylamine(N-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Nitrosodiphenylamine(N-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Oxybis(1-chloropropane)(2,2'-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Pentachlorophenol	3.8	U
17441	AAB0888	08-09000	0.67 - 1	Phenanthrene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Phenol	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Pyrene	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Trichlorobenzene(1,2,4-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Trichlorophenol(2,4,5-)	0.75	U
17441	AAB0888	08-09000	0.67 - 1	Trichlorophenol(2,4,6-)	0.75	U
17438	AAB0889	08-09000	0.67 - 1	Acetone	0.02	U
17438	AAB0889	08-09000	0.67 - 1	Benzene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Bromobenzene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Bromochloromethane	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Bromodichloromethane	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Bromoform	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Bromomethane	0.01	U
17438	AAB0889	08-09000	0.67 - 1	Butanone(2-)	0.02	U
17438	AAB0889	08-09000	0.67 - 1	Butylbenzene(n-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Butylbenzene(sec-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Butylbenzene(tert-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Carbon Disulfide	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Carbon Tetrachloride	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Chlorobenzene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Chlorodibromomethane	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Chloroethane	0.01	U
17438	AAB0889	08-09000	0.67 - 1	Chloroform	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Chloromethane	0.01	U
17438	AAB0889	08-09000	0.67 - 1	Chlorotoluene(2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Chlorotoluene(4-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dibromo-3-chloropropane(1,2-)	0.01	U
17438	AAB0889	08-09000	0.67 - 1	Dibromoethane(1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dibromomethane	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichlorobenzene(1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichlorobenzene(1,3-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichlorobenzene(1,4-)	0.005	U

Request	Sample	Location ID	Depth (ft)	Analyte	Result (mg/kg)	Qualifier
17438	AAB0889	08-09000	0.67 - 1	Dichlorodifluoromethane	0.01	U
17438	AAB0889	08-09000	0.67 - 1	Dichloroethane(1,1-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloroethane(1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloroethene(1,1-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloroethene(cis-1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloroethene(trans-1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloropropane(1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloropropane(1,3-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloropropane(2,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloropropene(1,1-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloropropene(cis-1,3-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Dichloropropene(trans-1,3-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Ethylbenzene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Hexanone(2-)	0.02	U
17438	AAB0889	08-09000	0.67 - 1	Iodomethane	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Isopropylbenzene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Isopropyltoluene(4-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Methyl-2-pentanone(4-)	0.02	U
17438	AAB0889	08-09000	0.67 - 1	Methylene Chloride	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Propylbenzene(1-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Styrene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Tetrachloroethane(1,1,1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Tetrachloroethane(1,1,2,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Tetrachloroethene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Toluene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trichloro-1,2,2-trifluoroethane(1,1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trichloroethane(1,1,1-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trichloroethane(1,1,2-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trichloroethene	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trichlorofluoromethane	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trichloropropane(1,2,3-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trimethylbenzene(1,2,4-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Trimethylbenzene(1,3,5-)	0.005	U
17438	AAB0889	08-09000	0.67 - 1	Vinyl Chloride	0.01	U
17438	AAB0889	08-09000	0.67 - 1	Xylene (Total)	0.005	U
17441	AAB0890	08-09001	0.75-1.25	Acenaphthene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Acenaphthylene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Aniline	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Anthracene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Benzidine	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Benzo(a)anthracene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Benzo(a)pyrene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Benzo(b)fluoranthene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Benzo(g,h,i)perylene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Benzo(k)fluoranthene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Benzoic Acid	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Benzyl Alcohol	1.5	U

Request	Sample	Location ID	Depth (ft)	Analyte	Result (mg/kg)	Qualifier
17441	AAB0890	08-09001	0.75-1.25	Bis(2-chloroethoxy)methane	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Bis(2-chloroethyl)ether	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Bis(2-ethylhexyl)phthalate	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Bromophenyl-phenylether(4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Butylbenzylphthalate	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Chloro-3-methylphenol(4-)	1.5	U
17441	AAB0890	08-09001	0.75-1.25	Chloroaniline(4-)	1.5	U
17441	AAB0890	08-09001	0.75-1.25	Chloronaphthalene(2-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Chlorophenol(2-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Chlorophenyl-phenyl(4-) Ether	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Chrysene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dibenz(a,h)anthracene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dibenzofuran	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dichlorobenzene(1,2-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dichlorobenzene(1,3-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dichlorobenzene(1,4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dichlorobenzidine(3,3'-)	1.5	U
17441	AAB0890	08-09001	0.75-1.25	Dichlorophenol(2,4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Diethylphthalate	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dimethyl Phthalate	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dimethylphenol(2,4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Di-n-butylphthalate	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dinitro-2-methylphenol(4,6-)	4	U
17441	AAB0890	08-09001	0.75-1.25	Dinitrophenol(2,4-)	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Dinitrotoluene(2,4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Dinitrotoluene(2,6-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Di-n-octylphthalate	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Fluoranthene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Fluorene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Hexachlorobenzene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Hexachlorobutadiene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Hexachlorocyclopentadiene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Hexachloroethane	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Indeno(1,2,3-cd)pyrene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Isophorone	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Methylnaphthalene(2-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Methylphenol(2-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Methylphenol(4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Naphthalene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Nitroaniline(2-)	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Nitroaniline(3-)	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Nitroaniline(4-)	2	U
17441	AAB0890	08-09001	0.75-1.25	Nitrobenzene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Nitrophenol(2-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Nitrophenol(4-)	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Nitrosodimethylamine(N-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Nitroso-di-n-propylamine(N-)	0.78	U

Request	Sample	Location ID	Depth (ft)	Analyte	Result (mg/kg)	Qualifier
17441	AAB0890	08-09001	0.75-1.25	Nitrosodiphenylamine(N-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Oxybis(1-chloropropane)(2,2'-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Pentachlorophenol	3.9	U
17441	AAB0890	08-09001	0.75-1.25	Phenanthrene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Phenol	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Pyrene	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Trichlorobenzene(1,2,4-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Trichlorophenol(2,4,5-)	0.78	U
17441	AAB0890	08-09001	0.75-1.25	Trichlorophenol(2,4,6-)	0.78	U
17438	AAB0891	08-09001	0.75-1.25	Acetone	0.02	U
17438	AAB0891	08-09001	0.75-1.25	Benzene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Bromobenzene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Bromochloromethane	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Bromodichloromethane	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Bromoform	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Bromomethane	0.01	U
17438	AAB0891	08-09001	0.75-1.25	Butanone(2-)	0.02	U
17438	AAB0891	08-09001	0.75-1.25	Butylbenzene(n-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Butylbenzene(sec-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Butylbenzene(tert-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Carbon Disulfide	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Carbon Tetrachloride	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Chlorobenzene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Chlorodibromomethane	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Chloroethane	0.01	U
17438	AAB0891	08-09001	0.75-1.25	Chloroform	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Chloromethane	0.01	U
17438	AAB0891	08-09001	0.75-1.25	Chlorotoluene(2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Chlorotoluene(4-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dibromo-3-chloropropane(1,2-)	0.01	U
17438	AAB0891	08-09001	0.75-1.25	Dibromoethane(1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dibromomethane	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichlorobenzene(1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichlorobenzene(1,3-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichlorobenzene(1,4-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichlorodifluoromethane	0.01	U
17438	AAB0891	08-09001	0.75-1.25	Dichloroethane(1,1-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloroethane(1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloroethene(1,1-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloroethene(cis-1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloroethene(trans-1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloropropane(1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloropropane(1,3-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloropropane(2,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloropropene(1,1-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloropropene(cis-1,3-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Dichloropropene(trans-1,3-)	0.005	U

Request	Sample	Location ID	Depth (ft)	Analyte	Result (mg/kg)	Qualifier
17438	AAB0891	08-09001	0.75-1.25	Ethylbenzene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Hexanone(2-)	0.02	U
17438	AAB0891	08-09001	0.75-1.25	Iodomethane	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Isopropylbenzene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Isopropyltoluene(4-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Methyl-2-pentanone(4-)	0.02	U
17438	AAB0891	08-09001	0.75-1.25	Methylene Chloride	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Propylbenzene(1-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Styrene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Tetrachloroethane(1,1,1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Tetrachloroethane(1,1,2,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Tetrachloroethene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Toluene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trichloro-1,2,2-trifluoroethane(1,1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trichloroethane(1,1,1-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trichloroethane(1,1,2-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trichloroethene	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trichlorofluoromethane	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trichloropropane(1,2,3-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trimethylbenzene(1,2,4-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Trimethylbenzene(1,3,5-)	0.005	U
17438	AAB0891	08-09001	0.75-1.25	Vinyl Chloride	0.01	U
17438	AAB0891	08-09001	0.75-1.25	Xylene (Total)	0.005	U

Los Alamos National Laboratory Environmental Restoration
DAILY ACTIVITY LOG

Date: 05-MAY-94 Sheet 1 of 2

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Stephanie Y Cober, QA O.S.
Albert Dye FTC 06-May-94

Comments:

Today Albert Dye, Consuelo Montoya, Stephanie Cober, Kellie Lovelace and Dan Vandorpe will be completing sample diagram (this) concerning the Bald Knolls and Ground & Stained Soil & Storage Building.

7:55 We left TA-59

8:05 Signed into station 502 w/ Kellie as Albert & Stephanie escort

8:12 Signed in at DX-116

8:16 Loaded equipment from ESH-8 (sample trailer) and then proceeded to TA-8 to the storage buildings site. Eye wash station inspection done here

8:22 Albert gave the Daily Activity Briefing. Dan continued with the Tailgate Safety Meeting. Clarita Trujillo joined us to perform field monitoring

8:35 Sampled 08-9001 & 08-9000. We dug down to 9" hoping that was the original surface.

9:00 Arrived at Bald Knolls Kits were numbered wrong so 09-5108 was changed to 09-5100

10:25 Arrived at Stained Soil Building #1

10:45 Completed sampling & Clarita trucked to Sect with the ESP-1 & PN-(C7367) Dave HNIL

☐ CHECK HERE IF CONTINUED ON BACK OF THIS SHEET.

Los Alamos National Laboratory Environmental Restoration
DAILY ACTIVITY LOG

Date: 05-MAY-91 Sheet 2 of 2

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-IIR-93-1230

Signature Stephanie A. Olson, O.A.D.S.

Comments:

Hitachi # SN101351 was returned

☐ CHECK HERE IF CONTINUED ON BACK OF THIS SHEET.

Los Alamos National Laboratory Environmental Restoration
SAMPLE COLLECTION LOG

Date: 05-May-94 Time (24 hour clock) 8:45 Sheet 19 of 76

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Stephanie L. Cohen, D.H.D.S.

AAB0888

Control No. 0e933 Sample Type Soil

Sample Location C-8-010 STORAGE BLDG. Site ID No 08-9000

Composite _____ Yes X No

Composite Type N/A

Depth of Sample 0-6"

Weather Sunny & Cool

Containers Used	Amount Collected
1-125mL Glass	125mL

COMMENTS

Beta/Gamma before: CPM

after: CPM

H.E. Spot Test: NEGATIVE

0-8" all silt

at 8" some asphalt & hard clay material

Samples taken from clay.

LEGEND

1. A sample collection log is to be completed for samples in each sampling interval and realfax stickers to form when the sample label is prepared.
2. Date: Use DD-MMM-YY; e.g., 01-JAN-91.
3. Time: Use 24-hour clock; i.e., 1835 for 6:35 PM.
4. All entries on the log are to be completed. If not applicable, mark N/A.
5. Page: Each sample team should number sheet ___ of ___ for the day's activities for all sheets prepared on a single day, i.e., if there is a total of 24 pages, number 1 of 24, 2 of 24, etc.
6. Control No.: obtain from chain of custody/request for analysis form.
7. Sample Location: Use boring or monitor well number, grid location (transect), sample station I.D., or coordinate to physical features with distances. Include sketch in comment section, if necessary.
8. Sample Type: Use the following - soil; water (surface or ground); air (filter, tubes, ambient, personnel); sludge, drum contents; oil; vegetation; wipe sample.
9. Site ID No. FIMAD supplied unique site designation.
10. Composite Type: i.e., 24-hour, list sample numbers in composite, spatial composite.
11. Depth of Sample: Give units, write out units such as feet.
12. Weather: Approximate temperature, sun, and moisture conditions.
13. Containers Used: List each container type as number, volume, material type (e.g., 2 - 1L glass, 4 - 40 ml glass vial, 1 - 400 ml plastic, 1 - 3 inch steel tube, 1 - 8 oz. glass jar).
14. Amount Collected: Volume of container.

Los Alamos National Laboratory Environmental Restoration
SAMPLE COLLECTION LOG

Date: 05-May-94 Time (24 hour clock) 8:45 Sheet 20 of 26

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Stephanie M. Cohen, Q.A.O.S.

AAB0869

Control No. 04933 Sample Type Soil

Sample Location C-8-010 Storage Box Site ID No 08-9000

Composite _____ Yes X No

Composite Type N/A

Depth of Sample 6-12"

Weather Sunny & Cool

Containers Used	Amount Collected
2-40mL Glass	80mL

COMMENTS

Beta/Gamma before: CPM

after: CPM

H.E. Spot Test: NEGATIVE

LEGEND

1. A sample collection log is to be completed for samples in each sampling interval and realfix stickers to form when the sample label is prepared.
2. Date: Use DD-MMM-YY; e.g., 01-JAN-91.
3. Time: Use 24-hour clock; i.e., 1835 for 6:35 PM.
4. All entries on the log are to be completed. If not applicable, mark N/A.
5. Page: Each sample team should number sheet ___ of ___ for the day's activities for all sheets prepared on a single day, i.e., if there is a total of 24 pages, number 1 of 24, 2 of 24, etc.
6. Control No.: obtain from chain of custody/request for analysis form.
7. Sample Location: Use boring or monitor well number, grid location (transect), sample station I.D., or coordinate to physical features with distances. Include sketch in comment section, if necessary.
8. Sample Type: Use the following - soil; water (surface or ground); air (filter, tubes, ambient, personnel); sludge, drum contents; oil; vegetation; wipe; sample.
9. Site ID No. FIMAD supplied unique site designation.
10. Composite Type: I.e., 24-hour, list sample numbers in composite, spatial composite.
11. Depth of Sample: Give units, write out units such as feet.
12. Weather: Approximate temperature, sun, and moisture conditions.
13. Containers Used: List each container type as number, volume, material type (e.g., 2 - 1L glass, 4 - 40 ml glass vial, 1 - 400 ml plastic, 1 - 3 inch steel tube, 1 - 8 oz. glass jar).
14. Amount Collected: Volume of container.

Los Alamos National Laboratory Environmental Restoration
SAMPLE COLLECTION LOG

Date: 05-May-94 Time (24 hour clock) 8:35 Sheet 21 of 26

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Stephanie A Cohen, OH.D.S.

AAB0890

Control No. 010933 Sample Type Soil

Sample Location C-8-010 STORAGE BLDG. Site ID No 08-9001

Composite _____ Yes X No

Composite Type N/A

Depth of Sample ~~0-6 inches~~ 9"

Weather Sunny & Cool

Containers Used	Amount Collected
1-125mL Glass	125mL

COMMENTS

Beta/Gamma before: CPM

after: CPM

H.E. Spot Test: NEGATIVE.

Silt 7-9"

Started sample at 9" because upper layer is covered to be only wash down from above. Clay material at 9" is where sample is taken.

LEGEND

1. A sample collection log is to be completed for samples in each sampling interval and restfix stickers to form when the sample label is prepared.
2. Date: Use DD-MMM-YY; e.g., 01-JAN-91.
3. Time: Use 24-hour clock; i.e., 1635 for 4:35 PM.
4. All entries on the log are to be completed. If not applicable, mark N/A.
5. Page: Each sample team should number sheet ___ of ___ for the day's activities for all sheets prepared on a single day, i.e., if there is a total of 24 pages, number 1 of 24, 2 of 24, etc.
6. Control No.: obtain from chain of custody/request for analysis form.
7. Sample Location: Use boring or monitor well number, grid location (transect), sample station I.D., or coordinate to physical features with distances. Include sketch in comment section, if necessary.
8. Sample Type: Use the following - soil; water (surface or ground); air (filter, tubes, ambient, personnel); sludge, drum contents; oil; vegetation; wipe, sample.
9. Site ID No. FIMAD supplied unique site designation.
10. Composite Type: i.e., 24-hour, list sample numbers in composite, spatial composite.
11. Depth of Sample: Give units, write out units such as feet.
12. Weather: Approximate temperature, sun, and moisture conditions.
13. Containers Used: List each container type as number, volume, material type (e.g., 2 - 1L glass, 4 - 40 ml glass vial, 1 - 400 ml plastic, 1 - 3 inch steel tube, 1 - 8 oz. glass jar).
14. Amount Collected: Volume of container.

Los Alamos National Laboratory Environmental Restoration
SAMPLE COLLECTION LOG

Date: 05-May-94 Time (24 hour clock) 8:35 Sheet 22 of 26

Technical Area 08/09 Operable Unit 1157

Site Work Plan LA-UR-93-1230

Signature Stephanie A. Cisneros

AAB0891

Control No. 016933 Sample Type Soil

Sample Location C-8-010 STORAGE BLDG. Site ID No 08-9001

Composite ~~Yes~~ X No

Composite Type N/A

Depth of Sample ~~6-12"~~ 15"

Weather Sunny & Cool.

Containers Used	Amount Collected
2-40mL Glass	80mL
—	

COMMENTS

Beta/Gamma before: CPM

after: CPM

H.E. Spot Test: NEGATIVE.

LEGEND

1. A sample collection log is to be completed for samples in each sampling interval and realfix stickers to form when the sample label is prepared.
2. Date: Use DD-MMM-YY; e.g., 01-JAN-91.
3. Time: Use 24-hour clock; i.e., 1835 for 6:35 PM.
4. All entries on the log are to be completed. If not applicable, mark N/A.
5. Page: Each sample team should number sheet ___ of ___ for the day's activities for all sheets prepared on a single day, i.e., if there is a total of 24 pages, number 1 of 24, 2 of 24, etc.
6. Control No.: obtain from chain of custody/request for analysis form.
7. Sample Location: Use boring or monitor well number, grid location (transect), sample station I.D., or coordinate to physical features with distances. Include sketch in comment section, if necessary.
8. Sample Type: Use the following - soil; water (surface or ground); air (filter, tubes, ambient, personnel); sludge, drum contents; oil; vegetation; wipe; sample.
9. Site ID No. FIMAD supplied unique site designation.
10. Composite Type: i.e., 24-hour, list sample numbers in composite, spatial composite.
11. Depth of Sample: Give units, write out units such as feet.
12. Weather: Approximate temperature, sun, and moisture conditions.
13. Containers Used: List each container type as number, volume, material type (e.g., 2 - 1L glass, 4 - 40 ml glass vial, 1 - 400 ml plastic, 1 - 3 inch steel tube, 1 - 8 oz. glass jar).
14. Amount Collected: Volume of container.

Los Alamos National Laboratory Environmental Restoration
CHAIN OF CUSTODY/REQUEST FOR ANALYSIS

Date -May-94 Control No. 16333

Technical Area 08/09 Send Lab Report Ron Conrad MS K490

Operable Unit 1157 Site Work Plan LA-UR-93-1230

OU Contact Tracy Glatzmaier Date Samples Shipped Hand delivered to SAF

Contact Phone No. 665-2613 Date Lab Report Required -June-94

Field Unique Sample #/ID (Write in sample ID number in space below)	Date and Time Collected	G R A B	C O M P	Sample Container Volume/Material	Matrix (Liquid, Soil, Core, Sludge, Etc.)	Preservative	Analysis Requested		Remarks (Condition of receipt, etc.)
							Test	Method	
AAB	5-May-94	X		125mL Glass	Soil	refrig.	SVOCs	CLP	08-9000
AAB	5-May-94	X		2-40mL Glass	Soil	refrig.	VOCs	CLP	08-9000
AAB	5-May-94	X		125mL Glass	Soil	refrig.	SVOCs	CLP	08-9001
AAB	-May-94	X		2-40mL Glass	Soil	refrig.	VOCs	CLP	08-9001
AAB	-May-94	X		125mL Glass	Soil	refrig.	SVOCs	CLP	09-9002
AAB	-May-94	X		2-40mL Glass	Soil	refrig.	VOCs	CLP	09-9002
AAB	-May-94	X		125mL Glass	Soil	refrig.	SVOCs	CLP	09-9003
AAB	-May-94	X		2-40mL Glass	Soil	refrig.	VOCs	CLP	09-9003

Relinquished by (Signature) Affiliation	Date 5-5-94	Relinquished by (Signature) Affiliation	Date	Relinquished by (Signature) Affiliation	Date
Received by (Signature) Affiliation Rebecca C. Seba, LTSS	Time 1500	Received by (Signature) Affiliation	Time	Received by (Signature) Affiliation	Time

POSSIBLE HAZARD IDENTIFICATION
(Please indicate if sample(s) are hazardous materials and/or are suspected to contain high levels of hazardous substances.)
Radiological Highly Toxic Flammable Skin Irritant Nonhazard Other

SAMPLE DISPOSAL
Return to client ___ Disposal by lab X Archive ___ (indicate number of months)

COMMENTS

SAMPLING TEAM (Print names and initial) Albert Dye, Kellie Soukup, Stephanie Cohen, Graciela Portugal

WHITE To accompany samples YELLOW Records Processing Facility PINK Field Team Leader

SOP 1.04, Rev

• U.S.G.P.O.: 1993-776-045

omment: RUN BY K.SOUKUP
B770 Number 1 User File: FIELD SCREENING Sample Data File: NONE
ample Set: OU1157 DAY6 Mode: Alpha/Beta
V-Meas.Counter [V] = 1575 HV-Guard Counter [V] = 1575
tatistical Error Definition: 3 standard deviation(s)

ategory List [pCi/g]:

	Alpha		Beta	
ategory	Low	High	Low	High

	1	2	3	4	5
BG Alpha [cpm]	0.630	0.560	0.870	0.630	0.700
BG Beta [cpm]	15.2	13.9	14.0	15.1	15.2
Eff. Alpha	0.038	0.041	0.036	0.043	0.040
Eff. Beta	0.207	0.223	0.223	0.211	0.227
Spillover	0.093	0.091	0.096	0.102	0.093
T(1/2) Alpha [days]	--	--	--	--	--
T(1/2) Beta [days]	--	--	--	--	--
Manuf. Alpha Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Manuf. Beta Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Normalization	27.0	27.0	27.0	27.0	27.0

Sample Results

easurement Date 05-05-94 Time 13:41:03
easuring Time [min:sec] Elapsed 0016:41 Preset 0016:40 Cycle 1/1
Guard [cpm] 1222

Det#	Spl#	Spl. Name	ALPHA pCi/g	ALPHA %Error	ALPHA Cat	BETA pCi/g	BETA %Error	BETA Cat	
1	20	09-5104R 6"	4.61	> 100	1	8.97	> 100	1	AA60878
2	21	09-5104R 12"	2.40	> 100	1	8.08	> 100	1	AA60879
3	22	09-5105 6"	0.363	> 100	1	7.55	> 100	1	AA60880
4	23	09-5105 12"	4.07	> 100	1	4.40	> 100	1	AA60881
5	24	09-5106 6"	6.29	> 100	1	5.77	> 100	1	AA60882
6	25	09-5106 12"	3.68	> 100	1	8.40	97.4	1	AA60883
7	26	09-5107 6"	3.61	> 100	1	8.86	91.4	1	AA60884
8	27	09-5107 12"	3.94	> 100	1	8.41	> 100	1	AA60885
9	28	08-9000 6"	4.12	> 100	1	12.3	74.0	1	AA60888
10	29	08-9000 12"	2.41	> 100	1	12.7	75.2	1	AA60889

ent: RUN BY K.SOUKUP
B770 Number 1 User File: FIELD SCREENING Sample Data File: NONE
ample Set: OU1157 DAY6 Mode: Alpha/Beta
V-Meas.Counter [V] = 1575 HV-Guard Counter [V] = 1575
tatistical Error Definition: 3 standard deviation(s)

ategory List [pCi/g]:

	Alpha		Beta	
ategory	Low	High	Low	High

	1	2	3	4	5
BG Alpha [cpm]	0.630	0.560	0.870	0.630	0.700
BG Beta [cpm]	15.2	13.9	14.0	15.1	15.2
Eff. Alpha	0.038	0.041	0.036	0.043	0.040
Eff. Beta	0.207	0.223	0.223	0.211	0.227
Spillover	0.093	0.091	0.096	0.102	0.093
T(1/2) Alpha [days]	--	--	--	--	--
T(1/2) Beta [days]	--	--	--	--	--
Manuf. Alpha Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Manuf. Beta Date	--/--/--	--/--/--	--/--/--	--/--/--	--/--/--
Normalization	27.0	27.0	27.0	27.0	27.0

Sample Results

Measurement Date 05-05-94 Time 14:01:45
Measuring Time [min:sec] Elapsed 0016:41 Preset 0016:40 Cycle 1/1
Guard [cpm] 1235

Det#	Spl#	Spl. Name	ALPHA pCi/g	ALPHA %Error	ALPHA Cat	BETA pCi/g	BETA %Error	BETA Cat	
1	30	08-9001 6"	5.32	> 100	1	10.1	93.5	1	AA60890
2	31	08-9001 12"	1.09	> 100	1	18.5	48.7	1	AA60891
3	32	09-9002 6"	4.11	> 100	1	5.19	> 100	1	AA60892
4	33	09-9002 12"	8.47	> 100	1	11.3	82.5	1	AA60893
5	34	09-9003 6"	2.91	> 100	1	0.000	0.000	1	AA60894
6	35	09-9003 12"	0.000	0.000	1	16.4	52.9	1	AA60895
7	36	SR-90 STD	8.88	> 100	1	49649	0.453	1	
8	37	PU-239 STD	15574	1.95	1	154.4	15.3	1	
9	38		0.000	0.000	1	0.000	0.000	1	
10	39		0.000	0.000	1	0.000	0.000	1	

7.0 SWMU 14-003
FORMER BURN AREA FOR HIGH EXPLOSIVE DEBRIS

7.1 Summary

SWMU 14-003 is an area formerly used to burn detonation debris contaminated by HE. The Laboratory ER Project conducted an RFI at this SWMU in 1995. Based on the results of the RFI, the ER Project implemented a VCA. The VCA plan for this site was presented to NMED for comment at a January 29, 1997, meeting. At that meeting, NMED concurred with the ER Project's plans to proceed with this VCA, with the stipulation that surface soil samples in addition to those specified in the VCA plan be collected. VCA activities were conducted from April to July of 1997 and involved sampling to determine the extent of contamination, removing contaminated soil, and collecting confirmation samples to verify that clean up goals were met. Confirmation sampling verified that residual contamination is at concentrations that do not pose an unacceptable level of risk under current and projected future land use. Although the VCA completion report was completed in September 1997, it was not submitted to NMED because of a reprioritization of sites during a reorganization of the ER Project. The VCA report is included as part of this request for permit modification for this SWMU. Because an ecological screening methodology was not in place at the time the VCA report was prepared, a subsequent ecological screening evaluation for SWMU 14-003 was conducted in the summer of 1999. The ecological evaluation determined that there is no unacceptable risk to ecological receptors from this site. SWMU 14-003 is being proposed for NFA under Criterion 5 (the site was remediated in accordance with state and/or federal regulations).

7.2 Description and Operational History

7.2.1 Site Description

The SWMU 14-003 burn area was located near the southeastern corner of TA-14, approximately 300 ft northeast of Building TA-14-5 (Figure 7.2-1). The SWMU was located at the end of an abandoned asphalt-paved road and was used for burning HE-contaminated debris remaining from experimental test shots. Prior to VCA activities, the SWMU consisted of a level 5- by 20-ft grass-covered area, enclosed on its north, south, and west sides by a 3-ft-high, horseshoe-shaped earthen berm (Figure 7.2-2), and several charred remnants of noncombustible debris were visible at the site.

7.2.2 Operational History

In 1944, Building TA-14-5 was constructed as a control building for a nearby firing site. Group X-1D, the Rotating Prism Camera Group, was the principal group that operated in this building during the war years. The group used pyramid and mirror cameras to photograph detonation tests on small HE cylinders and spheres. These photographic methods provided shadow photographs of imploding explosives during detonation of various HE formulations or lens types. Only relatively small tests (up to 15 lb) were conducted at the firing site. The explosive devices contained HE, uranium, and various other metals. Small-scale testing continued to occur during the post-war years.

In approximately 1952 (LASL 1950, 23936; LASL 1952, 69698) (Attachment A), the SWMU 14-003 burn area was established to burn combustible HE-contaminated debris and to flash-burn noncombustible HE-contaminated debris that resulted from the Group X-ID experimental test shots. According to the SWMU report (LANL 1990, 07512), the burn area ceased being used during the 1960s.

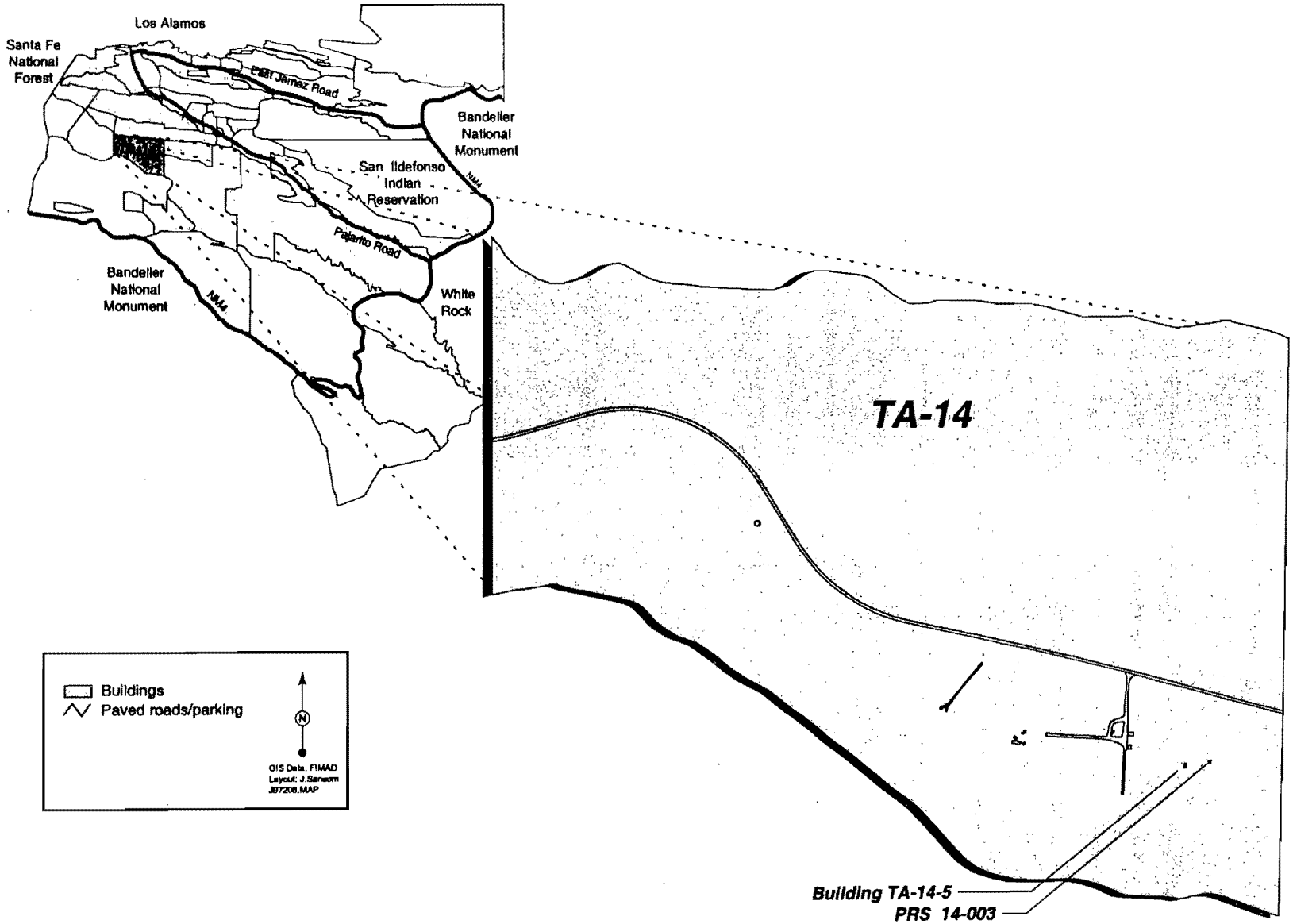
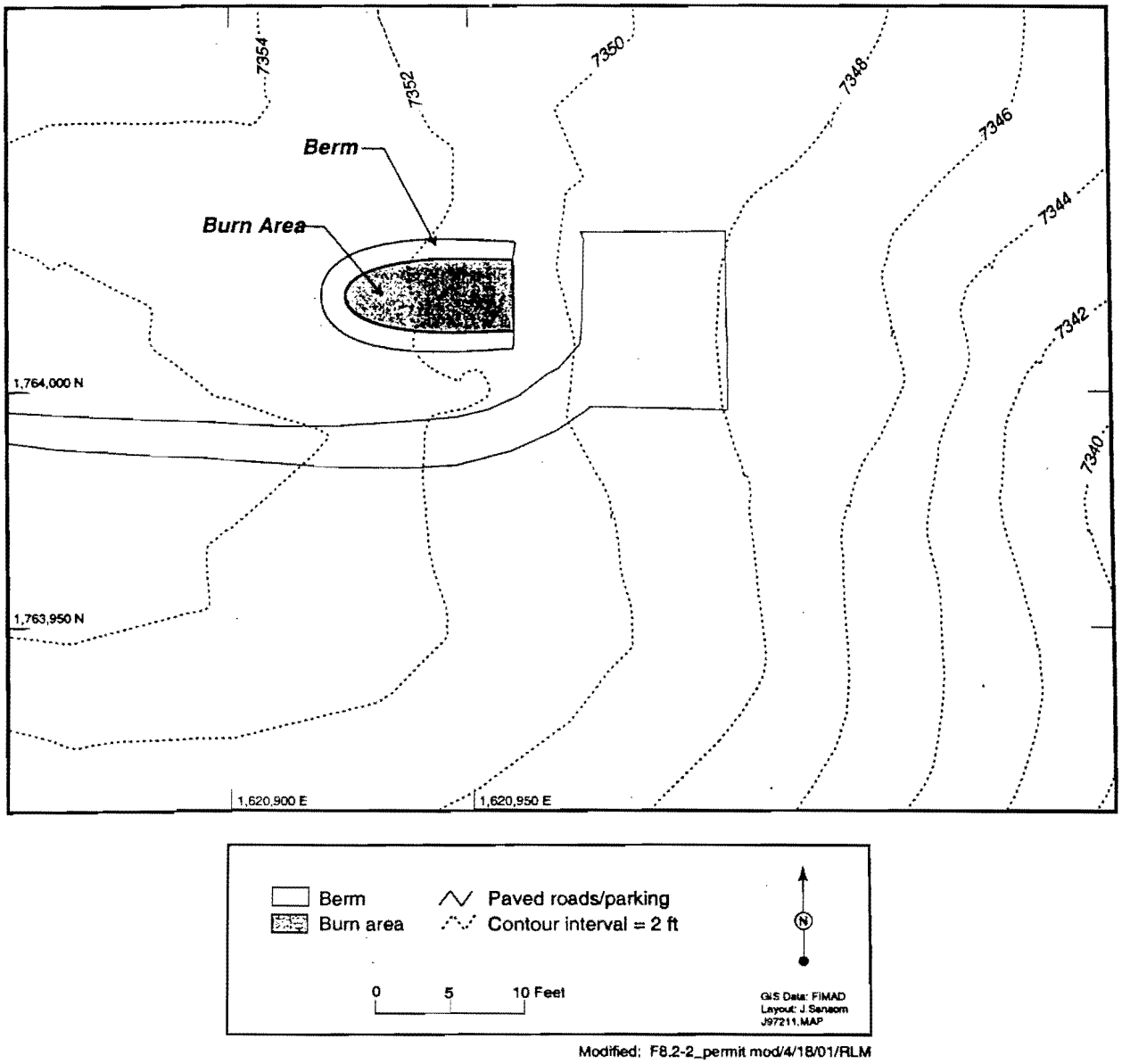


Figure 7.2-1 Site map of TA-14 and SWMU 14-003



Modified: F8.2-2_permit mod/4/18/01/RLM

Figure 7.2-2. SWMU 14-003, former burn area for high explosives

7.3 Land Use

7.3.1 Current

SWMU 14-003 was located within TA-14, an industrial area with high-security restricted access. A chain-link fence topped with barbed wire encloses this technical area. Access through the fence is obtained only by passing through a guard gate. These security measures effectively eliminate the possibility of inadvertent site intrusion.

7.3.2 Future/Proposed

The Laboratory does not anticipate any change in land use at TA-14 from industrial use with restricted access for the operational life of the Laboratory (LANL 1995, 57224, pp.11–12) (Appendix D, Attachment 1). Thus, this area will remain under institutional control.

7.4 Investigation Activities

7.4.1 Summary

An RFI was conducted at SWMU 14-003 in 1995. Based on the RFI results, the ER Project implemented a VCA at the site in 1997. A complete and detailed discussion of all investigation activities is presented in the VCA report for the SWMU 14-003 burn area (Environmental Restoration Project 1997, 56564), included as Attachment B of this request. A summary of those activities is presented in Sections 7.4.1 through 7.4.3 of this request for permit modification.

7.4.2 Investigation #1: RFI Investigation of SWMU 14-003

The RFI completed for SWMU 14-003 in July 1995 was designed to determine if the area encompassed by the earthen berm was contaminated from the burning activities formerly conducted at this site.

7.4.2.1 Nonsampling Data Collection

No nonsampling data collection was conducted.

7.4.2.2 Sampling Data and Collection

Field personnel collected two samples from near the center of the grassy area within the berm at a depth of 0–12 in. (using the hand-auger technique). Samples collected were submitted to a fixed analytical laboratory for gamma spectroscopy and analyses for total and isotopic uranium, HE, SVOCs, and metals.

7.4.2.3 Data Gaps

Although no data gaps, per se, were identified in the RFI report for SWMU 14-003 (Environmental Restoration Project 1996, 54086), the extent of contamination at SWMU 14-003 was not determined in the RFI.

7.4.2.4 Results and Conclusions

The RFI found that the following inorganic chemicals were above their respective background values (BVs): antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver, uranium, and zinc; and that the following radionuclides were above their respective BVs: uranium-235 and uranium-238. The following organics were detected: 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and RDX. Of these, antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, RDX, silver, uranium, and zinc were also above their respective SALs (EPA 1995, 53970) and, therefore, were identified as COPCs.

Although the RFI analytical results for SWMU 14-003 indicated the presence of soils contaminated with HE and metals, the extent of contamination could not be determined because no samples were collected from the berm or from outside of the bermed area. Based on these results, a VCA was planned to determine the extent of the soil contamination at this site and to excavate and remove the contaminated soils.

7.4.3 Investigation #2: VCA Remediation of SWMU 14-003

VCA activities for SWMU 14-003 were conducted from April 10 through July 18, 1997 (ER Project 1997, 56564) (Attachment B). Field activities for this VCA were conducted in accordance with the NMED-approved VCA Plan (Environmental Restoration Project 1996, 55250). Based on expected land use at the site (i.e., industrial, continued Laboratory use), preliminary remediation goals (PRGs) were calculated for the 12 COPCs identified in the RFI risk-based screening assessment (see Section 7.6.2.1).

7.4.3.1 Nonsampling Data Collection

The nonsampling data collection consisted of extensive field screening data collected prior to VCA remediation. Field screening was conducted for HE, metals, and radionuclides. A 34- by 28-ft grid with 2-ft-square intervals was placed over the burn area and the surrounding earthen berm. Various field-screening samples were collected from the center of each 2-ft interval. Laser-induced breakdown spectroscopy (LIBS) screening was used to determine concentrations of barium, lead, and manganese in relation to PRGs. As expected from the historical use of this site and the results of the RFI, the LIBS screening detected several areas where lead exceeded PRGs, primarily in the center of the burn area. Neither manganese nor barium exceeded PRGs in any screening sample. LIBS screening of the top and inner face of the berm surrounding the burn area indicated this area to be free of metal contaminants.

Each grid sample was screened for radioactivity using an Eberline pancake probe and tested for HE using the Laboratory's Dynamic Experimentation (DX) Division HE spot test kit. No radiation was detected above background at any location. One grid location (#240) tested positive with the HE spot test kit. Subsequently, this grid location was excavated until HE soil testing yielded no positive results.

To comply with NMED's request that the area outside of the berm be screened for contaminants, additional LIBS, radiological, and HE screenings (i.e., in addition to screening locations specified in the VCA plan) were conducted outside of the berm. The results of these screenings confirmed that no contamination existed outside of the berm and that no migration of metals or other contaminants occurred in the downgradient drainage extending from the mouth of the berm.

A performance evaluation sample, which consisted of US Geological Survey rock # GXR-2, was analyzed along with the samples from SWMU 14-003 to verify the accuracy and precision of the LIBS. The Z-test for two sample means to compare the measured results with the known standard showed no significant differences between the measured values of lead and barium and the certified values; however, the

manganese results were biased high by approximately 350 ppm. The manganese bias did not affect screening decisions regarding the remediation for two reasons: (1) the highest concentration recorded (5849 ppm manganese at grid location 266) was well below the PRG of 7800 ppm and (2) excavation was performed in grid 266 because lead was above the PRG of 1000 ppm in that grid.

Based on the screening results, a 3-ft-10-in.- by 3-ft-6-in.-area, which included grid square 240, was excavated to a depth of 2.5 ft to remove HE-contaminated soil, and grid squares 265, 266, 267, and 291 were excavated to a depth of 3 ft to remove lead-contaminated soil. The total volume of excavated soil was 19 yd^3.

7.4.3.2 Sampling Data Collection

On July 15, 1997, after VCA soil removal was completed at SWMU 14-003, 15 confirmation samples (including 3 field duplicates) were collected from 12 surface locations to determine if any residual metals, HE, or isotopic uranium remained. Samples were submitted for fixed analytical laboratory analysis of the target analyte metals, HE, and isotopic uranium.

The only deviation from the VCA plan occurred during confirmation sampling. The VCA plan specified the collection of 12 confirmatory samples, all from the center of a 5-ft grid located in the burn area. However, field personnel deviated from the VCA plan and collected samples not only from the center of the burn area, but also from the surrounding berm and at locations outside of the berm. Field personnel determined that additional confirmation sampling locations were required to adequately confirm that contamination was heterogeneously distributed as determined during field screening, that no runoff contaminant transportation occurred at the mouth of the berm, and that the berm consisted of clean soil suitable for placement into excavated areas.

Fifteen confirmation samples were collected from twelve surface locations: nine from 0–6 in., one from 0–8 in., three from 0–10 in., and two from 0–12 in. Seven samples were collected from the depression formed by the excavation of the burn area; two were collected at the mouth of the burn area; two were collected downgradient at 80 ft southeast and 100 ft east from the mouth of the burn area; and four samples were collected from the berm surrounding the burn area. The sample locations (with detected analytes) are presented in Figure 7.4-1.

7.4.3.3 Data Gaps

There were no data gaps associated with the VCA of SWMU 14-003. Sufficient data were collected to adequately determine nature and extent (horizontal and vertical) of contamination.

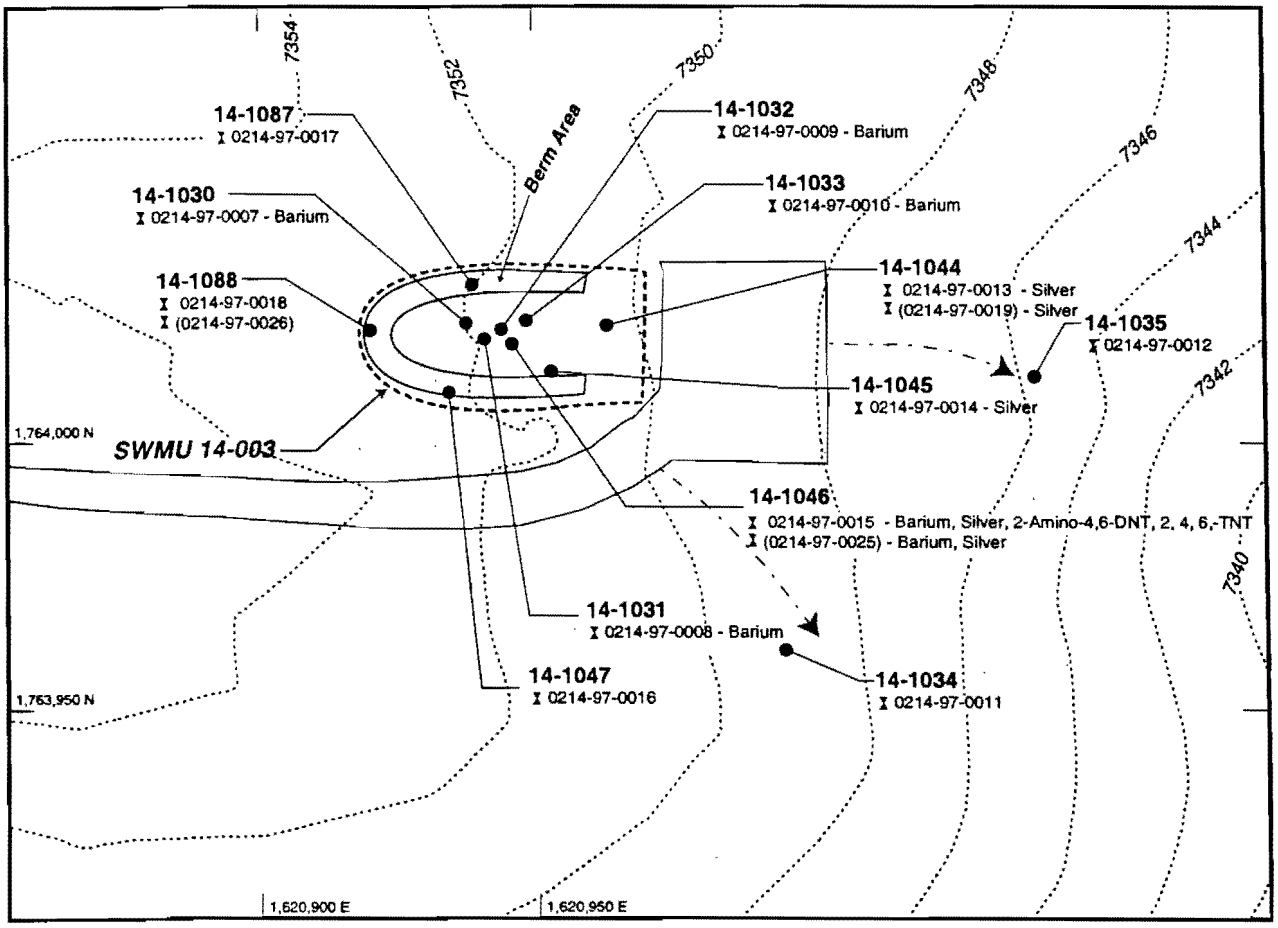


Figure 7.4-1. SWMU 14-003, site map of sample locations with detected analytes

7.4.3.4 Results and Conclusions

The VCA determined that contamination was confined to the 5- by 20-ft area encompassed by the earthen berm. In the confirmation samples taken from the surface soil within the burn area, barium was detected above its then current BV of 315 mg/kg in five samples at concentrations ranging from 330 to 1800 mg/kg. Silver was also detected in three samples at concentrations ranging from 0.6 to 2.0 mg/kg. (At the time the VCA report was prepared, there was no BV for silver; the current BV for silver is 1 mg/kg.) All other inorganic chemicals were detected at concentrations below their respective BVs. Isotopic uranium was detected below its BV.

Two HEs, 2,4,6-trinitrotoluene and 2-amino-4,6 dinitrotoluene (a degradation product of 2,4,6-TNT), were detected in one confirmation sample at concentrations of 0.13 and 0.11 mg/kg, respectively (both at concentrations below their respective PRGs of 64 and 680 mg/kg); the 2,4,6-trinitrotoluene was not detected in the RFI sampling. RDX, which was detected in the RFI, was not detected in the confirmation samples.

After receipt of the confirmation sampling results demonstrating that berm soils were free of contaminants, two feet of soil was removed from the berm and used to fill in the areas excavated from the burn area. The site was regraded and a mixture of native grass seed was applied. A best management practice (BMP) in the form of straw bales was put in place to prevent runoff from the site until vegetation from reseeding established itself to 75% of the vegetation cover that had been present prior to remediation. The BMP was monitored and maintained until vegetation reached this point.

7.5 Site Conceptual Model

SWMU 14-003 was an area for burning HE-contaminated debris remaining from experimental test shots conducted at TA-14. The primary release of contaminants was via deposition of burned residue.

7.5.1 Nature and Extent of Contamination

Prior to the VCA, the extent of any contamination (HE and metals) at SWMU 14-003 was assumed to be confined to the burn area within the earthen berm. VCA field screening and contamination sampling confirmed that the extent of contamination was, indeed, confined to this area and therefore defined. The confirmation samples verified that all COPCs were below the PRGs provided in the NMED-approved VCA Plan, and that the levels of residual contamination that remain at the site are well below their respective SALs; thus presenting no unacceptable risk to human (or ecological) receptors.

7.5.2 Environmental Fate

The physiochemical properties of the detected metals and HE compounds cause them to bind to soil and move via transport of soil particles by water as opposed to moving as dissolved chemicals in water or moving in air because of volatilization. HE compounds are also susceptible to bio- and photolytic degradation. Based on these factors and the low erosion potential at this site (see Section 7.6.4.1 of this request), it is unlikely that any residual contamination present at SWMU 14-003 has the potential for off-site migration (as verified by the two VCA confirmation samples [14-1034 and -1035] collected downgradient from the mouth of the burn area).

7.6 Site Assessments

7.6.1 Summary

A complete and detailed discussion of the human health screening assessment is presented in the VCA report for the SWMU 14-003 burn area (Attachment B), included in this request for permit modification and summarized below in Section 7.6.2.1. A complete and detailed discussion of the ecological screening assessment is presented in the ecological screening evaluation for SWMU 14-003 (Attachment C), included in this request and summarized below in Section 7.6.2.2.

7.6.2 Screening Assessments

The VCA remediation of the SWMU 14-003 burn area reduced the number and concentrations of contaminants from those found during the original RFI. The VCA also determined that contamination was localized and confined to the 5- by 20-ft burn area encompassed by the earthen berm. Within this area, the data review of VCA confirmation samples indicated that two metals (barium and silver) were detected above their BVs and two HE compounds (2,4,6-trinitrotoluene and 2-amino-4,6-dinitrotoluene) were also detected. These four compounds were subjected to an ecological evaluation.

7.6.2.1 Human Health

Because TA-14 will remain under Laboratory control, the future land use for SWMU 14-003 will remain industrial. Therefore, exposure potential was evaluated using the industrial worker scenario, which assumes that people will be working at the site 8 hours a day, 250 days of the year for 25 years. The exposure pathways identified were inhalation, incidental ingestion, and dermal contact of contaminated soil.

Based on expected land use at the site (i.e., industrial, continued Laboratory use), PRGs were calculated for the 12 COPCs identified in the RFI risk-based screening assessment (antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, RDX, silver, uranium, zinc). PRGs were calculated using the modified EPA equations and input parameters presented in EPA Region 9 PRG tables (EPA 1995, 53970).

The VCA confirmatory sampling results for SWMU 14-003 yielded nondetects for antimony, cadmium, and RDX. Arsenic, chromium, copper, lead, manganese and uranium were detected, but at concentrations well below their respective BVs. Zinc was detected within the range of the background data set (Longmire et al. 1995, 52227, Table 7) and, therefore, was considered to be indistinguishable from background. Within the burn area only, barium was greater than its BV of 315 mg/kg in 5 of the 15 confirmation samples (at concentrations ranging from 330–1800 mg/kg). These concentrations are well below the industrial cleanup level of 100,000 mg/kg for barium and also well below the SAL (based on residential exposure) for barium (5300 mg/kg). The data review also indicated that, within the burn area only, silver was detected in 3 of the 15 confirmation samples (at concentrations ranging from 0.6 – 2.0 mg/kg). These concentrations are well below the industrial cleanup level of 8500 mg/kg for silver and also well below the SAL (based on residential exposure) for silver (380 mg/kg). Because the maximum concentrations of barium (1800 mg/kg) and silver (2.0 mg/kg) are well below the industrial PRGs of 100,000 mg/kg and 8500 mg/kg, respectively, these metals were eliminated as COPCs.

Two HE compounds (2,4,6-trinitrotoluene and 2-amino-4,6-dinitrotoluene) were also detected in one confirmatory sample from within the burn area. The 2,4,6-trinitrotoluene was detected at a concentration of 0.11 mg/kg and the 2-amino-4,6-dinitrotoluene was detected at a concentration of 0.13 mg/kg. The

0.11 mg/kg detected concentration of 2,4,6-trinitrotoluene is well below its industrial PRG of 64 mg/kg and also well below its SAL (based on residential exposure) of 15 mg/kg. Thus, this HE compound is not retained as a COPC. Because there is no SAL for 2-amino-4,6-dinitrotoluene, 2,6-dinitrotoluene (with a SAL of 65 mg/kg) is used as a surrogate. (If a chemical compound has no SAL, the SAL of a compound with a similar chemical structure may be used as a surrogate SAL.) Because the 0.13 mg/kg detected concentration of 2-amino-4,6-dinitrotoluene is well below its industrial PRG of 680 mg/kg and its surrogate SAL of 65 mg/kg, 2-amino-4,6-dinitrotoluene is also not retained as a COPC.

The confirmation sample analytical results verify that the VCA was successful in reducing concentrations of human health COPCs at SWMU 14-003 to concentrations below risk-based industrial cleanup levels and residential screening levels (EPA 1995, 53970). Because the human health risk screening assessment determined that no unacceptable risk to human health is present at this SWMU, a human health risk assessment is not required.

7.6.2.2 Ecological

The purpose of an ecological screening evaluation is to identify chemicals of potential ecological concern (COPECS) and not to calculate risk. The evaluation involves the calculation of hazard quotients (HQs) and hazard indices (HIs) for all COPCs identified in the data review and all appropriate ecological screening receptors as described in "Screening Level Ecological Risk Assessment Methods" (Environmental Restoration Project 1999, 63303.2). The HQ analysis is based on the maximum detected concentration or detection limit for each COPC and is calculated by dividing these values by the soil ESL for the nine receptors. The derivation of ESLs is based on the approach presented in the ER Project's ecological risk assessment methodology document (Environmental Restoration Project 1999, 63303.2) and the June 1999 version of the ER ECORISK database (LANL 1999, 64161), which is part of LANL ER Records Package 186. The screening receptors for which ESLs have been derived include the plant, invertebrate, deer mouse, vagrant shrew, desert cottontail, American robin, American kestrel, and the red fox. The rationale for using these receptors is presented in the ER Project's ecological risk assessment methodology document (Environmental Restoration Project 1999, 63303.2).

An HI is the sum of HQs across contaminants with like effects for a given screening receptor. An HQ or HI greater than 1.0 is considered to be an indicator of potential adverse impacts. Chemicals resulting in an HQ greater than 1.0 or that contribute more than 0.1 to an HI greater than 1.0 are identified as COPECs. An ecological assessment is designed to be conservative (i.e., some assumptions may not represent actual conditions) in order to minimize the possibility of eliminating an analyte that may pose a potential ecological risk.

Because the maximum HQs for 2,4,6-trinitrotoluene and 2-amino-4,6-dinitrotoluene are less than 1, these compounds do not meet the definition of a COPEC and are not considered further. However, the maximum HQs for barium and silver are greater than 1; thus these compounds are considered COPECs and are further evaluated using HI analysis.

HI analysis indicated that HIs are greater than 1.0 for the plant, deer mouse, shrew, cottontail, robin, and kestrel and less than 1.0 for the red fox. Because there are no earthworm ESLs for barium and silver, the earthworm was not considered for HI analysis. The HIs greater than 1.0 are driven by barium, except for the plant, which is driven by silver.

Although residual elevated levels of barium and silver remain in the burn area, the ecological receptors of concern have home ranges much larger than this area. The burn area and its surrounding berm covers approximately 1250 ft^2 or 0.3 acre. The home range of the small terrestrial vertebrate receptors identified for this SWMU range from 0.5 to 3 acres. The other wildlife receptors identified for this SWMU have much

larger home ranges. As a result, exposure to the elevated concentrations of barium and silver would be infrequent. In addition, the area containing residual contamination has been covered with 2–3 ft of clean soil, making residual contamination even less accessible to receptors. Grasses and wildflowers have re-vegetated the site since the completion of VCA activities. Based on the localized nature of the residual contamination, the re-colonization of the vegetative community, and the depth at which the residual contamination has been covered, the Laboratory believes that there is no potential for adverse ecological impacts to ecological receptors.

Because the ecological risk screening assessment determined that no unacceptable risk to ecological receptors is present at this SWMU, an ecological risk assessment is not required.

7.6.3 Risk Assessments

7.6.3.1 Human Health

Based on the elimination of all COPCs in the human health screening assessment for SWMU 14-003, no human health risk assessment was necessary.

7.6.3.2 Ecological

Based on the elimination of all COPECs in the ecological screening assessment for SWMU 14-003, no ecological risk assessment was necessary.

7.6.4 Other Applicable Assessments

7.6.4.1 Surface Water

The ER Project has developed a procedure to assess sediment transport and erosion concerns at individual SWMUs. It provides a basis for prioritizing and scheduling actions to control the erosion of potentially contaminated soils at specific SWMUs. The procedure is a two-part evaluation. Part A is a compilation of existing analytical data for the SWMU, site maps, and knowledge-of-process information. Part B is an assessment of the erosion/sediment transport potential at a SWMU. Erosion potential is numerically rated from 1 to 100 using a matrix system. SWMUs that score below 40 have a low erosion potential; those that score from 40 to 60 have a medium erosion potential; and those that score above 60 have a high erosion potential.

As part of the VCA, SWMU 14-003 was regraded and reseeded. A BMP in the form of straw bales was put in place to prevent runoff from the site until vegetation from reseeding established itself to 75% of the vegetation cover prior to remediation. The BMP was monitored and maintained until vegetation reached this point.

A surface water assessment for SWMU 14-003 was conducted on October 6, 1997 after VCA activities had been completed. The assessment resulted in an erosion matrix score of 31.4 (with straw BMPs in place), indicating that the site has low erosion potential.

The assessment found no debris in any nearby watercourse. There are no man-made or natural hydraulic structures or features that might affect the hydrology of the site. Interflow is not a suspected pathway for contaminant migration because of the relatively insoluble nature of metals. Therefore, the results of the surface water assessment indicated little potential for contaminant transport via surface water or sediment.

There are no wetlands or springs in the vicinity of SWMU 14-003.

7.6.4.2 Groundwater

SWMU 14-003 presents no potential pathway for contaminant release to groundwater. The regional aquifer is approximately 875–1100 ft below the ground surface at TA-14 and well below the vertical extent of contamination at SWMU 14-003, which was defined. There are no active or inactive local water supplies and no production wells in the vicinity of SWMU 14-003.

7.6.4.3 Underground Storage Tank

This section is not applicable.

7.6.4.4 Other

This section is not applicable.

7.7 No Further Action Proposal

The VCA plan for this site was presented to the NMED for comment at a January 29, 1997, meeting. At that meeting, NMED concurred to proceed with this VCA, with the stipulation that additional surface soil samples be collected outside of the bermed area (Koch 1997, 66771) (Attachment D). Although the VCA completion report (Attachment B) was completed in September 1997, it was not submitted to NMED because of a reprioritization of sites due to an ER Project reorganization. Because an ecological screening methodology was not in place at the time the VCA report was completed, the VCA report contains no ecological screening assessment. However, an ecological screening evaluation for SWMU 14-003 was conducted during the summer of 1999 (Attachment C).

7.7.1 Rationale

The VCA for SWMU 14-003 consisted of collecting samples to determine the extent of contamination, removing approximately 19 yds^3 of contaminated soils from the burn area and from the surrounding berm, and collecting samples to confirm that cleanup goals were met. In addition, the site was regraded and reseeded, and BMPs were put in place to prevent runoff from leaving the site.

The VCA completion report

- documents all cleanup activities and sampling results;
- states that the nature and extent of contamination for SWMU 14-003 was adequately defined;
- states that confirmation sampling performed at SWMU 14-003 verified that residual contamination is at concentrations that pose no unacceptable level of risk under current and projected future land use; and
- proposes that this SWMU be considered for NFA because the site was successfully remediated based on human health concerns.

The 1999 ecological screening evaluation conducted for SWMU 14-003

- states that, based on the localized nature of the residual contamination, the re-colonization of the vegetative community, and the depth of the residual barium and silver, SWMU 14-003 has no potential for adverse impacts to ecological receptors.

The Laboratory ER Project is proposing SWMU 14-003 for NFA because this SWMU

- has been successfully remediated, as reported in the VCA completion report;
- poses no risk to human health, as reported in the VCA completion report; and
- poses no potential adverse impacts to ecological receptors, as reported in the ecological screening evaluation.

7.7.2 Criterion

Based on the information presented in Sections 7.2 through 7.7, SWMU 14-003 is being proposed for NFA under Criterion 5.

7.8 Supporting Documentation Attached

Attachment A: LASL Engineering Drawings ENG 4-R129 (LASL 1950, 23936); ENG R-129 (LASL 1952, 69698)

Attachment B: ER Project VCA completion report for SWMU 14-003. (ER Project 1997, 56564)

Attachment C: Mirenda memo to file, ecological screening for SWMU 14-003. (Mirenda 2000, 66772)

Attachment D: Koch minutes for the January 29, 1997, NMED-HRMB and LANL monthly meeting. (Koch 1997, 66771)

Appendix D, Attachment 1: LANL site development plan, annual update 1995, pp. 11–12. (LANL 1995, 57224)

7.9 References Used for Text of the Request for Permit Modification for SWMU 14-003

Environmental Restoration Project, February 19, 1996. "RFI Report for Potential Release Sites at TA-14 and TA-12/67 (located in Former Operable Unit 1085," Los Alamos National Laboratory report LA-UR-96-511, Los Alamos, New Mexico. (Environmental Restoration Project 1996, 54086)

Environmental Restoration Project, September 1997. "Voluntary Corrective Action Report for Potential Release Site 14-003, Burn Area," Los Alamos National Laboratory report LA-UR-97-3870, Los Alamos, New Mexico. (Environmental Restoration Project 1997, 56564)

Mirenda, R., August 2000. "Ecological Screening Evaluation for PRS 14-003," Los Alamos National Laboratory, Los Alamos, New Mexico. (Mirenda 2000, 66772)

References Cited in Text

Environmental Restoration Project, November 1996. "Voluntary Corrective Action Plan for Potential Release Site 14-003, Burn Area," Los Alamos National Laboratory report LA-UR-97-3984, Los Alamos, New Mexico. (Environmental Restoration Project 1996, 55250)

Environmental Restoration Project, December 1999. "Screening Level Ecological Risk Assessment Methods, December 1999," Los Alamos National Laboratory report LA-UR-99-1405, Los Alamos, New Mexico. (Environmental Restoration Project 1999, 63303.2)

EPA (Environmental Protection Agency), September 1, 1995. "Region IX Preliminary Remediation Goals (PRGs) Second Half 1995," San Francisco, California. (EPA 1995, 53970)

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. II of IV, Los Alamos National Laboratory report LA-UR-90-3400, Los Alamos, New Mexico. (LANL 1990, 07512)

LANL (Los Alamos National Laboratory), June 1999. "LANL ECORISK Database (DB)," Los Alamos National Laboratory zip diskette, LANL ER Records Package 186, Los Alamos, New Mexico. (LANL 1999, 64161)

Longmire, P.A., D. E. Broxton, and S. L. Reneau (Eds.), October 1995. "Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff, Los Alamos, New Mexico," Los Alamos National Laboratory report LA-UR-95-3468, Los Alamos, New Mexico. (Longmire et al. 1995, 52227)

7.10 History of Regulatory Deliverables

ER Project, February 15, 1996:	Submittal of RFI report for Technical Areas 12, 14, and 67. (ER Project 1996, 54085)
NMED, August 16, 1996:	NOD on RFI report for Technical Areas 12, 14, and 67. (NMED 1996, 59154)
ER Project, October 15, 1996:	Response to the NOD on RFI report for Technical Areas 12, 14, and 67. (ER Project 1996, 55045)
ER Project, November 6, 1996:	Submittal of VCA plan for PRS 14-003 to HWB. (ER Project 1996, 55250)
NMED, January 29, 1997:	NMED verbal approval of VCA plan for PRS 14-003. (Koch 1997, 66771)
ER Project, September 1997:	VCA completion report for PRS 14-003 submitted to HWB as Attachment B of this request. (ER Project 1997, 56564)

7.10.1 References for Regulatory Deliverables

LANL (Los Alamos National Laboratory), February 15, 1996. "Submittal of the Resource Conservation and Recovery Act (RFI) Report for Potential Release Sites (PRSs) at Technical Areas (TAs) 14 and 12/67 (located in Former Operable Unit 1085)," Los Alamos National Laboratory letter EM/ER:96-062 to D. Neleigh (EPA Region 6) from J. Jansen (ER Program Manager) and T. Taylor (LAAO Program Manager), Los Alamos, New Mexico. (LANL 1996, 54085)

NMED (New Mexico Environment Department), August 16, 1996. "Notice of Deficiency, RCRA Facility Investigation Report, Technical Areas 12, 14, 67, Los Alamos National Laboratory (NM 0890010515)," New Mexico Environment Department document, Santa Fe, New Mexico. (NMED 1996, 59154)

LANL (Los Alamos National Laboratory), October 15, 1996. "Response to the NOD for TAs-12, -14, and -67 for RFI Report (Former Operable Unit 1085)," Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL 1996, 55045)

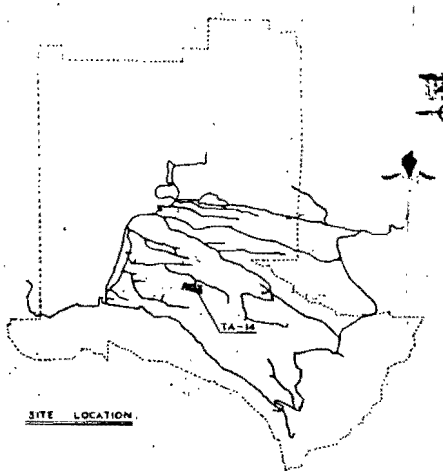
Environmental Restoration Project, November 1996. "Voluntary Corrective Action Plan for Potential Release Site 14-003, Burn Area," Los Alamos National Laboratory report LA-UR-97-3984, Los Alamos, New Mexico. (Environmental Restoration Project 1996, 55250)

Koch, B., January 31, 1997. "January 29, 1997, Meeting Minutes, NMED-HRMB and LANL Monthly Technical Meeting," US Department of Energy-Los Alamos Area Office, Los Alamos, New Mexico (Koch 1997, 66771)

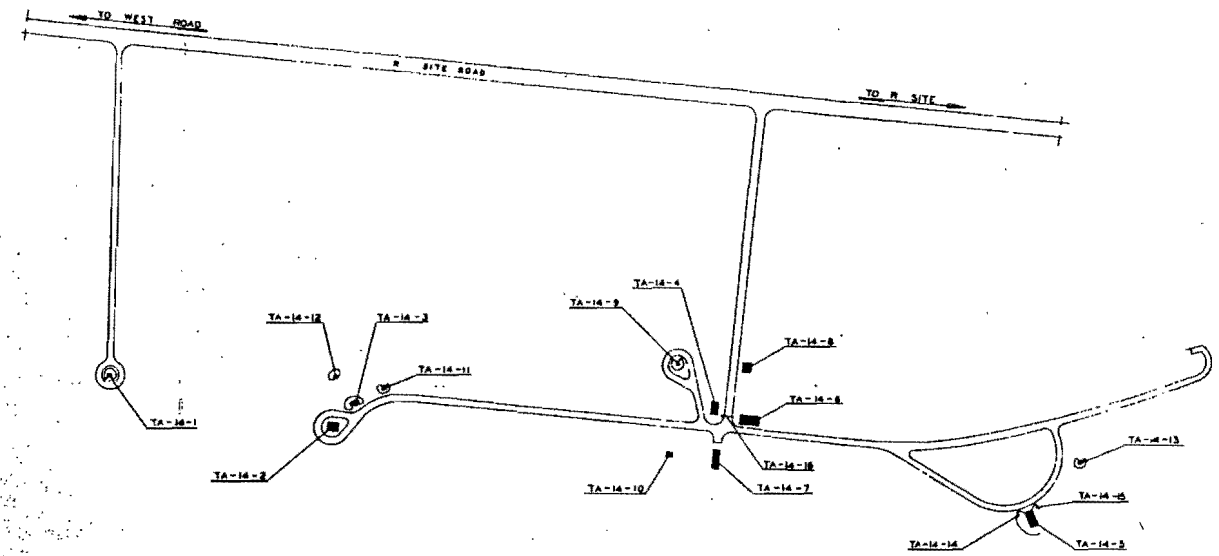
Environmental Restoration Project, September 1997. "Voluntary Corrective Action Report for Potential Release Site 14-003, Burn Area," Los Alamos National Laboratory report LA-UR-97-3870, Los Alamos, New Mexico. (Environmental Restoration Project 1997, 56564)

14-003

ATTACHMENTS



STRUCTURE NUMBER	DESIGNATION	REMARKS
TA-14-1	Q-1	MAGAZINE
TA-14-2	Q-2	CLOSED CHAMBER
TA-14-3	Q-3	CONTROL ROOM
TA-14-4	Q-4	EXPL. PREP. BUILDING
TA-14-5	Q-5	CONTROL BUILDING
TA-14-6	Q-6	SHOP & DARK ROOM
TA-14-7	Q-7	ELECTRONIC SHOP
TA-14-8	Q-8	STORAGE BUILDING
TA-14-9	Q-9	MAGAZINE
TA-14-10	Q-10	STORAGE
TA-14-11	Q-11	MAGAZINE
TA-14-12	Q-12	INSTRUMENT CHAMBER & FIRING POINT
TA-14-13	Q-13	MAGAZINE
TA-14-14	Q-14	CHAMBER NO. 1
TA-14-15	Q-15	CHAMBER NO. 2
TA-14-16	Q-16	ROAD BLOCK



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P. Lang 5-14-2001

1-0106371

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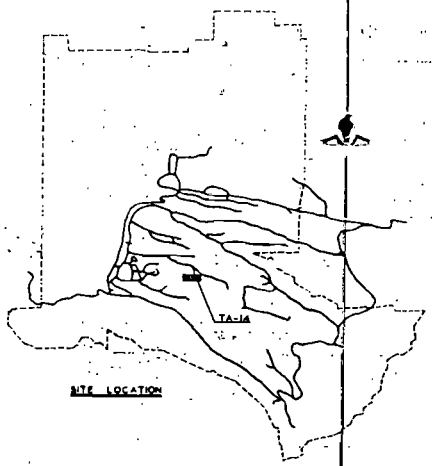
NORTH (MAGNETIC)

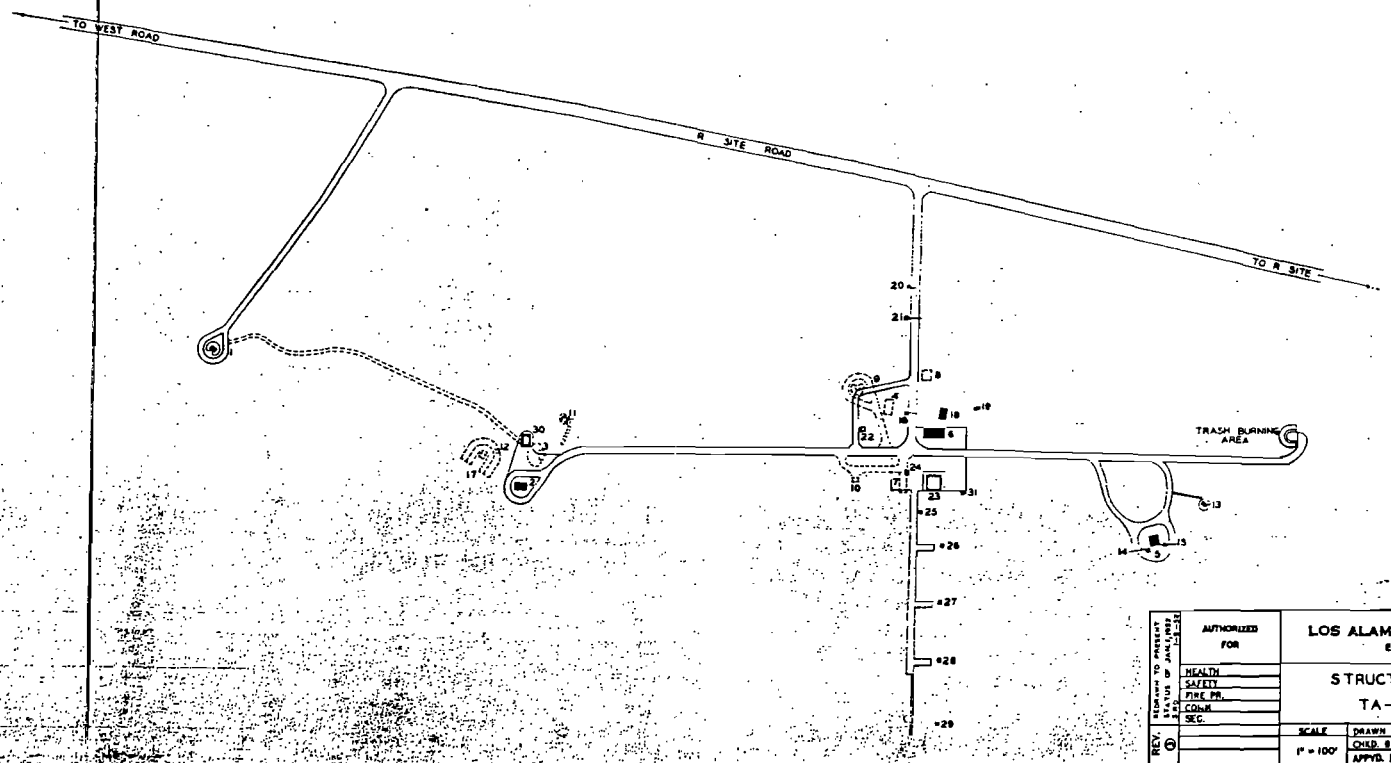
Attachment A-1

14-003

AUTHORIZED FOR	LOS ALAMOS SCIENTIFIC LABORATORY DEPARTMENT OF ENGINEERING—CONSTRUCTION & MAINTENANCE GROUP	
HEALTH SAFETY FIRE PR. COMM. SEC.	STRUCTURE LOCATION PLAN TA-14 Q-SITE	
REV. 0	SCALE 1" = 100'	DRAWN BY C.R.S. DATE 7-31-58 CHKD BY DATE APPVD BY DATE
		DWG. NO. ENG4-R129



STRUCTURE NUMBER	DESIGNATION	REMARKS
TA-14-1	Q-1	MAGAZINE
TA-14-2	Q-2	CLOSED CHAMBER
TA-14-3	Q-3	CONTROL ROOM TO BE REMOVED
TA-14-4	Q-4	EXPL. PREP. BLDG. TO BE REMOVED
TA-14-5	Q-5	CONTROL BLDG.
TA-14-6	Q-6	SHOP & DARK ROOM
TA-14-7	Q-7	ELECTRONIC SHOP TO BE REMOVED
TA-14-8	Q-8	STORAGE BLDG. TO BE REMOVED
TA-14-9	Q-9	MAGAZINE TO BE REMOVED
TA-14-10	Q-10	STORAGE TO BE REMOVED
TA-14-11	Q-11	MAGAZINE TO BE REMOVED
TA-14-12	Q-12	JUNCTION BOX SHELTER TO BE REMOVED
TA-14-13	Q-13	MAGAZINE
TA-14-14	Q-14	EQUIPMENT BOX NO. 1
TA-14-15	Q-15	EQUIPMENT BOX NO. 2
TA-14-16	Q-16	ROAD BLOCK TO BE REMOVED
TA-14-17	Q-17	FIRING PEDESTAL TO BE REMOVED
TA-14-18	Q-18	SUBSTATION
TA-14-19	Q-19	SEPTIC TANK
TA-14-20	Q-20	WIG-WAG PROPOSED
TA-14-21	Q-21	BARRICADE GATE "
TA-14-22	Q-22	MAGAZINE "
TA-14-23	Q-23	CONTROL BLDG. "
TA-14-24	Q-24	PULLBOX "
TA-14-25	Q-25	PULLBOX "
TA-14-26	Q-26	PULLBOX "
TA-14-27	Q-27	PULLBOX "
TA-14-28	Q-28	PULLBOX "
TA-14-29	Q-29	PULLBOX "
TA-14-30	Q-30	MAGAZINE "
TA-14-31	Q-31	FILTER BOX "



Attachment A-2
14-003

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REV.	REDRAWN TO PRESENT STATUS OF JAN. 1952	AUTHORIZED FOR
0		HEALTH
		SAFETY
		FIRE PR.
		COMM.
		SEC.

LOS ALAMOS SCIENTIFIC LABORATORY
ENGINEERING DEPARTMENT

STRUCTURE LOCATION PLAN
TA-14 Q-SITE

SCALE	DRAWN BY: S.R.D.	DATE: 1-9-52	DWG. NO.
1" = 100'	CHKD. BY: J.I.S. & J.	DATE: 1-16-52	ENG. A-129
	APPVD. BY:	DATE: 1-17-52	

Attachment B

14-003

Voluntary Corrective Action Completion Report for

Potential Release Site
14-003
Burn Area

Field Unit 2

Environmental
Restoration
Project

September 1997

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-97-3870

TABLE OF CONTENTS

VOLUNTARY CORRECTIVE ACTION COMPLETION REPORT FOR POTENTIAL RELEASE SITE 14-003, BURN AREA

1.0 INTRODUCTION

Potential Release Site (PRS) 14-003 is a former High Explosives (HE) burn area at Los Alamos National Laboratory (the Laboratory/LANL). This PRS is located within LANL's TA-14, known as Q-site (Figure 1.0-1). PRS 14-003 is listed in Table A of the Hazardous and Solid Waste Amendments (HSWA) Module of the Laboratory's RCRA Permit, and is also on the list of sites in or near a water course. PRS 14-003 has now been remediated.

TA-14 was established in 1944 by LANL's Explosives Division (X Division) for close observation of small explosive charges. PRS 14-003, the burn area, consists of a former trash burning area, partly enclosed by a horseshoe-shaped dirt berm, which was used for burning debris remaining from experimental test shots conducted at TA-14 that left noncombustible residuals including uranium and various other metals. The burn area was 300 ft northeast of TA-14-5 at the end of an abandoned paved road which curves around the east end of the PRS. It consisted of a level, 5-ft x 20-ft grassy area enclosed on three sides by a 3-ft-high dirt berm, open on the east toward the end of the asphalt road. The floor of the burn area is soil. No drainage paths exit the PRS due to the surrounding berm and road, though beyond the paving to the east is a shallow gully that drains southeastward to Cañon de Valle. PRS 14-003 is on the LANL list of PRSs in or near watercourses.

The history of PRS 14-003 is discussed in detail in Section 5.6.2 of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) work plan (LANL 1994, 1156). This site was selected for Voluntary Corrective Action (VCA) because twelve (12) chemicals of potential concern (COPCs) were found in the soil of the burn area, and because the remedy was obvious (i.e., excavation and removal) and final. The VCA was conducted to eliminate contaminants from this PRS that could be of concern for human health reasons. The VCA plan for this site was approved by DOE in November 1996 (Environmental Restoration Project 1996, ER ID No. 55250). The plan was presented to the NMED for comment on January 29, 1997. NMED's concurrence to proceed with the VCA was obtained during the meeting, with the stipulation that additional surface soil samples were to be collected from outside the bermed area and screened for contamination to address concerns that contaminants could have been distributed outside the berm if any explosions occurred.

2.0 SITE CHARACTERIZATION PRIOR TO REMOVAL

The burn area was estimated to contain up to 30 cubic yards of material, including the flat inner area plus the surrounding berm. The surrounding area is grass and dirt. The extent of contamination was believed to be contained within the berm. Because the Phase I sampling had been limited to collection of two samples, the VCA plan included extensive Laser-Induced Breakdown Spectroscopy (LIBS), rad screening, and high explosives (HE) field testing to help determine the extent of contamination as the VCA proceeded.

2.1 RFI Field Activities

The Phase I RFI sampling was conducted in July 1995. The objective of the Phase I sampling was to determine whether contamination was present at this site. A VCA plan was written and approved by DOE in November 1996 (ER Project 1996, ER ID No 55250).

Two surface soil samples (6-12 in.) were collected in the center of the grassy area of the bermed pit during the Phase I investigation at this PRS. The surface soil was screened for HE and radioactivity prior to any intrusive activities; screening showed no elevated levels. Samples collected were submitted to a fixed analytical laboratory for gamma spectroscopy, total and isotopic uranium, HE, semi-volatile organic compounds (SVOCs), and target analyte list (TAL) metals. The results of the RFI screening assessment

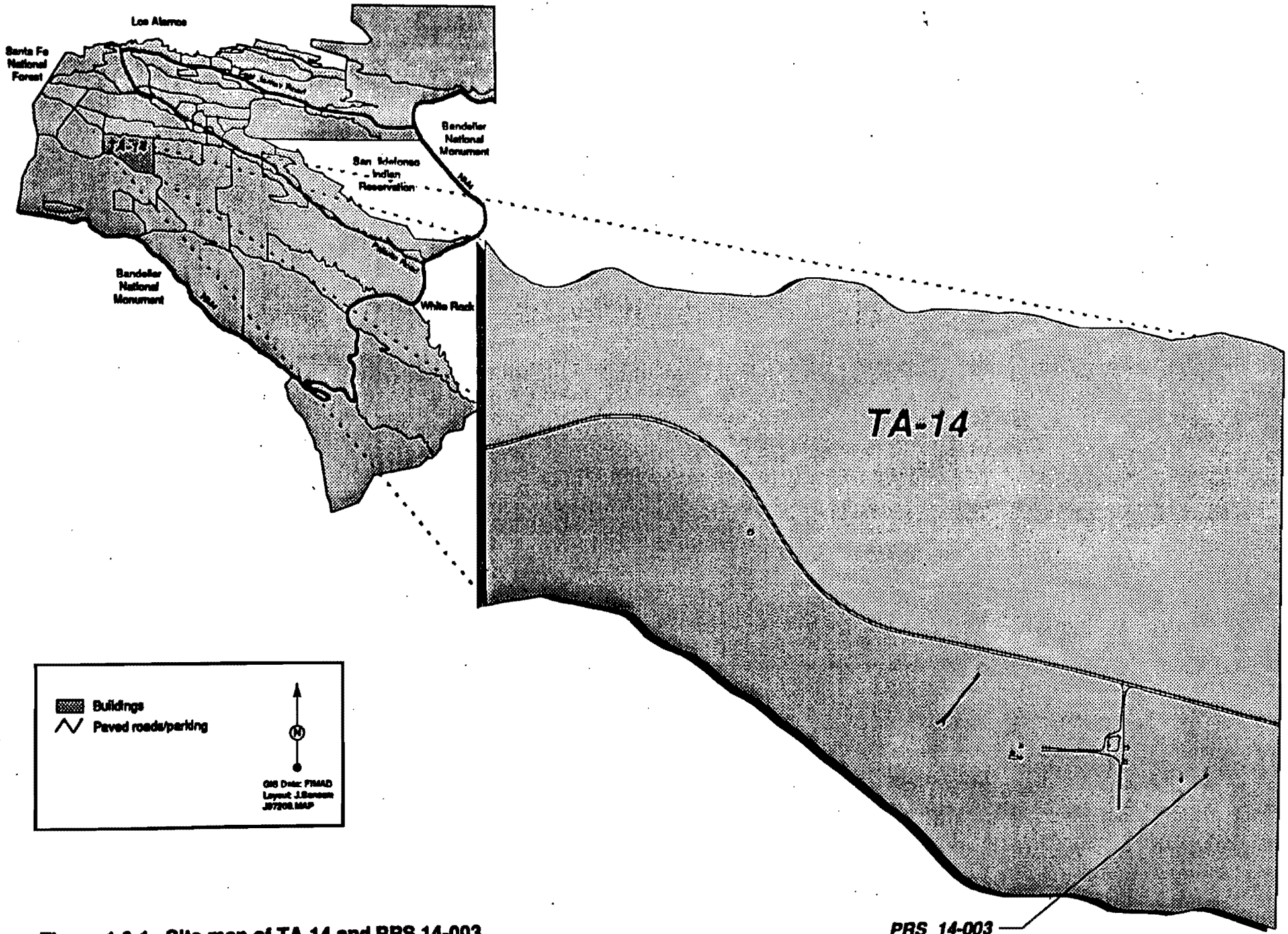

Figure 1.0-1 Site map of TA-14 and PRS 14-003

indicated that 12 COPCs were detected at this PRS. The data quality assessment and results of the 1995 sampling are fully presented in the VCA Plan. A summary of the analytical results is presented below.

- Twelve inorganics (antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, uranium, and zinc) were detected at concentrations above their respective background upper tolerance limits (UTLs). Silver was also detected in the soil samples, but does not have a background UTL. All other inorganics were detected at concentrations below their respective background UTLs and are eliminated from further evaluation.

- Arsenic, barium, cadmium, copper, lead, and manganese were detected at concentrations above their respective screening action levels (SALs) and were retained as COPCs. Antimony, chromium, mercury, nickel, silver, uranium, and zinc were below their respective SALs and were submitted to an MCE for noncarcinogens.

- The radionuclides (total uranium, uranium-235, and uranium-238) were detected above their respective background UTLs, but were below their SALs. The two isotopes of uranium are components of total uranium; therefore, the detected concentrations of total uranium were used in place of the two isotope concentrations, a more conservative approach. Uranium was not submitted to an MCE for radionuclides because it was the only analyte present in this category and was eliminated as a COPC.

- Three HE organic analytes (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, and RDX) were detected in the soil samples. 2-Amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene have no SALs, but were compared to the SAL for 2,6-dinitrotoluene (65 mg/kg) because of similarity for chemical structure. The detected concentrations of these two HE compounds were less than 65 mg/kg. These analytes were submitted to the MCE for noncarcinogens. RDX was detected at a concentration that exceeded its SAL and was retained as a COPC.

- The MCE for noncarcinogens included nine analytes, seven inorganics, and two HE compounds. The sum of the normalized concentrations was 2.1, which is above the target value of 1.0. As a result, antimony, chromium, silver, uranium, and zinc were retained as COPCs because the normalized concentrations were equal to or greater than 0.1 (Dorries 1996, 1297). The remaining analytes were eliminated from further evaluation because they were below SAL and had normalized concentrations less than 0.1 (Dorries 1996, 1297).

The results of the screening assessment identified antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, RDX, silver, uranium, and zinc as COPCs at this PRS.

2.2 Nature and Extent of Contamination

The purpose of the Phase I sampling was to determine the presence of contamination at the burn pit. The sampling was confined to the depression within the burn pit where the burning of materials took place. This depression was considered the most likely area for contamination to be present. The Phase I sampling identified eleven inorganics and one HE as COPCs at this PRS. No sampling to determine the extent of contamination was conducted during this initial sampling. The determination of extent was the objective of the sampling proposed as part of the VCA activities at this PRS.

The VCA was designed to determine whether the contamination identified during the Phase I sampling extended beyond the boundaries of the burn pit. In order to accomplish this objective, the area within and around the burn pit at PRS 14-003 was extensively sampled by field screening (LIBS) and laboratory analyses. The field screening data collected during the VCA indicated that the area of contamination was limited to the depression within the burn pit and there were no concentrations of inorganics above background UTLs outside the burn pit. The confirmatory samples collected following remediation of the burn pit indicated that barium was present at concentrations above the background UTL but below SAL, and silver was present at two sample locations within the depression of the burn pit. 2-Amino-4,6-dinitrotoluene and 2,4,6-trinitrotoluene were also detected in one confirmatory sample within the

depression of the burn pit. However, the inorganics and HE analytes detected were below their respective SALs and industrial preliminary remediation goals (PRGs).

Confirmatory samples were also collected from the mouth of the burn pit, the berm surrounding the burn pit, and the drainage from the burn pit (see Section 3.2, Confirmatory Sampling, for a summary of the results). The results from confirmatory samples collected at the mouth of the burn pit had one detection of silver, several orders of magnitude below its SAL, but all other inorganics were detected below background. No HEs were detected in the soil from this area. Analytical results from the confirmatory samples collected from the berm surrounding the burn pit and the drainage located 80-100 ft southeast and east of the burn pit had no inorganics detected above background and no HEs detected in the soil. Therefore, the sampling conducted as part of the Phase I investigation and the VCA at PRS 14-003 has determined the nature of any contaminants in the soil as well as the extent of any contamination.

2.3 Risk Calculations and/or Cleanup Level Derivation

The PRGs for the COPCs retained as a result of the previous risk-based screening assessment and presented in Table 2.3-1 were calculated based on the expected land use at the site, i.e., industrial (continued Laboratory use). The PRGs were calculated using modified U.S. Environmental Protection Agency (EPA) equations and input parameters presented in EPA Region 9 PRG Tables (EPA 1995, 1307). The PRGs used for comparison purposes were the industrial PRGs for soil presented in the 1995 EPA PRG Tables. The derivation of human health risk-based cleanup levels for this VCA was based on an industrial exposure scenario for a generic worker. Exposure routes considered in the calculations of the PRGs included incidental ingestion, dermal contact, and inhalation of contaminated soil.

The PRGs for carcinogens were derived assuming an acceptable level of risk of 10^{-6} and for noncarcinogens a hazard index of 1.0. With this approach, the residual risk remaining at the site following remediation should be within the acceptable risk range of 10^{-4} to 10^{-6} for carcinogens and less than a hazard index of one for noncarcinogens.

The PRG for lead in soil is 1,000 ppm and has been adopted by the Laboratory for an industrial exposure scenario based on information obtained from EPA Region 6 (Neleigh 1995, ER ID No. 55740). This soil PRG considers the fetal effects when a pregnant worker is exposed. Under the industrial/commercial exposure scenario, a pregnant female adult worker is the reasonable maximum exposed individual.

TABLE 2.3-1
PRGs FOR PRS 14-003

COPCs	PRGs[1] (mg/kg)	Rationale
Antimony	680	Noncarcinogen; based on hazard index of 1
Arsenic	7.8	Carcinogen; based on acceptable risk level of 10^{-5}. The PRG is the Laboratory background UTL.
Barium	100,000	Noncarcinogen; based on hazard index of 1
Cadmium	850	Noncarcinogen; based on hazard index of 1
Chromium	450	Noncarcinogen; based on hazard index of 1
Copper	63,000	Noncarcinogen; based on hazard index of 1
Lead	1,000	Noncarcinogen; based on EPA Region 6 guidance[2]
Manganese	7800	Noncarcinogen; based on hazard index of 1
RDX	17	Carcinogen; based acceptable risk level of 10^{-6}
Silver	8500	Noncarcinogen; based on hazard index of 1
Uranium	5100	Noncarcinogen; based on hazard index of 1
Zinc	100,000	Noncarcinogen; based on hazard index of 1

[1] Based on an industrial scenario

[2] Neleigh 1995, ER ID No. 55740

3.0 REMEDIAL ACTIVITIES AND RESULTS OF CONFIRMATORY SAMPLING

3.1 Remedial Implementation

Field activities for this VCA were conducted in accordance with the approved VCA Plan (ER Project 1996, ER ID No. 53250). The VCA began on April 10, 1997, and continued through July 18, and the confirmatory sampling was completed on July 15, 1997. All activities took place at PRS 14-003 in TA-14. Figure 3.1-1 shows the areas of soil removal, based upon the field screening results.

In the field, extensive screening using LIBS, rad meters, and the HE spot test was completed prior to actual remediation. A two-foot grid was placed over the site and berm (see Figure 3.1-2), and samples were collected initially at three depths (surface, 6", and 12") for screening. As proposed in the VCA plan, the LIBS was utilized in the field to determine Pb, Mn and Ba concentrations relative to PRGs, and to direct the removal of soil with metals concentrations above PRGs. This screening technique was utilized to reduce waste volume and because LIBS has good sensitivity (i.e., the detection limits for LIBS are at least an order of magnitude below the PRGs) for these elements. The final sample screening grid consisted of a 17 x 14 square grid (each square was 2' on a side, total size 34' x 28') for a total of 238 grid positions. Samples were collected from the center of each grid, totaling 238 individual locations at each of 3 depths. This grid pattern resulted in a 90% probability of finding any "hot spots" having a radius of 1 ft or greater (Gilbert 1987, 0312). The LIBS screening grid began at the top of the berm, and extended down into the face and center.

Each grid sample was also screened for radioactivity using an Eberline pancake probe, and tested for HE using the LANL DX division Field Spot Test kit. No radiation was detected above background at any location. One grid location tested positive with the HE spot test kit. Subsequently, this grid location was excavated for HE until soil testing revealed no further positive results.

The LIBS results from the screening activity are presented in Appendix D (Tables D-1 through D-3). A graphical representation of the grid area is shown in Figure 3.1-2. As expected from the descriptions of the historical site use, the LIBS results showed several areas where Pb exceeded the PRGs, primarily in the center of the PRS. Grid squares 265, 266, 267, and 291 had concentrations of Pb above or close to the PRGs. Grid square 240 was found to contain HE, as evidenced by the HE spot test kit. Neither Mn nor Ba exceeded the PRGs in any screening sample. The top and inner face of the berm around the site was shown by screening to be free of any contamination above PRGs, which greatly reduced the waste volume.

To comply with additional characterization of the extent of contamination requested by NMED, an extra suite of surface soil screening locations was analyzed by LIBS, rad screening, and the HE spot test along a radial grid centered on the burn area. Results from the screening outside the berm area are presented in Table D-4. These samples were collected at 20-ft intervals in eight directions out to 100 ft, beginning from the center of the berm (i.e., 45-degree angles) from square 267. If the sample location from this additional grid fell on a sample location from the original grid, the original sample location was used. The results from the additional screening sampling confirmed the lack of contaminants outside the center of the berm. In addition, the screening results confirmed the supposition that no migration of metals or other contaminants had occurred in the slightly downgradient direction from the center of the berm.

A Performance Evaluation (PE) sample, which consisted of USGS rock # GXR-2, was analyzed along with the samples from PRS 14-003 as an additional check on the accuracy and precision of the LIBS. Table D-5 shows the results. Using the z-test for two sample means to compare the measured results with the known standard, there were no significant differences between the measured values of Pb and Ba and the certified values, while the Mn results were biased high by approximately 350 ppm. The Mn bias did not affect the screening decisions on where to remediate, because the highest concentration recorded (5,849 ppm Mn at grid location 266) was well below the PRG of 7,800 ppm and because the Pb was above the PRG in that grid; thus excavation was performed based on the Pb screening results.

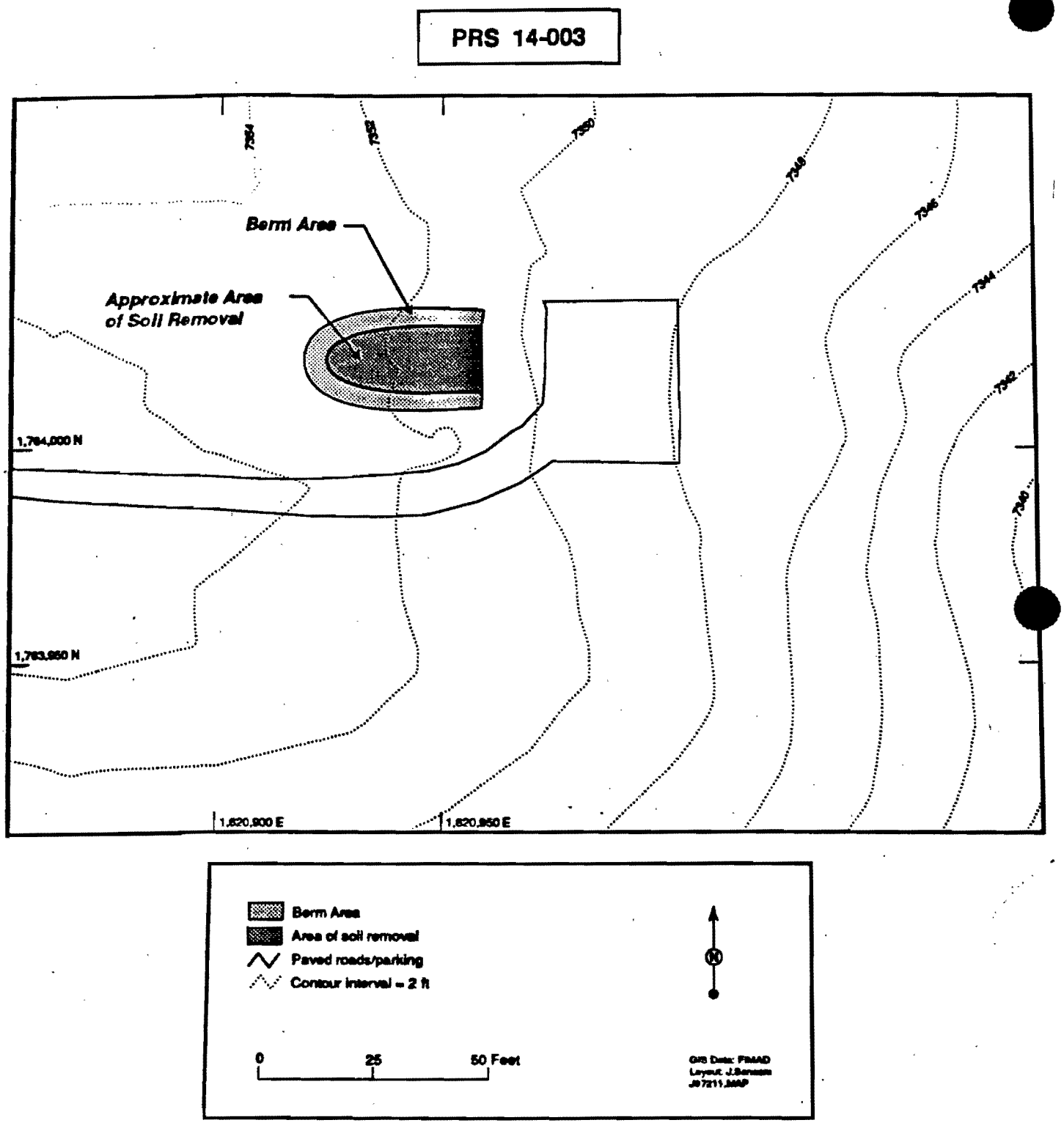

Figure 3.1-1 PRS 14-003, Area of soil removal

PRS 14-003

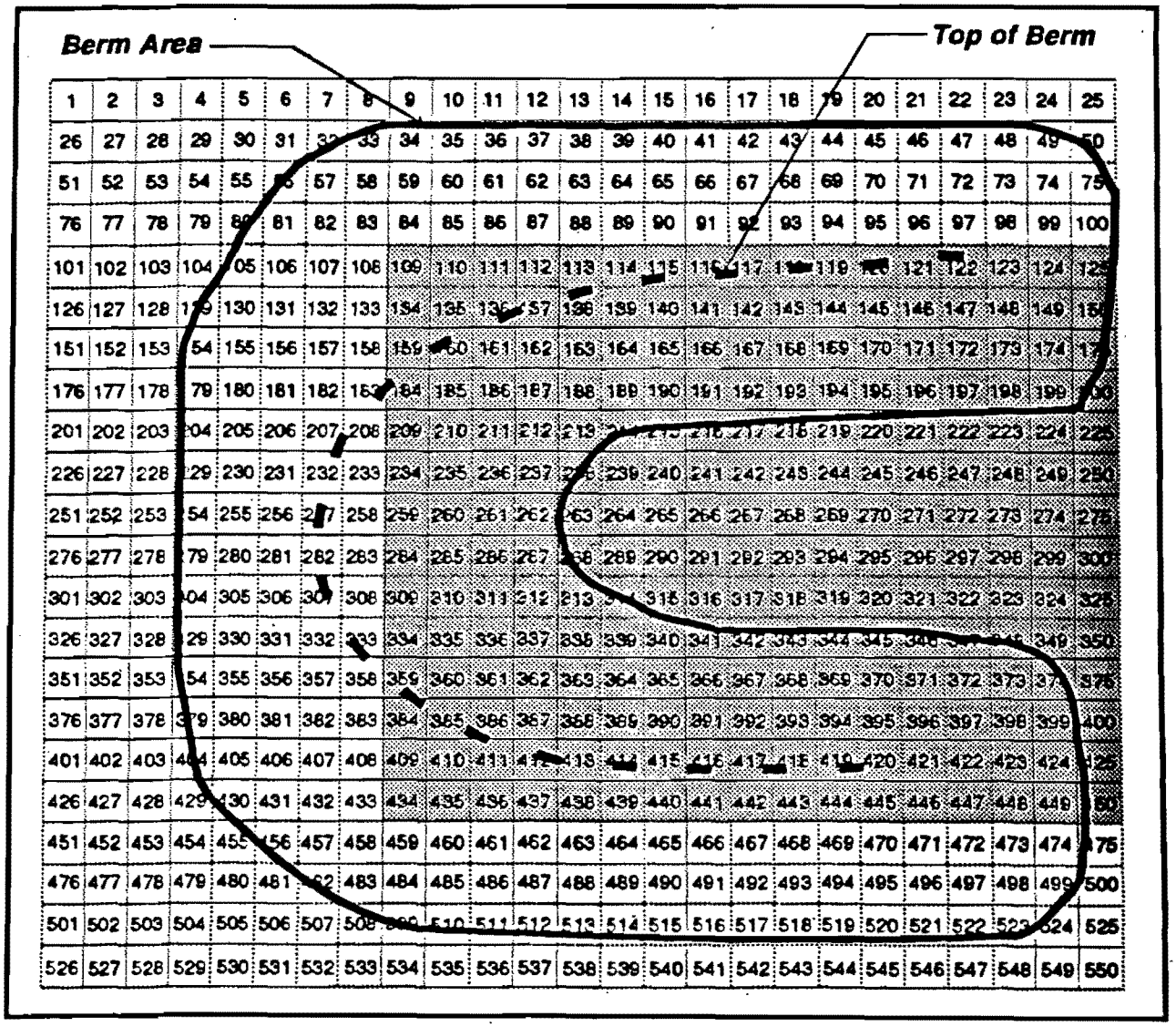

Figure 3.1-2 PRS 14-003, Grid for screening sampling

Based upon the screening results, a conservative removal of the center of the grid (5 squares x 8 squares; numbers 214-221; 239-246; 264-271; 289-296; 314-321) was accomplished down to a depth of 2'. Grid square 240 was excavated to a depth of 2.5' and an area of 3' 10" x 3' 6" to remove HE. Grid squares 265-267 and 291 were excavated to a depth of 3' to remove Pb. These deeper excavations followed the removal of the 2' of soil from the entire interior of the berm. In all, just over three B-25 bins were filled during this VCA, for a total excavated volume of 19 cubic yards of soil. This agrees with the 15 cubic yards of soil estimated for removal in the VCA plan (ER Project 1996, ER ID No. 55250)

Site restoration was completed after receipt of the confirmatory samples by shoveling the berm soil into the excavation. Both LIBS screening and fixed laboratory analysis (see Figure 3.2-1) confirmed the cleanliness of this soil prior to backfilling. A mixture of native grass seed will be applied to the area, and the area will be monitored until regrowth is substantially complete. Until regrowth is 75% complete, storm runoff controls (such as hay bales or silt fencing) will be implemented.

The only deviation from the VCA plan occurred during the confirmatory sampling. The VCA plan specified collection of 12 samples from the centers of a 5-ft grid located in the burn area. The 12 confirmatory samples collected were taken from several different locations to more adequately account for the heterogeneous distribution of contamination determined during the screening, to account for possible runoff/transport to the mouth of the berm, and to confirm that the berm consisted of clean soil suitable for placement into the excavation. Thus, the confirmatory sampling scheme was altered to more completely characterize the remaining contaminants, if any.

3.2 Confirmatory Sampling

Confirmatory samples were collected from the following grid squares: grid #240, sample location ID 14-1030; #242, 14-1032; #292, 14-1031; #246, 14-1033. Due to a field oversight, the grid numbers for the remaining confirmatory samples, numbered 14-1044 through 1047 and 1087-1088 were not recorded, and the grid was removed before the locations could be recorded. The sample locations were flagged, however, and surveyed. An additional two laboratory samples were collected to confirm the screening results outside the berm (as requested by NMED), and to confirm that migration of contaminants had not occurred. These two samples were collected on the radial grid at locations 80SE, sample ID 14-1034, and 100E, 14-1035. In total, 12 confirmatory samples were collected. Figure 3.2-1 shows the locations.

Data Quality Assessment

Samples were collected, processed, and analyzed in accordance with the ER Project Quality Assurance Project Plan Requirements for Sampling and Analysis (QAPP) (LANL 1996, 1292). The QA/QC samples used to determine the quality and usability of the soil data generated from the confirmatory samples included method blanks, calibration blanks, laboratory duplicates, surrogates, spikes, laboratory control samples, and internal standards. These samples were analyzed according to the frequency outlined in EPA's functional guidelines for organic and inorganic data review (EPA 1994, 1205 and 1206). A review of the technical quality of the data (baseline validation) requires that the data be compared to numerical acceptance criteria established either by the analytical laboratory or EPA for the QA samples mentioned above. The data that do not meet these criteria are qualified to indicate to the data user those sample results that have potential deficiencies associated with sample handling and analysis.

The QA/QC data associated with this investigation indicated that 100% of the data are acceptable and defensible. None of the data are qualified as estimated undetected (UJ), estimated (J), or unusable (R). The data are of good quality and are suitable for decision-making purposes. The QA/QC mechanisms were effective in ensuring the reliability of measured data within expected limits of sampling and analytical error.

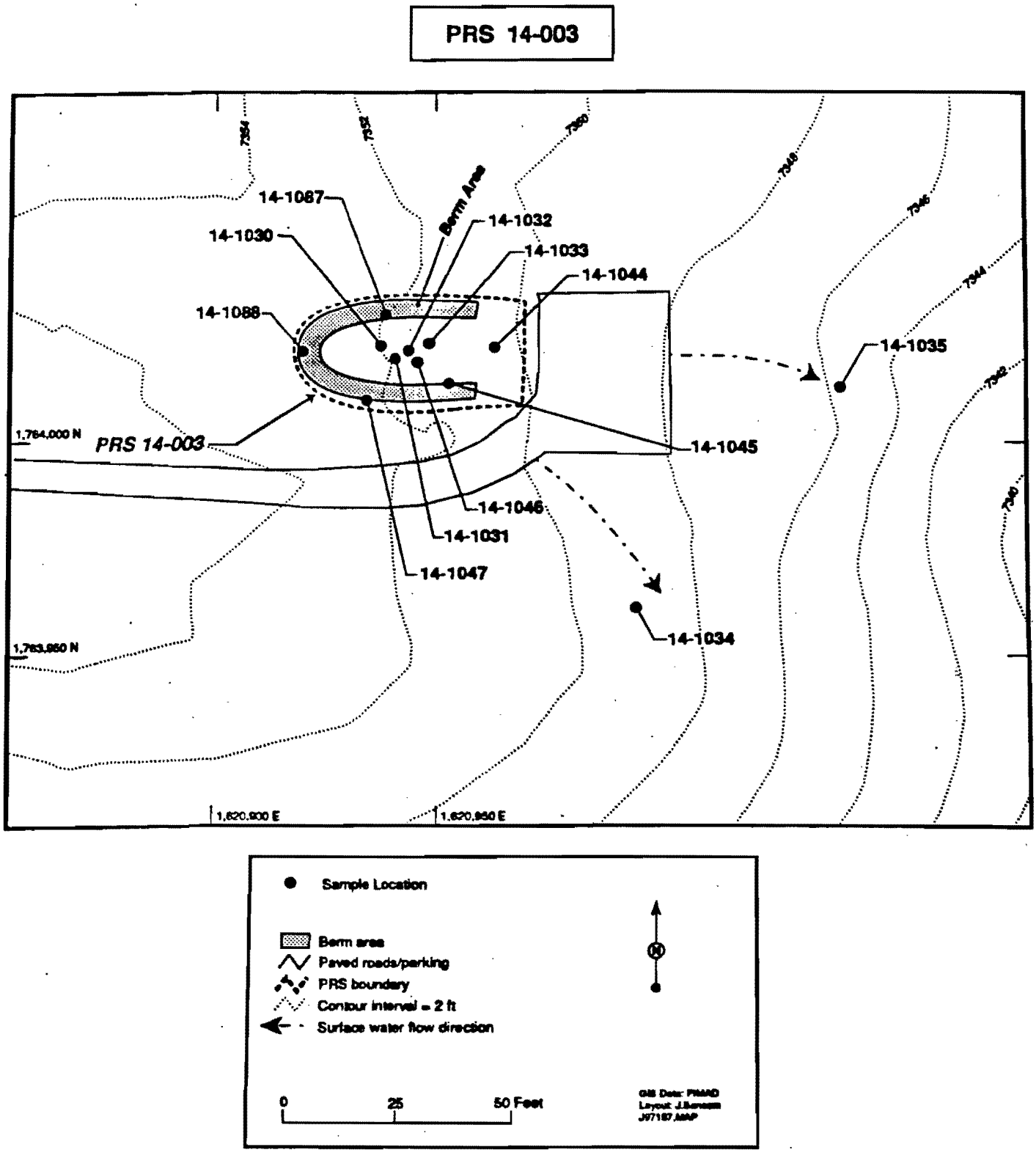

Figure 3.2-1 PRS 14-003, Site map of sample locations

The results of the data quality evaluation performed on the sample results associated with this report are summarized below. The QA/QC problems are presented in Appendix A (Table A-1) according to request number, sample ID, and analytical suite, respectively.

Fifteen soil samples, including three field duplicates, were collected at this PRS in accordance with the sampling described in the VCA Plan. These samples were analyzed for TAL metals, HE, and isotopic uranium.

- The inorganics had no QA/QC problems associated with the analyses.
- Uranium was detected in the method blank associated with nine soil samples. The sample values for all, except two samples, were less than 5X the blank value, indicating that its presence may be due to contamination (EPA 1994, 1206). Based on the blank contamination, the uranium values for all except two samples are qualified as U and are nondetects.
- The HEs had no QA/QC problems associated with the analyses.

Summary of Analytical Results

The PRS was extensively screened for metals using the LIBS in order to determine the appropriate locations for conducting the remediation (see Section 3.2 for a description of the screening methods and grid). The results of the screening samples are presented in Appendix D, Tables D-1, D-2, and D-3. Following remediation, confirmatory samples were collected from twelve sample locations and submitted to fixed analytical laboratories. All samples were collected from the surface soil: seven from 0-6 in., one from 0-8 in., three from 0-10 in., and two from 0-12 in. Seven samples were collected from the depression in the burn pit, two samples were collected downgradient southeast and east from the mouth of the burn pit at 80 ft and 100 ft respectively two samples were collected at the mouth of the burn pit depression, and four samples were collected from the bermed area surrounding the burn pit. The sample locations are presented on the site map (Figure 3.2-1) and the results are summarized below and in Figure 3.2-2. The confirmatory sample results are presented at the end of Appendix D.

- Three inorganics, barium, beryllium, and zinc, were detected in the surface soil at this PRS in at least one sample at concentrations above their respective background UTLs (Table 3.2-1). Silver, which does not have a background UTL, was also detected. All other inorganics were detected at concentrations below their respective background UTLs and are eliminated from further evaluation.
- The concentrations of beryllium and zinc were within the range of Laboratory-wide background values. The beryllium concentrations ranged from 0.6 mg/kg to 2.1 mg/kg and the zinc concentrations ranged from 18.5 mg/kg to 71 mg/kg. These inorganics were not statistically different from the background data set and were eliminated from further evaluation.
- Barium was detected above the background UTL of 315 mg/kg in five samples. The concentrations above background ranged from 330 mg/k to 1800 mg/kg (Table 3.2-1). These concentrations were between more than an order of magnitude below, up to one-third of the SAL (5300 mg/kg), and several orders of magnitude below the industrial PRG of 100,000 mg/kg. Silver was detected in three samples at concentrations ranging from 0.6 mg/kg to 2.0 mg/kg (Table 3.2-1). These concentrations were more than two orders of magnitude below its SAL of 380 mg/kg and more than three orders of magnitude below its industrial PRG of 8500 mg/kg. These analytes were submitted to an MCE for noncarcinogens (Table 3.2-3).
- Uranium was detected below the background UTL of 5.45 mg/kg in all of the soil samples.
- Two HEs, 2,4,6-trinitrotoluene and 2-amino-4,6-dinitrotoluene (a degradation product of 2,4,6-TNT), were detected in one soil sample (Table 3.2-2). The detected concentration of 2,4,6-TNT was more than two orders of magnitude below the SAL of 15 mg/kg and below the industrial PRG of 64 mg/kg.

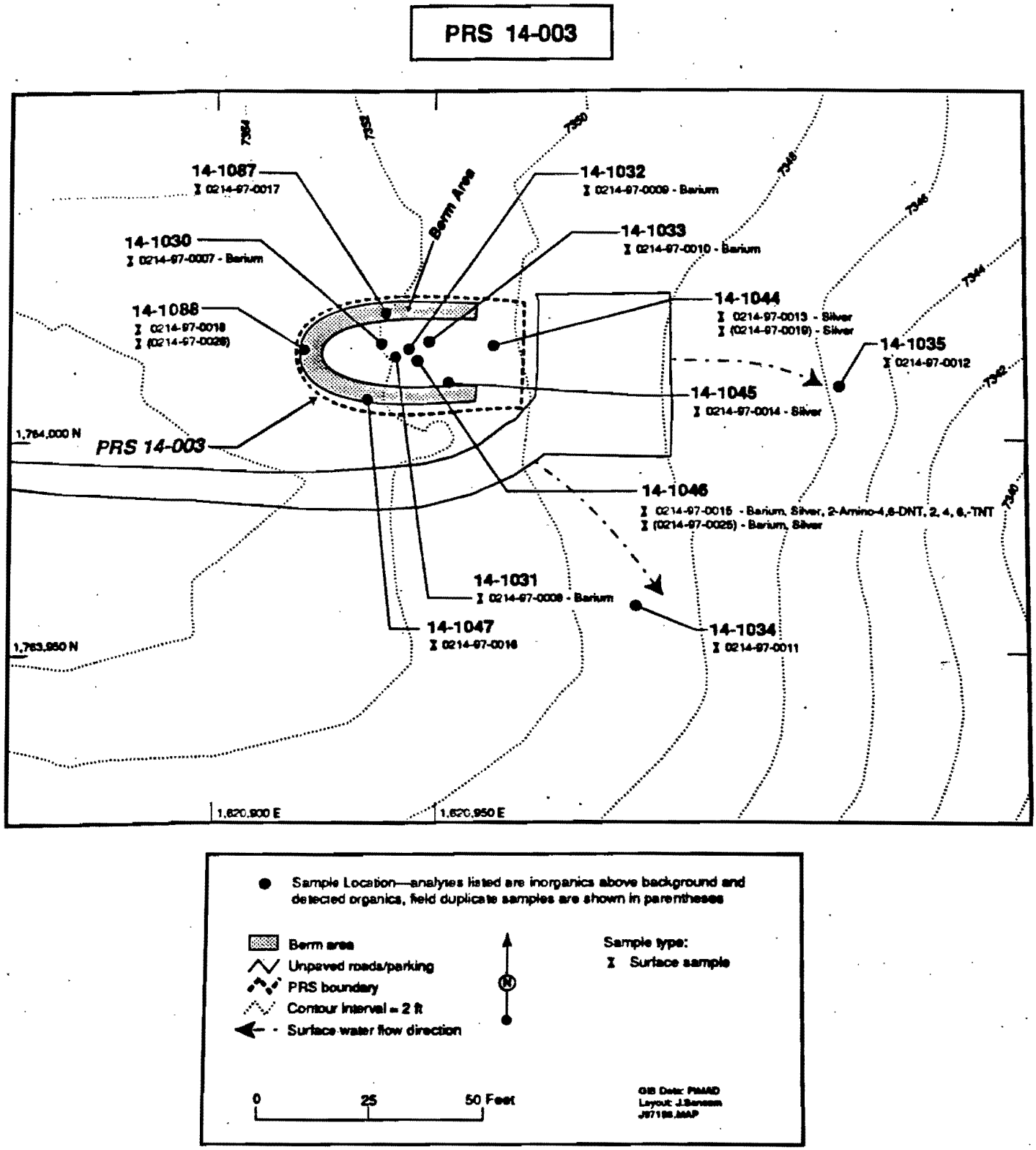

Figure 3.2-2 PRS 14-003, Site map of sample locations with detected analytes

TABLE 3.2-1
INORGANICS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 14-003

Sample ID	Location ID	Depth (ln)	Barium (mg/kg)	Silver (mg/kg)
SAL	N/A[a]	N/A[a]	5300	380
Industrial Soil PRG	N/A[a]	N/A[a]	100,000	8500
soil UTL	N/A[a]	N/A[a]	315	Not Available
0214-97-0007	13-1030	0-10	330	2.4(U)[b]
0214-97-0008	14-1031	0-10	860	2.6(U)
0214-97-0009	14-1032	0-10	1800	2.6(U)
0214-97-0010	14-1033	0-6	460	2.4(U)
0214-97-0011	14-1034	0-12	220	2.4(U)
0214-97-0012	14-1035	0-12	170	2.3(U)
0214-97-0013	14-1044	0-6	303	0.5(U)
0214-97-0014	14-1045	0-6	245	2.0
0214-97-0015	14-1046	0-6	746	1.5
0214-97-0016	14-1047	0-6	157	0.5(U)
0214-97-0017	14-1087	0-6	202	0.5(U)
0214-97-0018	14-1088	0-6	177	0.5(U)
0214-97-0019[c]	14-1044	0-6	278	0.6
0214-97-0025[d]	14-1046	0-6	533	1.2
0214-97-0026[e]	14-1087	0-6	165	0.4(U)

[a] Not applicable
[b] U indicates that the analyte was undetected
[c] Sample 0214-97-0019 is a field duplicate of sample 0214-97-0013.
[d] Sample 0214-97-0025 is a field duplicate of sample 0214-97-0015.
[e] Sample 0214-97-0026 is a field duplicate of sample 0214-97-0017.
Note: Boxes with darkened borders are values greater than background.

The other HE, 2-amino-4,6-dinitrotoluene, does not have a SAL, but a surrogate SAL of 65 mg/kg for 2,6-dinitrotoluene (based on similarity of chemical structure) were used for comparison. The detected concentration of 2-amino-4,6-dinitrotoluene was more than two orders of magnitude below the surrogate SAL of 65 mg/kg. 2-amino-4,6-dinitrotoluene was submitted to an MCE for noncarcinogens (Table 3.2-3). 2,4,6-trinitrotoluene was not submitted to an MCE for carcinogens because it was the only carcinogen detected. It was eliminated from further evaluation because it was less than SAL.

The MCE for noncarcinogens included three analytes (Table 3.2-3). The sum of the normalized concentrations was 0.3, which is less than the target value of 1.0. These analytes were eliminated from further evaluation because they were less than SALs and it was unlikely that there was the potential for an unacceptable risk to human health from combined effects.

The results of the confirmatory sampling indicated that there were no analytes detected at this PRS above either SALs or industrial PRGs following remediation. The COPCs identified in the Phase I investigation (antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, RDX, silver, uranium, and zinc) were either detected at concentrations that were not a concern to human health (i.e., below background or below SALs and industrial PRGs), or were not detected in the soil at this PRS following remediation. The detected inorganics, barium and silver, were detected at concentrations that were respectively 1.8% or less, and less than 1%, of their industrial PRGs, (Table 3.2-1). The detections above background were from confirmatory samples collected from the depression within the burn pit. The high explosives, 2,4,6-trinitrotoluene and 2-amino-4,6-dinitrotoluene, which were not detected in the Phase I investigation, were detected in one sample within the depression of the burn pit at concentrations less

TABLE 3.2-2
ORGANICS DETECTED IN SOIL AT PRS 14-003

Sample ID	Location ID	Depth (in)	2-Amino-4,6-dinitrotoluene (mg/kg)	2,4,6-Trinitrotoluene (mg/kg)
SAL	N/A[a]	N/A[a]	65[b]	15
Industrial Soil PRG	N/A[a]	N/A[a]	680[b]	64
EQL	N/A[a]	N/A[a]	0.09	0.1
0214-97-0007	13-1030	0-10	0.25(U)[b, c]	0.25(U)
0214-97-0008	14-1031	0-10	0.25(U)	0.25(U)
0214-97-0009	14-1032	0-10	0.25(U)	0.25(U)
0214-97-0010	14-1033	0-6	0.25(U)	0.25(U)
0214-97-0011	14-1034	0-12	0.25(U)	0.25(U)
0214-97-0012	14-1035	0-12	0.25(U)	0.25(U)
0214-97-0013	14-1044	0-6	0.09(U)	0.1(U)
0214-97-0014	14-1045	0-6	0.09(U)	0.1(U)
0214-97-0015	14-1046	0-6	0.11	0.13
0214-97-0016	14-1047	0-6	0.09(U)	0.1(U)
0214-97-0017	14-1087	0-6	0.09(U)	0.1(U)
0214-97-0018	14-1088	0-6	0.09(U)	0.1(U)
0214-97-0019[d]	14-1044	0-6	0.09(U)	0.1(U)
0214-97-0025[e]	14-1046	0-6	0.09(U)	0.1(U)
0214-97-0026[f]	14-1087	0-6	0.09(U)	0.1(U)

[a] Not applicable
[b] Toxicity criteria are not available for 2-amino-4,6-dinotrotoluene; therefore, the toxicity criteria for 2,6-dinotrotoluene were used as surrogates based on similarity of chemical structure.
[c] U indicates that the analyte was undetected.
[d] Sample 0214-97-0019 is a field duplicate of sample 0214-97-0013.
[e] Sample 0214-97-0025 is a field duplicate of sample 0214-97-0015.
[f] Sample 0214-97-0026 is a field duplicate of sample 0214-97-0017.
Note: Boxes with darkened borders are detected concentrations.

TABLE 3.2-3
MULTIPLE CHEMICAL EVALUATION FOR SOIL FROM PRS 14-003

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL	Normalized Values
Noncarcinogenic Effects (mg/kg)					
Outfall and Drainage Samples					
2-Amino-4,6-dinitrotoluene	14-1046	0215-97-0015	0.11	65	0.002
Barium	14-1032	0215-97-0009	1800	5300	0.3
Silver	14-1032	0215-97-0009	2.6	380	0.007
				Total:	0.3

than 1% of the industrial PRGs (64 mg/kg and 680 mg/kg, respectively). No inorganics were detected above background and no organics were detected outside of the burn pit or the berm. Therefore, based on the results of the confirmatory sampling, the remedial activities at PRS 14-003 were successful in reducing the levels of the COPCs to below their risk-based cleanup values and the site is recommended for no further action for human health concerns. In addition, there are no contaminants outside of the burn pit or in the drainage from the burn pit. The PRS has been successfully remediated. The site has been regraded, will be reseeded, and best management practices (BMPs) in the form of straw bales have been put in place to prevent runoff from the site.

4.0 WASTE MANAGEMENT

4.1 Waste Management Activities

The volume of wastes generated was as follows: Approximately 19 cubic yards of soil were removed from the site, which is closely comparable to the plan estimate of 15 cubic yards. Of this soil, the waste characterization results show that two B-25 bins (filled to 95%) contain non-hazardous waste which will be disposed of as industrial waste, one bin (filled to 80%) contains RCRA waste and will be moved offsite in September, and one bin (filled to 45%) contains mixed waste and will be moved to TA-54 in September in preparation for disposed at Envirocare. Due to the field screening, the plan worst-case total estimate of mixed waste (6 yards) was reduced to less than 3 yards.

4.2 Waste Characterization Data

4.2.1 Data Quality Assessment of Waste Characterization Data

The QA/QC samples used to determine the quality and usability of the waste characterization data generated from the analyses of the B-25 containers included method blanks, calibration blanks, laboratory duplicates, surrogates, spikes, laboratory control samples, and internal standards. These samples were analyzed according to the frequency outlined in EPA's functional guidelines for organic and inorganic data review (EPA 1994, 1205 and 1206). A review of the technical quality of the data (baseline validation) requires that the data be compared to numerical acceptance criteria established either by the analytical laboratory or EPA for the QA samples mentioned above. The data that do not meet these criteria are qualified to indicate to the data user those sample results that have potential deficiencies associated with sample handling and analysis. The QA/QC issues are presented in Appendix A (Table A-2) according to request number, sample ID, and analytical suite, respectively.

- Chromium and lead were detected in the method blank associated with one soil sample, barium was detected in the method blank associated with another soil sample, and arsenic was detected in the method blank associated with two other soil samples. The sample values for these analytes were less than 5X the blank values, indicating that their presence may be due to contamination (EPA 1994, 1206). The inorganics are qualified as U and are usable as nondetects. All other inorganic data are usable as reported.

- The minimum detection limit (MDA) was less than the estimated quantitation limit (EQL) for uranium-235 in one sample. One sample from one request number had a sample result greater than the MDA but less than the EQL and is qualified as U. The MDA was greater than the EQL for uranium-235 in two samples. The results less than the MDA and EQL are qualified as U, nondetected.

- The duplicate analysis for uranium-234 in one sample was not within the 3σ (3 standard deviation) criteria and is qualified as J. The datum is usable because the sample value is similar to the uranium-238 value for this sample. The ratio of uranium-234 to uranium-238 is approximately one-to-one, which is appropriate for natural uranium.

- 2,4-Dinitrotoluene was detected in the method blank associated with two samples. The sample values for this analyte were less than 5X the blank value, indicating that its presence may be due to contamination (EPA 1994, 1206). The analyte is qualified as U, nondetected.

- Acetone was detected in the method blank associated with one sample. The sample value for this analyte was less than 10X the blank value, indicating that its presence may be due to contamination (EPA 1994, 1206). Based on the blank contamination, the analyte is qualified as U and is nondetected.

- Two soil samples from one request number had QA/QC problems associated with the VOC internal standard area counts. The area counts for d4-1,4-dichlorobenzene were more than a factor of 2 below the lower limit for both samples and the area count for chlorobenzene-d5 was more than a factor of 2 below the lower limit for one sample. The data for all nondetects are qualified as UJ, while data for all detects are qualified as JPM. The data are usable because area counts are between 27-48%, are not extremely low (<10%), and do not drop off abruptly, which would indicate a loss of sensitivity (EPA 1994, 1205). Although the data are potentially biased low, the instrument is still able to detect and quantify the analytes because its sensitivity and responsiveness were not compromised. In addition, the continuing calibrations, the internal standard retention times, the other internal standard area counts, and the other QA/QC samples were acceptable.

- Carbon disulfide, cis-1,2-dichloroethene, trichloroethene, toluene, and tetrachloroethene in two samples and acetone in one sample from one request number had QA/QC problems associated with the VOC surrogate recoveries. The percent recoveries for dibromofluoromethane and bromofluorobenzene were above the established upper limits (120% and 121%, respectively) and are qualified as J+. The data are usable because the results are biased high and, therefore, may overestimate the true values.

- Bis(2-ethylhexyl)phthalate was detected in the method blank associated with one sample. The sample value for this analyte was less than 10X the blank value, indicating that its presence may be due to contamination (EPA 1994, 1206). Based on the blank contamination, the analyte is qualified as U and is nondetected.

4.2.2 Summary of Waste Characterization Data

Table 4.2-1 presents the analytical results of the waste characterization samples. Analytes listed were those detected in the individual waste characterization samples collected from the B-25 containers.

TABLE 4.2-1
WASTE CHARACTERIZATION SAMPLES FOR PRS 14-003

Sample ID	Compound	Result	Units	Qualifier
0214-97-0001	Barium	9.4	mg/L	
	Cadmium	0.01	mg/L	
	Selenium	0.03	mg/L	
	Uranium-234	1.1	pCi/g	
	Uranium-238	1.1	pCi/g	
	Di-n-butyl phthalate	0.1	mg/kg	J
0214-97-0002	Uranium-234	1.0	pCi/g	
	Uranium-238	1.2	pCi/g	
	2,4,6-Trinitrotoluene	340	mg/kg	
0214-97-0003	Barium	267	mg/L	
	Cadmium	0.7	mg/L	
	Lead	5.8	mg/L	
	Mercury	0.001	mg/L	
	Uranium-234	3.3	pCi/g	J
	Uranium-235	0.2	pCi/g	
	Uranium-238	3.4	pCi/g	
	HMX	1.9	mg/kg	
	RDX	15.2	mg/kg	
	1,3,5-Trinitrobenzene	2.2	mg/kg	
	2,4,6-Trinitrotoluene	51.7	mg/kg	
	2-Amino-4,6-dinitrotoluene	1.7	mg/kg	
	4-Amino-2,6-dinitrotoluene	1.5	mg/kg	
	2-Nitrotoluene	0.2	mg/kg	
	3-Nitrotoluene	1.2	mg/kg	
	cis-1,2-Dichloroethene	0.002	mg/kg	J+
	Trichloroethene	0.002	mg/kg	J+
	Toluene	0.006	mg/kg	J+
	Tetrachloroethene	0.004	mg/kg	J+
	Di-n-butyl phthalate	0.2	mg/kg	J
	Bis(2-ethylhexyl)phthalate	0.08	mg/kg	J
0214-97-0004	Barium	206	mg/L	
	Cadmium	0.2	mg/L	
	Lead	9.2	mg/L	
	Mercury	0.0002	mg/L	
	Uranium-234	1.3	pCi/g	
	Uranium-238	1.3	pCi/g	
	HMX	2.6	mg/kg	
	RDX	16.8	mg/kg	
	1,3,5-Trinitrobenzene	4.1	mg/kg	
	2,4,6-Trinitrotoluene	27.7	mg/kg	
	2-Amino-4,6-dinitrotoluene	1.4	mg/kg	
	4-Amino-2,6-dinitrotoluene	1.3	mg/kg	
	3-Nitrotoluene	0.5	mg/kg	
	cis-1,2-Dichloroethene	0.001	mg/kg	J+
	Toluene	0.004	mg/kg	J+
	Tetrachloroethene	0.002	mg/kg	J+
	Di-n-butyl phthalate	0.1	mg/kg	J
	Bis(2-ethylhexyl)phthalate	0.08	mg/kg	J

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APPENDIX A
QUALITY ASSURANCE/QUALITY CONTROL EVALUATION

TABLE A-1
DATA QUALITY EVALUATION OF CONFIRMATORY SAMPLES COLLECTED FROM PRS 14-003

Request Number	Sample ID	Suite	Comments
3394R	0214-97-0015, -0016,-0017, -0018,-0019, -0025,-0026	Radionuclides	Uranium was detected in the method blank associated with these seven samples at a concentration of 0.75 mg/kg. The results for these samples were less than 5X the blank value, indicating presence may be due to contamination. The uranium data are qualified as U and are nondetected.

TABLE A-2
DATA QUALITY EVALUATION OF WASTE CHARACTERIZATION SAMPLES COLLECTED FROM PRS 14-003

3167R	0214-97-0001	Inorganics	Chromium and lead were detected in the method blank associated with this sample at concentrations of 11.9 µg/L and 16.1 µg/L, respectively. The sample results were less than 5X the blank values, indicating presence may be due to contamination. Based on the blank contamination, the data are qualified as U and are nondetected.
3180R	0214-97-0002		Barium was detected in the method blank associated with this sample at a concentration of 1.1 µg/L. The sample result was less than 5X the blank value, indicating presence may be due to contamination. Based on the blank contamination, the datum is qualified as U and is nondetected.
3267R	0214-97-0003, 0214-97-0004		Arsenic was detected in the method blank associated with these samples at a concentration of 29.5 µg/L. The sample results were less than 5X the blank value, indicating presence may be due to contamination. Based on the blank contamination, the data are qualified as U and are nondetected.
3168R	0214-97-0001	Radionuclides	The MDA was greater than the EQL for uranium-235 in one sample. The result was less than the MDA and EQL and is qualified as U. The data are nondetected.
3181R	0214-97-0002		The MDA was greater than the EQL for uranium-235 in one sample. The result was less than the MDA and EQL and is qualified as U. The data are nondetected.
3268R	0214-97-0003		The MDA was less than the EQL for uranium-235 in one sample. The sample result was greater than the MDA but less than the EQL and is qualified as U. The datum is nondetected.
	0214-97-0004		The duplicate analysis for uranium-234 in one sample was not within the 3σ (3 standard deviation) criteria and is qualified as J. The datum is usable because the sample value is similar to the uranium-238 value for this sample. The ratio of uranium-234 to uranium-238 is approximately one-to-one, which is consistent with natural uranium.
3266R	0214-97-0003, 0214-97-0004	HE	2,4-Dinitrotoluene was detected in the method blank associated with two samples. The sample values for this analyte were less than 5X the blank value, indicating presence may be due to contamination. Based on the blank contamination, the analyte is qualified as U and is nondetected.
3165R	0214-97-0001	VOCs	Acetone was detected in the method blank associated with one sample. The sample value for this analyte was less than 10X the blank value, indicating presence may be due to contamination. Based on the blank contamination, the analyte is qualified as U and is nondetected.

TABLE A-2
DATA QUALITY EVALUATION OF WASTE CHARACTERIZATION SAMPLES COLLECTED FROM PRS 14-003
Continued

Request Number	Sample ID	Suite	Comments
3265R	0214-97-0003, 0214-97-0004	VOCs	Two internal standards, chlorobenzene-d5 and d4-1,4-dichlorobenzene, had area counts below the established lower limit of 50%. The undetected target compounds are qualified as UJ and the detected target compounds are qualified as JPM. The data are usable because recoveries were not extremely low (<10%) and do not drop off abruptly, which would indicate a loss of sensitivity. Although the data are potentially biased low, the instrument is still able to detect and quantify the analytes because its sensitivity and responsiveness were not compromised. In addition, the continuing calibrations, the internal standard retention times, the other internal standard area counts, and the other QA/QC samples were acceptable.
			Carbon disulfide, cis-1,2-dichloroethene, trichloroethene, toluene, and tetrachloroethene in two samples and acetone in one sample from one request number had QA/QC problems associated with the VOC surrogate recoveries. The percent recoveries for dibromofluoromethane and bromofluorobenzene were above the established upper limits (120% and 121%, respectively) and are qualified as J+. The data are usable because the results may potentially be biased high and, therefore, may overestimate the true values.
3165R	0214-97-0001	SVOCs	Bis(2-ethylhexyl)phthalate was detected in the method blank associated with one sample. The sample value for this analyte was less than 10X the blank value, indicating presence may be due to contamination. The analyte is qualified as U and is nondetected.

APPENDIX B
RFI ANALYTICAL RESULTS

The data from the RFI investigation sampling have been edited and validated. These data are available in Facility Information Management and Display (FIMAD) database and will be provided upon request.

APPENDIX C
COST COMPARISON

The estimated costs of this VCA are compared with the actual costs through August, 1997 in Table C-1. Differences between estimated and actual costs are discussed in the following sections.

TABLE C-1

Activity	$ Budget Cost	Actual Cost
Plan Development	28,000	28,000
Mobilization	7,700	7,700
Cleanup	36,000	76,000
Verification Sampling	4,500	5,000
Waste Disposal	40,000	19,000**
Field Screening	1,500	130,000
Demobilization/Site Restoration	2,300	2,300
Reporting	12,000	12,000
Total Cost	$132,000	$280,177*

* Actual cost total through August, 1997, categories estimated.
** Estimated from actual volumes and baseline costs

C.1 Plan Development

Plan costs, including regulatory review and presentations to NMED, were similar to those budgeted.

C.2 Mobilization

Mobilization costs were similar to those budgeted.

C.3 Cleanup

Cleanup costs were more expensive than budgeted, due to the hand digging necessary to remove selected contaminated grid locations and "chase" contamination found, and to weather delays.

C.4 Verification Sampling

Verification sampling costs exceeded those budgeted due to need for expedited sample analysis.

C.5 Waste Disposal

Waste disposal costs are estimated because as of the date of this report, the final costs have not been accumulated. Costs are estimated as follows: 12 yds industrial waste @ $77/yd; 5 yds RCRA waste @ $381/yd; 2.8 yds @ $6,000/yd.

C.6 Field Screening

Field screening costs exceeded those budgeted due to the extensive use of LIBS to determine the extent of contamination, and the request by HRMB to collect additional screening samples outside the bermed area.

C.7 Demobilization/Site Restoration

Demobilization and site restoration costs were similar to those budgeted.

C.8 Reporting

Reporting costs were similar to those budgeted.

C.9 Total Cost

Total costs exceeded the budgeted costs due to the increased effort for field characterization and sampling.

APPENDIX D
SCREENING AND CONFIRMATORY SAMPLING RESULTS

The results of the field screening using the Laser Induced Breakdown Spectroscopy (LIBS) are presented in Tables D-1, D-2, and D-3. Table D-4 contains the LIBS screening results for locations outside the berm (as requested by NMED). Table D-5 presents the results of the precision and accuracy determination of the LIBS in the field at TA-14-003. The last section contains the confirmatory sampling results.

TABLE D-1
SCREENING RESULTS FOR BARIUM AT PRS 14-003

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Barium (mg/kg)				
109	1029	651	487		
110	1755	617	636		
111	1988	550	617		
112	587	631	664		
113	113	724	1181		
114	604	591	746		
115	1060	725	985		
116	783	513	704		
117	730	1106	413		
118	1389	397	409		
119	1178	540	654		
120	987	733	857		
121	963	733	857		
122	672	805	423		
123	1134	432	872		
124	948	784	624		
125	813	762	528		
134	960	215	350		
135	664	624	416		
136	484	707	481		
137	852	632	530		
138	883	667	792		
139	1039	544	709		
140	1937	385	388		
141	1196	727	736		
142	849	480	606		
143	<0	497	471		
144	118	529	587		
145	1613	590	472		
146	921	580	468		
147	1653	590	472		
148	592	1064	949		
149	1057	741	952		
150	2229	48	1071		
159	723	1269	730		
160	591	250	564		
161	713	<0	847		
162	616	662	753		
163	593	556	772		
164	348	717	668		
165	933	579	652		
166	769	400	794		
167	773	556	731		
168	230	579	602		

TABLE D-1
SCREENING RESULTS FOR BARIUM AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Barium (mg/kg)				
169	674	421	451		
170	2979	661	340		
171	1012	370	305		
172	1029	987	730		
173	709	447	797		
174	1005	486	862		
175	100	1091	517		
184	943	611	872		
185	380	952	741		
186	609	554	688		
187	470	928	793		
188	519	<0	465		
189	798	742	545		
190	63	701	749		
191	899	929	393		
192	667	471	261		
193	1085	1193	493		
194	1464	1025	406		
195	782	798	913		
196	3143	601	617		
197	<0	776	824		
198	2218	1122	461		
199	416	698	450		
200	562	720	381		
209	1258	666	735		
210	844	501	331		
211	1122	684	210		
212	1457	747	1060		
213	836	650	1141		
214	1022	654	1117	700	1084
215	1334	4463	41303	1702	1751
216	546	1126	6464	1197	
217	607	985	3713	610	
218	1243	671	1425	1042	
219	857	924	1248	871	
220	946	818	2067	460	
221	2117	502	6413	996	
222	664	901	1067		
223	2096	629	807		
224	621	892	656		
225	992	940	772		
234	<0	532	1113		
235	1109	583	719		
236	589	573	1002		

TABLE D-1
SCREENING RESULTS FOR BARIUM AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Barium (mg/kg)				
237	858	429	1413		
238	797	445	82		
239	710	2239	1974	667	1582
240	1904	841	4856	24	
241	1964	1076	1048	6123	
242	973	1266	729	4807	
243	1585	1263	2064	2901	1358
244	655	807	1436	4106	1306
245	1114	683	1857	10479	508
246	2672	1073	4218	35787	
247	1180	1169	1159		
248	637	1233	975		
249	150	1107	670		
250	<0	909	449		
259	1644	644	679		
260	685	709	555		
261	2127	702	630		
262	<0	1355	1319		
263	2199	845	10484		
264	713	1580	3399	1995	813
265	924	795	396	6576	1125
266	3161	1897	8097	6059	2262
267	1083	50	3549	43741	
268	4918	1244	2392	26406	6011
269	919	1566	3336	9666	973
270	1603	1015	1578	38252	4291
271	1830	1037	1666		
272	<0	969	2603		
273	1631	844	2283		
274	734	712	887		
275	<0	1128	771		
284	250	691	897		
285	414	968	1066		
286	<0	821	843		
287	342	828	616		
288	417	470	1148		
289	961	786	1524	880	
290	776	900	28888	1623	725
291	363	952	936	1654	7520
292	1507	892	741	1833	691
293	723	1004	2193	34035	1073
294	2209	967	5334	5234	967
295	3606	980	993	6484	1664
296	<0	889	1425		

TABLE D-1
SCREENING RESULTS FOR BARIUM AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Barium (mg/kg)				
297	864	1107	2251		
298	1420	678	954		
299	<0	680	1103		
300	<0	803	1261		
309	579	837	772		
310	1033	530	872		
311	548	591	661		
312	413	795	914		
313	1860	850	840		
314	<0	1004	779	1018	
315	62	1094	2426	1121	
316	1592	909	2296	1098	
317	372	884	1064	1711	710
318	163	915	1089	4502	771
319	1102	1179	2642	1940	818
320	1664	2178	1212	3319	
321	1063	1734	1181		
322	2576	786	882		
323	763	657	955		
324	<0	820	790		
325	1356	1825	531		
334	2128	305	683		
335	1388	567	343		
336	130	554	832		
337	330	339	752		
338	854	230	599		
339	144	624	213		
340	846	659	792		
341	267	1471	1013		
342	658	532	630		
343	834	288	1026		
344	1537	410	501		
345	1607	996	560		
346	604	394	860		
347	<0	340	653		
348	300	729	708		
349	528	785	702		
350	1356	1825	531		
359	719	712	321		
360	1258	544	700		
361	1782	746	834		
362	593	389	529		
363	908	950	507		
364	872	668	587		

TABLE D-1
SCREENING RESULTS FOR BARIUM AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Barium (mg/kg)				
365	2725	539	786		
366	338	727	885		
367	1657	146	574		
368	<0	<0	778		
369	<0	118	791		
370	975	356	355		
371	713	429	1100		
372	198	<0	494		
373	757	80	1140		
374	673	225	1169		
375	<0	<0	693		
384	981	398	576		
385	1720	350	560		
386	927	142	569		
387	<0	2	632		
388	1047	95	<0		
389	341	459	420		
390	2535	468	554		
391	950	600	802		
392	285	771	691		
393	433	467	648		
394	845	727	805		
395	<0	462	329		
396	<0	1032	938		
397	<0	466	829		
398	<0	646	1246		
399	351	557	967		
400	<0	675	1262		
409	757	195	1600		
410	498	512	785		
411	178	703	63		
412	711	<0	368		
413	437	<0	60		
414	1388	75	319		
415	1004	324	419		
416	529	730	630		
417	<0	382	796		
418	1217	381	470		
419	318	410	469		
420	1165	240	711		
421	671	589	468		
422	613	431	1900		
423	<0	371	1137		
424	<0	485	1139		

TABLE D-1
SCREENING RESULTS FOR BARIUM AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Barium (mg/kg)				
425	<0	795	971		
434	750	465	774		
435	618	650	476		
436	547	685	451		
437	<0	626	450		
438	1394	845	486		
439	155	320	807		
440	<0	539	343		
441	499	655	806		
442	770	638	909		
443	386	841	380		
444	198	456	798		
445	965	260	423		
446	605	182	805		
447	178	655	348		
448	32	683	591		
449	377	489	670		
450	<0	635	792		

TABLE D-2
SCREENING FOR LEAD AT PRS 14-003

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Lead (mg/kg)				
109	265	219	371		
110	237	<0	234		
111	314	271	<0		
112	<0	<0	281		
113	<0	<0	240		
114	482	<0	<0		
115	266	<0	235		
116	185	<0	<0		
117	488	66	<0		
118	378	<0	309		
119	203	46	37		
120	363	<0	91		
121	436	<0	<0		
122	<0	<0	111		
123	312	<0	430		
124	302	453	369		
125	151	<0	<0		
134	<0	113	240		
135	<0	<0	180		

TABLE D-2
SCREENING FOR LEAD AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Lead (mg/kg)				
136	<0	<0	435		
137	<0	<0	407		
138	<0	<0	333		
139	<0	184	416		
140	<0	454	517		
141	233	<0	181		
142	<0	132	166		
143	59	<0	325		
144	280	156	166		
145	<0	0	<0		
146	<0	<0	332		
147	<0	35	68		
148	138	354	<0		
149	172	<0	<0		
150	193	<0	326		
159	346	337	<0		
160	288	134	344		
161	324	464	292		
162	156	103	<0		
163	<0	139	<0		
164	303	1	436		
165	465	<0	464		
166	518	261	326		
167	109	<0	<0		
168	392	144	<0		
169	307	195	<0		
170	<0	<0	409		
171	<0	232	366		
172	224	387	240		
173	172	236	<0		
174	187	<0	<0		
175	<0	387	476		
184	365	77	355		
185	285	<0	<0		
186	122	79	<0		
187	<0	<0	<0		
188	204	575	242		
189	<0	<0	313		
190	<0	<0	<0		
191	202	<0	333		
192	183	2	194		
193	383	<0	218		
194	414	<0	312		
195	543	<0	<0		

TABLE D-2
SCREENING FOR LEAD AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Lead (mg/kg)				
196	185	95	<0		
197	552	<0	<0		
198	416	379	244		
199	444	<0	184		
200	122	<0	271		
209	<0	<0	<0		
210	344	<0	301		
211	235	137	354		
212	429	<0	242		
213	<0	<0	<0		
214	309	<0	126	256	<0
215	24	153	<0	<0	<0
216	256	<0	<0	<0	
217	505	<0	347	<0	
218	410	630	284	<0	
219	463	<0	437	<0	
220	582	<0	<0	<0	
221	364	575	15	<0	
222	569	<0	442		
223	493	229	413		
224	507	<0	141		
225	656	346	<0		
234	632	<0	<0		
235	<0	<0	<0		
236	371	<0	<0		
237	19	75	<0		
238	<0	24	490		
239	328	<0	<0	<0	<0
240	179	<0	742		
241	597	589	260	206	<0
242	505	<0	591	597	97
243	588	<0	144	209	26
244	580	238	<0	<0	37
245	627	<0	<0	<0	119
246	517	<0	<0	163	
247	567	344	144		
248	<0	<0	85		
249	513	<0	288		
250	563	<0	<0		
259	<0	63	317		
260	522	<0	<0		
261	237	<0	241		
262	295	330	287		
263	20	259	492		

TABLE D-2
SCREENING FOR LEAD AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Lead (mg/kg)				
264	377	492	233	234	87
265	565	142	700	1541	186
266	582	467	1902	<0	32
267	542	5572	704	2308	
268	313	<0	199	822	8
269	547	<0	436	157	114
270	262	217	479	185	156
271	552	457	472		
272	582	<0	166		
273	564	<0	188		
274	12	<0	279		
275	441	<0	460		
284	465	<0	62		
285	414	<0	410		
286	516	<0	443		
287	359	<0	341		
288	591	<0	431		
289	626	<0	483	<0	
290	618	<0	29	<0	20
291	424	<0	1178	<0	140
292	187	<0	497	<0	28
293	547	<0	494	157	72
294	482	<0	558	<0	<0
295	320	<0	498	195	<0
296	461	244	413		
297	508	<0	514		
298	565	103	523		
299	496	171	502		
300	581	<0	197		
309	286	<0	480		
310	316	202	279		
311	423	<0	475		
312	536	<0	431		
313	<0	<0	451		
314	600	27	302	<0	
315	534	<0	263	<0	
316	186	<0	330	<0	
317	114	321	687	<0	<0
318	619	<0	518	8	<0
319	392	<0	443	<0	<0
320	117	486	602	<0	
321	526	239	555		
322	636	195	486		
323	<0	<0	184		

TABLE D-2
SCREENING FOR LEAD AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Lead (mg/kg)				
324	478	<0	374		
325	634	432	456		
334	373	152	450		
335	338	<0	452		
336	452	<0	392		
337	479	213	202		
338	322	169	461		
339	519	<0	562		
340	400	<0	60		
341	372	<0	<0		
342	338	<0	422		
343	400	324	346		
344	220	15	496		
345	332	<0	<0		
346	465	186	460		
347	543	84	386		
348	517	44	368		
349	424	<0	286		
350	310	<0	253		
359	390	<0	41		
360	322	7	323		
361	419	<0	187		
362	213	191	30		
363	171	<0	143		
364	491	240	222		
365	127	<0	316		
366	426	<0	21		
367	419	270	432		
368	390	220	236		
369	228	206	212		
370	439	<0	158		
371	166	281	25		
372	249	355	243		
373	169	109	322		
374	294	201	79		
375	599	344	<0		
384	470	298	253		
385	258	199	<0		
386	137	263	302		
387	141	247	213		
388	212	300	300		
389	245	<0	<0		
390	546	128	2		
391	445	195	<0		

TABLE D-2
SCREENING FOR LEAD AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Lead (mg/kg)				
392	456	219	<0		
393	468	250	16		
394	484	<0	43		
395	326	179	130		
396	521	<0	329		
397	574	49	<0		
398	444	26	405		
399	353	156	<0		
400	409	19	<0		
409	307	<0	<0		
410	179	<0	191		
411	503	9	534		
412	403	370	379		
413	545	240	246		
414	359	319	383		
415	<0	163	559		
416	<0	<0	433		
417	218	254	314		
418	78	283	522		
419	<0	<0	206		
420	321	171	349		
421	308	184	387		
422	236	114	245		
423	528	284	338		
424	264	104	349		
425	515	173	298		
434	283	209	144		
435	<0	<0	350		
436	154	<0	371		
437	308	<0	<0		
438	<0	<0	<0		
439	471	<0	<0		
440	414	<0	<0		
441	378	<0	<0		
442	113	<0	<0		
443	<0	261	359		
444	446	<0	<0		
445	312	<0	<0		
446	50	236	217		
447	<0	<0	<0		
448	<0	<0	<0		
449	4	202	<0		
450	436	<0	<0		

TABLE D-3
SCREENING RESULTS FOR MANGANESE AT PRS 14-003

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Manganese (mg/kg)				
109	<0	1155	741		
110	<0	1343	1146		
111	227	271	<0		
112	779	870	1111		
113	312	395	1164		
114	<0	2150	1489		
115	1302	284	901		
116	320	1474	1504		
117	58	957	1739		
118	<0	1518	669		
119	1251	802	1241		
120	<0	530	586		
121	<0	283	926		
122	176	1073	612		
123	<0	405	1498		
124	<0	816	1367		
125	<0	464	991		
134	387	275	1443		
135	803	1277	1205		
136	472	682	387		
137	714	409	339		
138	1535	1472	531		
139	2199	380	212		
140	1013	576	185		
141	2092	1359	1231		
142	850	973	1428		
143	1277	513	1553		
144	773	625	1778		
145	783	671	662		
146	735	867	954		
147	812	907	951		
148	1530	608	452		
149	170	884	663		
150	329	1139	283		
159	<0	843	644		
160	355	515	716		
161	<0	630	1072		
162	984	361	672		
163	1731	455	437		
164	795	712	493		
165	<0	1332	303		
166	565	280	970		
167	1156	920	343		
168	<0	754	1416		

TABLE D-3
SCREENING FOR MANGANESE AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Manganese (mg/kg)				
169	1298	410	236		
170	<0	792	1385		
171	991	518	822		
172	1232	742	1376		
173	385	293	550		
174	337	544	1201		
175	274	1282	347		
184	62	489	1207		
185	561	555	929		
186	1387	469	722		
187	1452	314	562		
188	2355	561	1290		
189	1112	918	1411		
190	1569	<0	1351		
191	1670	1231	1665		
192	2592	327	1529		
193	514	1378	1203		
194	<0	1092	1241		
195	<0	374	441		
196	939	616	1053		
197	575	722	1189		
198	<0	1044	1329		
199	631	1408	1494		
200	807	991	1645		
209	783	1073	644		
210	304	1575	1310		
211	655	612	1421		
212	48	1557	1118		
213	999	558	1463		
214	927	573	1027	1086	680
215	923	1056	451	894	474
216	1213	1242	1141	1190	
217	49	895	1091	1260	
218	400	622	1970	1164	
219	473	1144	1531	1477	
220	<0	936	1222	1142	
221	572	587	1134	1002	
222	422	1688	827		
223	603	635	862		
224	<0	475	1143		
225	383	613	1281		
234	<0	492	602		
235	1066	1509	1099		
236	1142	915	815		

TABLE D-3
SCREENING FOR MANGANESE AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Manganese (mg/kg)				
237	757	1151	1024		
238	991	390	76		
239	1015	720	1001	1665	1454
240	792	1894	1157		
241	508	419	480	1989	996
242	568	2037	889	1957	110
243	545	1972	767	471	494
244	614	364	1008	2472	193
245	461	1661	451	1630	<0
246	511	<0	666	<0	
247	600	722	397		
248	1215	999	390		
249	423	1148	422		
250	445	980	1710		
259	1042	522	241		
260	515	518	1003		
261	2000	710	600		
262	1292	1070	384		
263	991	455	1218		
264	1083	775	983	1457	266
265	549	490	<0	1287	936
266	516	1572	5849	1178	349
267	704	1008	631	767	
268	966	2381	354	620	<0
269	816	1222	394	840	342
270	1233	507	428	<0	576
271	547	820	<0		
272	674	48	981		
273	506	1561	514		
274	925	1259	527		
275	646	1155	275		
284	642	528	435		
285	555	880	330		
286	521	409	140		
287	775	989	307		
288	565	1447	669		
289	573	1739	423	733	
290	639	1597	1448	1342	735
291	845	1251	1445	1324	51
292	867	1555	187	1172	656
293	709	954	310	218	345
294	647	824	<0	1307	1001
295	682	1272	446	461	1036
296	547	381	771		

TABLE D-3
SCREENING FOR MANGANESE AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Manganese (mg/kg)				
297	319	1011	749		
298	421	269	404		
299	452	481	247		
300	383	1487	1172		
309	997	1418	<0		
310	570	398	478		
311	582	1168	131		
312	739	757	528		
313	1582	681	1382		
314	597	431	707	1481	
315	586	1006	698	1378	
316	792	1607	562	265	
317	776	1196	443	395	569
318	547	1124	122	249	473
319	712	1071	508	428	720
320	1762	745	726	804	
321	622	1278	153		
322	402	562	375		
323	742	1647	1384		
324	1345	1510	1023		
325	515	701	306		
334	515	335	414		
335	622	1154	521		
336	670	1400	185		
337	534	203	1124		
338	720	165	127		
339	675	373	68		
340	698	507	1072		
341	625	1554	331		
342	603	1680	234		
343	588	101	368		
344	767	574	32		
345	721	792	1453		
346	663	395	111		
347	680	345	396		
348	1013	1056	<0		
349	937	1491	208		
350	555	1536	570		
359	754	1144	1435		
360	839	602	1029		
361	572	411	965		
362	993	459	966		
363	711	1288	530		
364	557	95	208		

TABLE D-3
SCREENING FOR MANGANESE AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Manganese (mg/kg)				
365	1319	677	1151		
366	919	883	599		
367	524	263	1345		
368	898	72	1656		
369	842	66	713		
370	793	274	1226		
371	1212	30	806		
372	937	<0	1403		
373	692	475	1098		
374	968	191	1694		
375	942	175	1094		
384	751	107	563		
385	540	263	1220		
386	1036	234	561		
387	1055	232	798		
388	1061	182	810		
389	1097	531	1234		
390	352	201	1296		
391	619	227	1273		
392	624	163	957		
393	826	466	862		
394	883	1041	1355		
395	650	192	1353		
396	495	75	272		
397	553	507	892		
398	918	352	1250		
399	835	290	698		
400	1841	391	739		
409	743	1378	996		
410	1046	1231	846		
411	724	816	112		
412	609	116	510		
413	729	94	1323		
414	640	236	926		
415	917	438	379		
416	1197	913	580		
417	1433	258	1345		
418	1087	198	554		
419	1237	530	1361		
420	651	416	654		
421	652	128	1073		
422	437	314	2472		
423	527	240	196		
424	811	400	630		

TABLE D-3
SCREENING FOR MANGANESE AT PRS 14-003
Continued

Grid Location	Depth of Screening Samples (in)				
	0"	6"	12"	18"	24"
	Concentration of Manganese (mg/kg)				
447	1206	1367	1560		
448	958	885	1055		
449	857	620	953		
450	2009	753	1569		
425	1283	477	792		
434	583	627	1162		
435	1404	706	1010		
436	1045	510	1058		
437	1100	274	500		
438	1599	1035	1559		
439	942	1355	1372		
440	1214	608	642		
441	699	1185	1232		
442	913	1786	1221		
443	1001	302	1220		
444	1393	1159	751		
445	806	557	1212		
446	1065	594	877		

TABLE D-4
SCREENING RESULTS FROM SAMPLES OUTSIDE THE BURN AREA BERM AS REQUESTED BY NMED

SAMPLES TAKEN FROM LOCATIONS RADIATING OUT FROM CENTER OF THE TA 14 BURN PIT (GRID #267)			
SAMPLE LOCATION	BARIUM	LEAD	MANGANESE
20ft N	985.1	<0	330
20ft NE	21.6	122.7	<0
20ft E	838.8	<0	462.6
20ft SE	683	<0	885
20ft S	1065.3	<0	1044.2
20ft SW	277.8	27.9	95.5
20ft W	526.8	<0	<0
20ft NW	651	219	1155
40ft N	984.9	37.9	167.8
40ft NE	530.8	<0	675.7
40ft E	SAMPLE SITE LOCATED ON ASPHALT DRIVE. SAMPLE NOT TAKEN		
40ft SE	SAMPLE SITE LOCATED ON ASPHALT DRIVE. SAMPLE NOT TAKEN		
40ft S	1183.4	<0	1062.1
40ft SW	SAMPLE SITE LOCATED ON ASPHALT DRIVE. SAMPLE NOT TAKEN		
40ft W	841.6	<0	1026
40ft NW	1012.1	<0	353.6
60ft N	864.2	<0	449.8
60ft NE	<0	89.6	155.2
60ft E	695.3	13.9	N/A
60ft SE	381.4	<0	421
60ft S	602.4	<0	502
60ft SW	893.4	<0	200.3
60ft W	375.9	22.5	160.5
60ft NW	<0	79	394.1
80ft N	884	<0	970.7
80ft NE	635.6	58.4	244.9
80ft E	710.9	<0	1008.2
80ft SE	708.6	<0	1496.6
80ft S	985.4	<0	160.8
80ft SW	615.7	<0	408.1
80ft W	<0	154.7	N/A
80ft NW	467.6	73.6	<0
100ft N	404	<0	933.3
100ft NE	510.5	43.9	359.8
100ft E	847.5	<0	1310.7
100ft SE	280.1	<0	1041.2
100ft S	731.4	<0	148.2
100ft SW	868.1	<0	592.7
100ft W	749.5	<0	778
100ft NW	352.4	8.2	159

TABLE D-5
PRECISION AND ACCURACY OF THE LIBS AS DETERMINED IN THE FIELD BY ANALYSIS OF USGS CERTIFIED REFERENCE MATERIAL (SOIL) GXR-2 AT PRS 14-003

Analysis Number	Mn (ppm)	Pb (ppm)	Ba (ppm)
1	1306	567	2370
2	1425	539	2944
3	1384	512	3191
4	1380	570	3305
5	1376	561	3134
6	1380	608	2987
7	1396	603	2427
8	not analyzed	552	3050
Mean	1378	564	2926
Standard Deviation	36	31.6	345
Percent RSD	3%	6%	12%
Certified Values	1010	690	2240
Uncertainty	40	60	60

Z-Test Results for Comparison of Two Means (i.e. LIBS results vs USGS reference material)

Computed Z value *	6.84805843	-1.8581726	1.95920049
Z critical (two tail) @ 95% level	1.95996108	1.95996108	1.95996108
Significant Difference ?	yes	no	no

* Computed in Excel

CONFIRMATORY SAMPLING RESULTS

This is to certify that the following samples were analyzed using good laboratory practices to show the following results.

SAMPLE ID: 02 0214-97-0007 Collected: 05/29/97 Category: Soil

TEST DESCRIPTION	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	82	1	% wt.	06/06/97	ENH	D2216-90
Arsenic, Total	4.3	0.49	mg/kg	06/11/97	ALC	7060
Lead, Total	16	2.4	mg/kg	06/10/97	KHA	7421
Mercury, Total	ND	0.12	mg/kg	06/05/97	ALC	7471A\7471A
Selenium, Total	ND	1.2	mg/kg	06/05/97	JEC	7740
Thallium, Total	1.0S	0.61	mg/kg	06/13/97	KHA	7841
Aluminum, Total	29000	6.1	mg/kg	06/06/97	JYH	6010A\3050A
Antimony, Total	ND	12	mg/kg	06/06/97	JYH	6010A\3050A
Barium, Total	330	0.61	mg/kg	06/06/97	JYH	6010A\3050A
Beryllium, Total	1.7	0.61	mg/kg	06/06/97	JYH	6010A\3050A
Cadmium, Total	ND	0.61	mg/kg	06/06/97	JYH	6010A\3050A
Calcium, Total	3000	12	mg/kg	06/06/97	JYH	6010A\3050A
Chromium, Total	12	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Cobalt, Total	6.6	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Copper, Total	8.7	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Iron, Total	17000	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Magnesium, Total	2900	30	mg/kg	06/06/97	JYH	6010A\3050A
Manganese, Total	340	0.61	mg/kg	06/06/97	JYH	6010A\3050A
Nickel, Total	11	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Potassium, Total	2300	61	mg/kg	06/06/97	JYH	6010A\3050A
Silver, Total	ND	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Sodium, Total	670	30	mg/kg	06/06/97	JYH	6010A\3050A
Vanadium, Total	27	0.61	mg/kg	06/06/97	JYH	6010A\3050A
Zinc, Total	41	0.61	mg/kg	06/06/97	JYH	6010A\3050A

SAMPLE ID: 03 0214-97-0008 Collected: 05/29/97 Category: Soil

TEST DESCRIPTION	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	78	1	% wt.	06/06/97	ENH	D2216-90
Arsenic, Total	5.5	0.51	mg/kg	06/11/97	ALC	7060
Lead, Total	18	2.6	mg/kg	06/10/97	KHA	7421
Mercury, Total	ND	0.13	mg/kg	06/05/97	ALC	7471A\7471A
Selenium, Total	ND	1.3	mg/kg	06/05/97	JEC	7740
Thallium, Total	0.9IS	0.64	mg/kg	06/13/97	KHA	7841
Aluminum, Total	42000	6.4	mg/kg	06/06/97	JYH	6010A\3050A
Antimony, Total	ND	13	mg/kg	06/06/97	JYH	6010A\3050A
Barium, Total	860	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Beryllium, Total	2.1	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Cadmium, Total	ND	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Calcium, Total	5000	13	mg/kg	06/06/97	JYH	6010A\3050A
Chromium, Total	21	1.3	mg/kg	06/06/97	JYH	6010A\3050A
Cobalt, Total	7.4	1.3	mg/kg	06/06/97	JYH	6010A\3050A
Copper, Total	12	1.3	mg/kg	06/06/97	JYH	6010A\3050A
Iron, Total	22000	2.6	mg/kg	06/06/97	JYH	6010A\3050A
Magnesium, Total	4100	32	mg/kg	06/06/97	JYH	6010A\3050A
Manganese, Total	410	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Nickel, Total	17	2.6	mg/kg	06/06/97	JYH	6010A\3050A
Potassium, Total	3500	64	mg/kg	06/06/97	JYH	6010A\3050A
Silver, Total	ND	2.6	mg/kg	06/06/97	JYH	6010A\3050A
Sodium, Total	270	32	mg/kg	06/06/97	JYH	6010A\3050A
Vanadium, Total	32	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Zinc, Total	55	0.64	mg/kg	06/06/97	JYH	6010A\3050A

NOTES AND DEFINITIONS:

ND = Not detected at or above the reporting limit
S = Analyzed by method of standard addition

AMC/July 97

SAMPLE ID: 04 0214-97-0009 Collected: 05/29/97 Category: Soil

TEST DESCRIPTION	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	78	1	% wt.	06/06/97	ENH	D2216-90
Arsenic, Total	4.9	0.51	mg/kg	06/11/97	ALC	7060
Lead, Total	15	2.6	mg/kg	06/10/97	KHA	7421
Mercury, Total	ND	0.13	mg/kg	06/05/97	ALC	7471A\7471A
Selenium, Total	ND	1.3	mg/kg	06/05/97	JEC	7740
Thallium, Total	0.65S	0.64	mg/kg	06/13/97	KHA	7841
Aluminum, Total	31000	6.4	mg/kg	06/06/97	JYH	6010A\3050A
Antimony, Total	ND	13	mg/kg	06/06/97	JYH	6010A\3050A
Barium, Total	1800	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Beryllium, Total	1.8	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Cadmium, Total	ND	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Calcium, Total	3600	13	mg/kg	06/06/97	JYH	6010A\3050A
Chromium, Total	12	1.3	mg/kg	06/06/97	JYH	6010A\3050A
Cobalt, Total	5.5	1.3	mg/kg	06/06/97	JYH	6010A\3050A
Copper, Total	8.1	1.3	mg/kg	06/06/97	JYH	6010A\3050A
Iron, Total	17000	2.6	mg/kg	06/06/97	JYH	6010A\3050A
Magnesium, Total	2800	32	mg/kg	06/06/97	JYH	6010A\3050A
Manganese, Total	310	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Nickel, Total	10	2.6	mg/kg	06/06/97	JYH	6010A\3050A
Potassium, Total	2200	64	mg/kg	06/06/97	JYH	6010A\3050A
Silver, Total	ND	2.6	mg/kg	06/06/97	JYH	6010A\3050A
Sodium, Total	190	32	mg/kg	06/06/97	JYH	6010A\3050A
Vanadium, Total	24	0.64	mg/kg	06/06/97	JYH	6010A\3050A
Zinc, Total	37	0.64	mg/kg	06/06/97	JYH	6010A\3050A

SAMPLE ID: 05 0214-97-0010 Collected: 05/29/97 Category: Soil

TEST DESCRIPTION	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	83	1	% wt.	06/06/97	ENH	D2216-90
Arsenic, Total	4.1	0.48	mg/kg	06/11/97	ALC	7060
Lead, Total	16	2.4	mg/kg	06/10/97	KHA	7421
Mercury, Total	ND	0.12	mg/kg	06/05/97	ALC	7471A\7471A
Selenium, Total	ND	1.2	mg/kg	06/05/97	JEC	7740
Thallium, Total	0.89S	0.60	mg/kg	06/13/97	KHA	7841
Aluminum, Total	34000	6.0	mg/kg	06/06/97	JYH	6010A\3050A
Antimony, Total	ND	12	mg/kg	06/06/97	JYH	6010A\3050A
Barium, Total	460	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Beryllium, Total	1.8	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Cadmium, Total	ND	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Calcium, Total	3400	12	mg/kg	06/06/97	JYH	6010A\3050A
Chromium, Total	16	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Cobalt, Total	9.4	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Copper, Total	10	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Iron, Total	19000	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Magnesium, Total	3600	30	mg/kg	06/06/97	JYH	6010A\3050A
Manganese, Total	510	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Nickel, Total	14	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Potassium, Total	2800	60	mg/kg	06/06/97	JYH	6010A\3050A
Silver, Total	ND	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Sodium, Total	240	30	mg/kg	06/06/97	JYH	6010A\3050A
Vanadium, Total	30	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Zinc, Total	51	0.60	mg/kg	06/06/97	JYH	6010A\3050A

NOTES AND DEFINITIONS:

ND = Not detected at or above the reporting limit
S = Analyzed by method of standard addition

AMC/July 97

SAMPLE ID: 06 0214-97-0011 Collected: 05/30/97 Category: Soil

TEST DESCRIPTION	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	83	1	% wt.	06/06/97	ENH	D2216-90
Arsenic, Total	4.7	0.48	mg/kg	06/11/97	ALC	7060
Lead, Total	16	2.4	mg/kg	06/10/97	KHA	7421
Mercury, Total	ND	0.12	mg/kg	06/05/97	ALC	7471A\7471A
Selenium, Total	ND	1.2	mg/kg	06/05/97	JEC	7740
Thallium, Total	1.2S	0.60	mg/kg	06/13/97	KHA	7841
Aluminum, Total	17000	6.0	mg/kg	06/06/97	JYH	6010A\3050A
Antimony, Total	ND	12	mg/kg	06/06/97	JYH	6010A\3050A
Barium, Total	220	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Beryllium, Total	1.3	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Cadmium, Total	ND	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Calcium, Total	2500	12	mg/kg	06/06/97	JYH	6010A\3050A
Chromium, Total	11	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Cobalt, Total	8.1	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Copper, Total	7.7	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Iron, Total	14000	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Magnesium, Total	2400	30	mg/kg	06/06/97	JYH	6010A\3050A
Manganese, Total	470	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Nickel, Total	9.6	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Potassium, Total	2000	60	mg/kg	06/06/97	JYH	6010A\3050A
Silver, Total	ND	2.4	mg/kg	06/06/97	JYH	6010A\3050A
Sodium, Total	160	30	mg/kg	06/06/97	JYH	6010A\3050A
Vanadium, Total	24	0.60	mg/kg	06/06/97	JYH	6010A\3050A
Zinc, Total	71	0.60	mg/kg	06/06/97	JYH	6010A\3050A

SAMPLE ID: 07 0214-97-0012 Collected: 05/29/97 Category: Soil

TEST DESCRIPTION	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED	BY	METHOD
Percent Solids	86	1	% wt.	06/06/97	ENH	D2216-90
Arsenic, Total	3.8	0.47	mg/kg	06/11/97	ALC	7060
Lead, Total	13	2.3	mg/kg	06/10/97	KHA	7421
Mercury, Total	ND	0.12	mg/kg	06/05/97	ALC	7471A\7471A
Selenium, Total	ND	1.2	mg/kg	06/05/97	JEC	7740
Thallium, Total	0.66S	0.58	mg/kg	06/13/97	KHA	7841
Aluminum, Total	10000	5.8	mg/kg	06/06/97	JYH	6010A\3050A
Antimony, Total	ND	12	mg/kg	06/06/97	JYH	6010A\3050A
Barium, Total	170	0.58	mg/kg	06/06/97	JYH	6010A\3050A
Beryllium, Total	0.33	0.58	mg/kg	06/06/97	JYH	6010A\3050A
Cadmium, Total	ND	0.58	mg/kg	06/06/97	JYH	6010A\3050A
Calcium, Total	2000	12	mg/kg	06/06/97	JYH	6010A\3050A
Chromium, Total	8.4	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Cobalt, Total	6.7	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Copper, Total	5.9	1.2	mg/kg	06/06/97	JYH	6010A\3050A
Iron, Total	11000	2.3	mg/kg	06/06/97	JYH	6010A\3050A
Magnesium, Total	1700	29	mg/kg	06/06/97	JYH	6010A\3050A
Manganese, Total	410	0.58	mg/kg	06/06/97	JYH	6010A\3050A
Nickel, Total	8.6	2.3	mg/kg	06/06/97	JYH	6010A\3050A
Potassium, Total	1600	58	mg/kg	06/06/97	JYH	6010A\3050A
Silver, Total	ND	2.3	mg/kg	06/06/97	JYH	6010A\3050A
Sodium, Total	94	29	mg/kg	06/06/97	JYH	6010A\3050A
Vanadium, Total	21	0.58	mg/kg	06/06/97	JYH	6010A\3050A
Zinc, Total	29	0.58	mg/kg	06/06/97	JYH	6010A\3050A

NOTES AND DEFINITIONS:

ND = Not detected at or above the reporting limit
S = Analyzed by method of standard addition

MC/July 97

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0013

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*66

Level (low/med): ___ Date Received: 07/18/97

%Solids 97.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6600			P
7440-36-0	Antimony	4.8	U		P
7440-38-2	Arsenic	1.6			F
7440-39-3	Barium	303			P
7440-41-7	Beryllium	0.61			P
7440-43-9	Cadmium	0.48	U		P
7440-70-2	Calcium	2040			P
7440-47-3	Chromium	6.3			P
7440-48-4	Cobalt	5.2			P
7440-50-8	Copper	9.6		•	P
7439-89-6	Iron	8370			P
7439-92-1	Lead	15.7		NS	F
7439-95-4	Magnesium	1670			P
7439-96-5	Manganese	392		N	P
7439-97-6	Mercury	0.046	U		CV
7440-02-0	Nickel	6.8			P
7440-09-7	Potassium	1540			P
7782-49-2	Selenium	0.24	U		F
7440-22-4	Silver	0.48	U		P
7440-23-5	Sodium	229	B		P
7440-28-0	Thallium	0.19	U		F
7440-62-2	Vanadium	17.7			P
7440-66-6	Zinc	22.6			P
57-12-5	Cyanide				NR

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0014

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*67

Level (low/med): Date Received: 07/18/97

%Solids 98.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6070			P
7440-36-0	Antimony	4.8	U		P
7440-38-2	Arsenic	1.8			F
7440-39-3	Barium	245			P
7440-41-7	Beryllium	0.68			P
7440-43-9	Cadmium	0.48	U		P
7440-70-2	Calcium	1590			P
7440-47-3	Chromium	5.8			P
7440-48-4	Cobalt	5.6			P
7440-50-8	Copper	12.3		*	P
7439-89-6	Iron	8110			P
7439-92-1	Lead	15.5		N	F
7439-95-4	Magnesium	1430			P
7439-96-5	Manganese	379		N	P
7439-97-6	Mercury	0.049	U		CV
7440-02-0	Nickel	5.6			P
7440-09-7	Potassium	1470			P
7782-49-2	Selenium	0.23	U		F
7440-22-4	Silver	2.0			P
7440-23-5	Sodium	288	B		P
7440-28-0	Thallium	0.18	U		F
7440-62-2	Vanadium	17.5			P
7440-66-6	Zinc	34.1			P
57-12-5	Cyanide				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0015

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*68

Level (low/med): Date Received: 07/18/97

%Solids 89.3

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13900			P
7440-36-0	Antimony	5.3	U		P
7440-38-2	Arsenic	2.4			F
7440-39-3	Barium	746			P
7440-41-7	Beryllium	1.2			P
7440-43-9	Cadmium	0.53	U		P
7440-70-2	Calcium	2510			P
7440-47-3	Chromium	7.8			P
7440-48-4	Cobalt	5.8			P
7440-50-8	Copper	9.6		*	P
7439-89-6	Iron	11500			P
7439-92-1	Lead	15.6		N	F
7439-95-4	Magnesium	2110			P
7439-96-5	Manganese	388		N	P
7439-97-6	Mercury	0.045	U		CV
7440-02-0	Nickel	8.6			P
7440-09-7	Potassium	1660			P
7782-49-2	Selenium	0.26	U		F
7440-22-4	Silver	1.5			P
7440-23-5	Sodium	332	B		P
7440-28-0	Thallium	0.21	U		F
7440-62-2	Vanadium	22.2			P
7440-66-6	Zinc	27.8			P
57-12-5	Cyanide				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0016

Lab Name: QST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: QST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*69

Level (low/med): Date Received: 07/18/97

%Solids 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7180			P
7440-36-0	Antimony	4.5	U		P
7440-38-2	Arsenic	1.9			F
7440-39-3	Barium	157			P
7440-41-7	Beryllium	0.70			P
7440-43-9	Cadmium	0.45	U		P
7440-70-2	Calcium	1990			P
7440-47-3	Chromium	6.2			P
7440-48-4	Cobalt	5.4			P
7440-50-8	Copper	4.9		*	P
7439-89-6	Iron	8790			P
7439-92-1	Lead	15.1		NS	F
7439-95-4	Magnesium	1550			P
7439-96-5	Manganese	422		N	P
7439-97-6	Mercury	0.047	U		CV
7440-02-0	Nickel	6.3			P
7440-09-7	Potassium	1190			P
7782-49-2	Selenium	0.22	U		F
7440-22-4	Silver	0.45	U		P
7440-23-5	Sodium	298	B		P
7440-28-0	Thallium	0.18	U		F
7440-62-2	Vanadium	17.5			P
7440-66-6	Zinc	20.0			P
57-12-5	Cyanide				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

FORM I - IN

U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0017

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*70

Level (low/med): ___ Date Received: 07/18/97

%Solids 97.2

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7320			P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	1.7			F
7440-39-3	Barium	202			P
7440-41-7	Beryllium	0.80			P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	1810			P
7440-47-3	Chromium	6.3			P
7440-48-4	Cobalt	6.0			P
7440-50-8	Copper	5.1		*	P
7439-89-6	Iron	9060			P
7439-92-1	Lead	12.5		N	F
7439-95-4	Magnesium	1560			P
7439-96-5	Manganese	444		N	P
7439-97-6	Mercury	0.043	U		CV
7440-02-0	Nickel	6.8			P
7440-09-7	Potassium	1410			P
7782-49-2	Selenium	0.23	U		F
7440-22-4	Silver	0.50	U		P
7440-23-5	Sodium	309	B		P
7440-28-0	Thallium	0.18	U	W	F
7440-62-2	Vanadium	18.9			P
7440-66-6	Zinc	18.5			P
57-12-5	Cyanide				NR

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0018

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*71

Level (low/med): ___ Date Received: 07/18/97

%Solids 95.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10400			P
7440-36-0	Antimony	5.0	U		P
7440-38-2	Arsenic	2.3		S	F
7440-39-3	Barium	177			P
7440-41-7	Beryllium	0.93			P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	2080			P
7440-47-3	Chromium	7.5			P
7440-48-4	Cobalt	5.6			P
7440-50-8	Copper	6.0		*	P
7439-89-6	Iron	11300			P
7439-92-1	Lead	13.8		N	F
7439-95-4	Magnesium	2080			P
7439-96-5	Manganese	340		N	P
7439-97-6	Mercury	0.048	U		CV
7440-02-0	Nickel	7.8			P
7440-09-7	Potassium	1710			P
7782-49-2	Selenium	0.24	U		F
7440-22-4	Silver	0.50	U		P
7440-23-5	Sodium	331	B		P
7440-28-0	Thallium	0.21	B		F
7440-62-2	Vanadium	22.6			P
7440-66-6	Zinc	22.5			P
57-12-5	Cyanide				NR

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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U.S. EPA - CLP

1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0019

Lab Name: QST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: QST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*72

Level (low/med): ___ Date Received: 07/18/97

%Solids 97.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7500			P
7440-36-0	Antimony	4.4	U		P
7440-38-2	Arsenic	1.8			F
7440-39-3	Barium	278			P
7440-41-7	Beryllium	0.61			P
7440-43-9	Cadmium	0.44	U		P
7440-70-2	Calcium	2030			P
7440-47-3	Chromium	6.3			P
7440-48-4	Cobalt	4.7			P
7440-50-8	Copper	8.9		*	P
7439-89-6	Iron	9180			P
7439-92-1	Lead	18.6		NS	F
7439-95-4	Magnesium	1700			P
7439-96-5	Manganese	352		N	P
7439-97-6	Mercury	0.051	U		CV
7440-02-0	Nickel	6.9			P
7440-09-7	Potassium	1470			P
7782-49-2	Selenium	0.25	U		F
7440-22-4	Silver	0.61	B		P
7440-23-5	Sodium	270	B		P
7440-28-0	Thallium	0.20	U		F
7440-62-2	Vanadium	18.8			P
7440-66-6	Zinc	22.8			P
57-12-5	Cyanide				NR

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

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U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0025

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*73

Level (low/med): Date Received: 07/18/97

%Solids 88.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17900			P
7440-36-0	Antimony	5.4	U		P
7440-38-2	Arsenic	2.2			F
7440-39-3	Barium	533			P
7440-41-7	Beryllium	1.3			P
7440-43-9	Cadmium	0.54	U		P
7440-70-2	Calcium	2530			P
7440-47-3	Chromium	8.7			P
7440-48-4	Cobalt	5.3	B		P
7440-50-8	Copper	11.4		*	P
7439-89-6	Iron	12900			P
7439-92-1	Lead	17.4		NS	F
7439-95-4	Magnesium	2230			P
7439-96-5	Manganese	354		N	P
7439-97-6	Mercury	0.052	U		CV
7440-02-0	Nickel	8.8			P
7440-09-7	Potassium	1730			P
7782-49-2	Selenium	0.28	U		F
7440-22-4	Silver	1.2			P
7440-23-5	Sodium	363	B		P
7440-28-0	Thallium	0.23	B		F
7440-62-2	Vanadium	21.8			P
7440-66-6	Zinc	25.4			P
57-12-5	Cyanide				NR

Color Before: Clarity Before: Texture:

Color After: Clarity After: Artifacts:

Comments:

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U.S. EPA - CLP

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

0214-97-0026

Lab Name: OST ENVIRONMENTAL Contract: LOS ALAMOS

Lab Code: OST Case No.: 3393R SAS No.: NA SDG No.: L3393R

Matrix (soil/water): S Lab Sample ID: !LNS10D*74

Level (low/med): ___ Date Received: 07/18/97

%Solids 97.1

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8940			P
7440-36-0	Antimony	4.3	U		P
7440-38-2	Arsenic	1.7			F
7440-39-3	Barium	165			P
7440-41-7	Beryllium	0.77			P
7440-43-9	Cadmium	0.43	U		P
7440-70-2	Calcium	1750			P
7440-47-3	Chromium	7.3			P
7440-48-4	Cobalt	5.7			P
7440-50-8	Copper	5.3		*	P
7439-89-6	Iron	10200			P
7439-92-1	Lead	13.1		NS	F
7439-95-4	Magnesium	1640			P
7439-96-5	Manganese	402		N	P
7439-97-6	Mercury	0.045	U		CV
7440-02-0	Nickel	6.3			P
7440-09-7	Potassium	1460			P
7782-49-2	Selenium	0.26	U		F
7440-22-4	Silver	0.43	U		P
7440-23-5	Sodium	286	B		P
7440-28-0	Thallium	0.20	U	W	F
7440-62-2	Vanadium	19.7			P
7440-66-6	Zinc	20.9			P
57-12-5	Cyanide				NR

Color Before: _____ Clarity Before: _____ Texture: _____

Color After: _____ Clarity After: _____ Artifacts: _____

Comments: _____

FORM I - IN

TOTAL URANIUM ANALYSIS RESULTS SUMMARY
By Laser-Induced Kinetic Phosphorimetry

Lab Name: Paragon Analytics, Inc.

Date Collected: 05/27/97

Client Name: Los Alamos Natl' Lab/SMO

Date Analyzed : 06/14/97

Client Project ID: 3181R

Sample Matrix : Soil

Lab Sample ID Series: 97-06-005

Client Sample ID	Lab Sample ID	Total Uranium (ug/g)	Reporting Limit	Flag
0214-97-0002	06-005-01	3.52 ± 0.48	0.49	
0214-97-0007	06-005-02	3.01 ± 0.41	0.48	
0214-97-0008	06-005-03	3.11 ± 0.42	0.48	
0214-97-0009	06-005-04	3.14 ± 0.43	0.50	
0214-97-0010	06-005-05	3.45 ± 0.47	0.49	
0214-97-0011	06-005-06	3.29 ± 0.45	0.49	
0214-97-0012	06-005-07	3.33 ± 0.45	0.49	
Blank	06-005-B1	BDL	0.05	U
Duplicate	06-005-D1	3.03 ± 0.41	0.50	

Reported Uncertainties are the Estimated Total Propagated Uncertainties (2σ).
See PAI SOP 743FC for details of TPU determinations.

FLAGS = J - 'Estimated Value' - result between Method Detection Limit and Reporting Limit.
U - 'Not Detected' - result less than Method Detection Limit.

BDL = Below Detection Limit; see method for DL determination.

Remarks:

Sample 97-06-005-D1 is a duplicate of 97-06-005-07.

15/July97 BP

000001

970709704

Thermo NUtech

Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0013

SDG: 9707097
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709704

Client sample ID 0214-97-0013
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.83	0.07	0.10	0.05	

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

970709705

Thermo NUtech

Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0014

SDG: 9707097
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709705

Client sample ID 0214-97-0014
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	4.61	0.07	0.10	0.50	

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00024

970709706

Thermo NUtech
Ray F. Weston/LANL

0214-97-0015

SAMPLE DATA SHEET

SDG: 9707097
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709706

Client sample ID 0214-97-0015
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.46	0.06	0.10	0.50	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00025

970709707

Thermo NUtech

Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0016

SDG: 9706061
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709707

Client sample ID 0214-97-0016
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	2.98	0.06	0.10	0.50	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00026

970709708

Thermo NUtech

Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0017

SDG: 9706061
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709708

Client sample ID 0214-97-0017
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.72	0.07	0.10	0.05	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00027

970709709

Thermo NUtech
Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0018

SDG: 9703027
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709709

Client sample ID 0214-97-0018
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.37	0.06	0.10	0.05	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00028

970709710

Thermo NUtech
Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0019

SDG: 9706061
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709710

Client sample ID 0214-97-0019
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.68	0.07	0.10	0.05	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00029

970709711

Thermo NUtech

Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0025

SDG: 9706061
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709711

Client sample ID 0214-97-0025
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.42	0.06	0.10	0.05	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00030

970709712

Thermo NUtech
Roy F. Weston/LANL

SAMPLE DATA SHEET

0214-97-0026

SDG: 9706061
Contact: John Miglio

Client/Case No: RECRA Environmental, Inc./LANL 3394R
Contract: L00228

Lab Sample ID: 970709712

Client sample ID 0214-97-0026
Matrix: Soil

ANALYTE	Method	Result ug/g	1 sigma Error ug/g	MDA ug/g	RDL ug/g	Qual
Total U	ASTM D5174 Modified	3.34	0.05	0.10	0.05	(U, R4)

Lab ID TNU/OR
Form LANL-RES
Report Date 7/30/97

00031

NITROAROMATICS AND NITRAMINES

Modified Method 8330

		Sample ID
Lab Name:	Paragon Analytics, Inc.	0214-97-0007
Client Name:	LANL SMO	
Client Project ID:	3179R	Date Collected: 05-29-97
Lab Sample ID:	9706004-2	Date Extracted: 06-09-97
Sample Matrix:	Soil	Date Analyzed: 06-10-97
Cleanup:	N/A	Sample Weight(g): 2
		Final Volume(mL): 20

Results based on dry weight.

Analyte	Conc. (mg/kg)	Detection Limit (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	ND	2.2
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	ND	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	ND	0.25
1,3-Dinitrobenzene (1,3-DNB)	ND	0.25
Nitrobenzene (NB)	ND	0.26
2,4,6-Trinitrotoluene (2,4,6-TNT)	ND	0.25
2-Amino-4,6-DNT	ND	0.25
2,4-Dinitrotoluene (2,4-DNT)	ND	0.25
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	ND	0.65
4-Amino-2,6-DNT	ND	0.25
2,6-Dinitrotoluene (2,6-DNT)	ND	0.26
o-Nitrotoluene (2-NT)	ND	0.25
p-Nitrotoluene (4-NT)	ND	0.25
m-Nitrotoluene (3-NT)	ND	0.25

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
1,2 Dinitrobenzene	110	50-150

ND = Not detected or below detection limits.

ATIC/July 97

NITROAROMATICS AND NITRAMINES

Modified Method 8330

		Sample ID
Lab Name:	Paragon Analytics, Inc.	0214-97-0008
Client Name:	LANL SMO	Date Collected: 05-29-97
Client Project ID:	3179R	Date Extracted: 06-09-97
Lab Sample ID:	9706004-3	Date Analyzed: 06-10-97
Sample Matrix:	Soil	Sample Weight(g): 2
Cleanup:	N/A	Final Volume(mL): 20

Results based on dry weight.

Analyte	Conc. (mg/kg)	Detection Limit (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	ND	2.2
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	ND	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	ND	0.25
1,3-Dinitrobenzene (1,3-DNB)	ND	0.25
Nitrobenzene (NB)	ND	0.26
2,4,6-Trinitrotoluene (2,4,6-TNT)	ND	0.25
2-Amino-4,6-DNT	ND	0.25
2,4-Dinitrotoluene (2,4-DNT)	ND	0.25
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	ND	0.65
4-Amino-2,6-DNT	ND	0.25
2,6-Dinitrotoluene (2,6-DNT)	ND	0.26
o-Nitrotoluene (2-NT)	ND	0.25
p-Nitrotoluene (4-NT)	ND	0.25
m-Nitrotoluene (3-NT)	ND	0.25

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
1,2 Dinitrobenzene	108	50-150

ND = Not detected or below detection limits.

FORM-1

7/16/ul97

NITROAROMATICS AND NITRAMINES

Modified Method 8330

		Sample ID
Lab Name:	Paragon Analytics, Inc.	
Client Name:	LANL SMO	0214-97-0009
Client Project ID:	3179R	Date Collected: 05-29-97
Lab Sample ID:	9706004-4	Date Extracted: 06-09-97
Sample Matrix:	Soil	Date Analyzed: 06-10-97
Cleanup:	N/A	Sample Weight(g): 2
		Final Volume(mL): 20

Results based on dry weight.

Analyte	Conc. (mg/kg)	Detection Limit (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	ND	2.2
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	ND	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	ND	0.25
1,3-Dinitrobenzene (1,3-DNB)	ND	0.25
Nitrobenzene (NB)	ND	0.26
2,4,6-Trinitrotoluene (2,4,6-TNT)	ND	0.25
2-Amino-4,6-DNT	ND	0.25
2,4-Dinitrotoluene (2,4-DNT)	ND	0.25
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	ND	0.65
4-Amino-2,6-DNT	ND	0.25
2,6-Dinitrotoluene (2,6-DNT)	ND	0.26
o-Nitrotoluene (2-NT)	ND	0.25
p-Nitrotoluene (4-NT)	ND	0.25
m-Nitrotoluene (3-NT)	ND	0.25

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
1,2 Dinitrobenzene	110	50-150

ND = Not detected or below detection limits.

FORM-1

7/16/July 97

NITROAROMATICS AND NITRAMINES

Modified Method 8330

		Sample ID
Lab Name:	Paragon Analytics, Inc.	
Client Name:	LANL SMO	0214-97-0010
Client Project ID:	3179R	Date Collected: 05-29-97
Lab Sample ID:	9706004-5	Date Extracted: 06-09-97
Sample Matrix:	Soil	Date Analyzed: 06-10-97
Cleanup:	N/A	Sample Weight(g): 2
		Final Volume(mL): 20

Results based on dry weight.

Analyte	Conc. (mg/kg)	Detection Limit (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	ND	2.2
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	ND	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	ND	0.25
1,3-Dinitrobenzene (1,3-DNB)	ND	0.25
Nitrobenzene (NB)	ND	0.26
2,4,6-Trinitrotoluene (2,4,6-TNT)	ND	0.25
2-Amino-4,6-DNT	ND	0.25
2,4-Dinitrotoluene (2,4-DNT)	ND	0.25
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	ND	0.65
4-Amino-2,6-DNT	ND	0.25
2,6-Dinitrotoluene (2,6-DNT)	ND	0.26
o-Nitrotoluene (2-NT)	ND	0.25
p-Nitrotoluene (4-NT)	ND	0.25
m-Nitrotoluene (3-NT)	ND	0.25

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
1,2 Dinitrobenzene	111	50-150

ND = Not detected or below detection limits.

6/16/97

NITROAROMATICS AND NITRAMINES

Modified Method 8330

		Sample ID
Lab Name:	Paragon Analytics, Inc.	
Client Name:	LANL SMO	0214-97-0011
Client Project ID:	3179R	Date Collected: 05-30-97
Lab Sample ID:	9706004-6	Date Extracted: 06-09-97
Sample Matrix:	Soil	Date Analyzed: 06-10-97
Cleanup:	N/A	Sample Weight(g): 2
		Final Volume(mL): 20

Results based on dry weight.

Analyte	Conc. (mg/kg)	Detection Limit (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	ND	2.2
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	ND	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	ND	0.25
1,3-Dinitrobenzene (1,3-DNB)	ND	0.25
Nitrobenzene (NB)	ND	0.26
2,4,6-Trinitrotoluene (2,4,6-TNT)	ND	0.25
2-Amino-4,6-DNT	ND	0.25
2,4-Dinitrotoluene (2,4-DNT)	ND	0.25
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	ND	0.65
4-Amino-2,6-DNT	ND	0.25
2,6-Dinitrotoluene (2,6-DNT)	ND	0.26
o-Nitrotoluene (2-NT)	ND	0.25
p-Nitrotoluene (4-NT)	ND	0.25
m-Nitrotoluene (3-NT)	ND	0.25

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
1,2 Dinitrobenzene	112	50-150

ND = Not detected or below detection limits.

NITROAROMATICS AND NITRAMINES

Modified Method 8330

		Sample ID
Lab Name:	Paragon Analytics, Inc.	
Client Name:	LANL SMO	0214-97-0012
Client Project ID:	3179R	Date Collected: 05-29-97
Lab Sample ID:	9706004-7	Date Extracted: 06-09-97
Sample Matrix:	Soil	Date Analyzed: 06-10-97
Cleanup:	N/A	Sample Weight(g): 2
		Final Volume(mL): 20

Results based on dry weight.

Analyte	Conc. (mg/kg)	Detection Limit (mg/kg)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	ND	2.2
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	ND	1.0
1,3,5-Trinitrobenzene (1,3,5-TNB)	ND	0.25
1,3-Dinitrobenzene (1,3-DNB)	ND	0.25
Nitrobenzene (NB)	ND	0.26
2,4,6-Trinitrotoluene (2,4,6-TNT)	ND	0.25
2-Amino-4,6-DNT	ND	0.25
2,4-Dinitrotoluene (2,4-DNT)	ND	0.25
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	ND	0.65
4-Amino-2,6-DNT	ND	0.25
2,6-Dinitrotoluene (2,6-DNT)	ND	0.26
o-Nitrotoluene (2-NT)	ND	0.25
p-Nitrotoluene (4-NT)	ND	0.25
m-Nitrotoluene (3-NT)	ND	0.25

SURROGATE RECOVERY

Analyte	% Recovery	% Rec Limits
1,2 Dinitrobenzene	113	50-150

ND = Not detected or below detection limits.

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0013

Name: QST (GAINESVI Project No.: 1944006G SDG No.: G83809

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*75

Sample wt/vol: 2.0. G Lab File ID: G83809

%Moisture: 2.0 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 0300 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.165	U
121-82-4	RDX	0.164	U
99-35-4	1,3,5-TRINITROBENZENE	0.081	U
99-65-0	1,3-DINITROBENZENE	0.082	U
479-45-8	TETRYL	0.094	U
98-95-3	NITROBENZENE	0.092	U
118-96-7	2,4,6-TRINITROTOLUENE	0.086	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.086	U
55-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.083	U
06-20-2	2,6-DINITROTOLUENE	0.081	U
121-14-2	2,4-DINITROTOLUENE	0.061	U
88-72-2	2-NITROTOLUENE	0.161	U
99-99-0	4-NITROTOLUENE	0.163	U
99-08-1	3-NITROTOLUENE	0.177	U

RQS 8/13/97

00020

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0014

Lab Name: QST (GAINESVI Project No.: 1944006G SDG No.: G83809

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*76

Sample wt/vol: 2.0. G Lab File ID: G83809

%Moisture: 1.9 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 0332 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.165	U
121-82-4	RDX	0.164	U
99-35-4	1,3,5-TRINITROBENZENE	0.081	U
99-65-0	1,3-DINITROBENZENE	0.082	U
479-45-8	TETRYL	0.094	U
98-95-3	NITROBENZENE	0.092	U
118-96-7	2,4,6-TRINITROTOLUENE	0.085	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.086	U
355-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.083	U
606-20-2	2,6-DINITROTOLUENE	0.081	U
121-14-2	2,4-DINITROTOLUENE	0.061	U
88-72-2	2-NITROTOLUENE	0.161	U
99-99-0	4-NITROTOLUENE	0.163	U
99-08-1	3-NITROTOLUENE	0.177	U

7/23/97 00021

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0015

Name: QST (GAINESVI Project No.: 1944006G SDG No.: G83809

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*77

Sample wt/vol: 2.0. G Lab File ID: G83809

%Moisture: 9.0 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 0405 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.178	U
121-82-4	RDX	0.176	U
99-35-4	1,3,5-TRINITROBENZENE	0.088	U
99-65-0	1,3-DINITROBENZENE	0.088	U
479-45-8	TETRYL	0.102	U
98-95-3	NITROBENZENE	0.099	U
118-96-7	2,4,6-TRINITROTOLUENE	0.131	
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.093	U
35572-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.107	
606-20-2	2,6-DINITROTOLUENE	0.088	U
121-14-2	2,4-DINITROTOLUENE	0.066	U
88-72-2	2-NITROTOLUENE	0.173	U
99-99-0	4-NITROTOLUENE	0.176	U
99-08-1	3-NITROTOLUENE	0.191	U

RJS 8/13/97

FORM 1
ANALYSIS DATA SHEET

Client ID

0214-97-0016

Lab Name: QST (GAINESVI Project No.: 1944006G SDG No.: G83809

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*78

Sample wt/vol: 2.0. G Lab File ID: G83809

%Moisture: 2.3 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 0438 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.166	U
121-82-4	RDX	0.164	U
99-35-4	1,3,5-TRINITROBENZENE	0.082	U
99-65-0	1,3-DINITROBENZENE	0.082	U
479-45-8	TETRYL	0.095	U
98-95-3	NITROBENZENE	0.092	U
118-96-7	2,4,6-TRINITROTOLUENE	0.086	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.086	U
355-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.083	U
606-20-2	2,6-DINITROTOLUENE	0.082	U
121-14-2	2,4-DINITROTOLUENE	0.062	U
88-72-2	2-NITROTOLUENE	0.161	U
99-99-0	4-NITROTOLUENE	0.164	U
99-08-1	3-NITROTOLUENE	0.178	U

RQS
8/13/97

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0017

Name: QST (GAINESVI Project No.: 1944006G SDG No.: G83809

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*79

Sample wt/vol: 2.0. G Lab File ID: G83809

%Moisture: 2.5 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 0510 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.166	U
121-82-4	RDX	0.165	U
99-35-4	1,3,5-TRINITROBENZENE	0.082	U
99-65-0	1,3-DINITROBENZENE	0.082	U
479-45-8	TETRYL	0.095	U
98-95-3	NITROBENZENE	0.092	U
118-96-7	2,4,6-TRINITROTOLUENE	0.086	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.087	U
35-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.084	U
606-20-2	2,6-DINITROTOLUENE	0.082	U
121-14-2	2,4-DINITROTOLUENE	0.062	U
88-72-2	2-NITROTOLUENE	0.162	U
99-99-0	4-NITROTOLUENE	0.164	U
99-08-1	3-NITROTOLUENE	0.178	U

8/13/97

FORM 1
ANALYSIS DATA SHEET

Client ID

0214-97-0018

ab Name: QST (GAINESVI Project No.: 1944006G SDG No.: G83809

latrix: (soil/water) SOIL Lab Sample ID: !LNS10D*80

ample wt/vol: 2.0. G Lab File ID: G83809

Moisture: 4.0 Dilution Factor: 1.00

oncentrated Extract Volume: 0.040 L Date Received: 07/18/97

njection Volume: Date Extracted: 07/21/97

ime Analyzed: 0543 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.169	U
121-82-4	RDX	0.167	U
99-35-4	1,3,5-TRINITROBENZENE	0.083	U
99-65-0	1,3-DINITROBENZENE	0.083	U
479-45-8	TETRYL	0.096	U
98-95-3	NITROBENZENE	0.094	U
118-96-7	2,4,6-TRINITROTOLUENE	0.087	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.088	U
355-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.085	U
606-20-2	2,6-DINITROTOLUENE	0.083	U
121-14-2	2,4-DINITROTOLUENE	0.063	U
88-72-2	2-NITROTOLUENE	0.164	U
99-99-0	4-NITROTOLUENE	0.167	U
99-08-1	3-NITROTOLUENE	0.181	U

8/13/97

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0019

Name: QST (GAINESVI Project No.: SDG No.: G83835

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*81

Sample wt/vol: 2.0. G Lab File ID: G83835

%Moisture: 2.0 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 1136 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.165	U
121-82-4	RDX	0.164	U
99-35-4	1,3,5-TRINITROBENZENE	0.081	U
99-65-0	1,3-DINITROBENZENE	0.082	U
479-45-8	TETRYL	0.094	U
98-95-3	NITROBENZENE	0.092	U
118-96-7	2,4,6-TRINITROTOLUENE	0.086	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.086	U
55-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.083	U
606-20-2	2,6-DINITROTOLUENE	0.081	U
121-14-2	2,4-DINITROTOLUENE	0.061	U
88-72-2	2-NITROTOLUENE	0.161	U
99-99-0	4-NITROTOLUENE	0.163	U
99-08-1	3-NITROTOLUENE	0.177	U

8/13/97

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0025

Lab Name: QST (GAINESVI Project No.: SDG No.: G83835

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*82

Sample wt/vol: 2.0. G Lab File ID: G83835

%Moisture: 0.6 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 1209 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.163	U
121-82-4	RDX	0.162	U
99-35-4	1,3,5-TRINITROBENZENE	0.080	U
99-65-0	1,3-DINITROBENZENE	0.081	U
479-45-8	TETRYL	0.093	U
98-95-3	NITROBENZENE	0.091	U
118-96-7	2,4,6-TRINITROTOLUENE	0.084	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.085	U
355-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.082	U
606-20-2	2,6-DINITROTOLUENE	0.080	U
121-14-2	2,4-DINITROTOLUENE	0.061	U
88-72-2	2-NITROTOLUENE	0.159	U
99-99-0	4-NITROTOLUENE	0.161	U
99-08-1	3-NITROTOLUENE	0.175	U

RDS 8/13/97 00016

FORM 1
ANALYSIS DATA SHEET

Client ID
0214-97-0026

Name: QST (GAINESVI Project No.: SDG No.: G83835

Matrix: (soil/water) SOIL Lab Sample ID: !LNS10D*83

Sample wt/vol: 2.0. G Lab File ID: G83835

%Moisture: 3.0 Dilution Factor: 1.00

Concentrated Extract Volume: 0.040 L Date Received: 07/18/97

Injection Volume: Date Extracted: 07/21/97

Time Analyzed: 1242 Date Analyzed: 07/23/97

CAS NO.	COMPOUND	CONCENTRATION UNITS UG/G	Q
2691-41-0	HMX	0.167	U
121-82-4	RDX	0.166	U
99-35-4	1,3,5-TRINITROBENZENE	0.082	U
99-65-0	1,3-DINITROBENZENE	0.082	U
479-45-8	TETRYL	0.095	U
98-95-3	NITROBENZENE	0.093	U
118-96-7	2,4,6-TRINITROTOLUENE	0.086	U
1946-51-0	4-AMINO-2,6-DINITROTOLUENE	0.087	U
55-72-78-2	2,AMINO-4,6-DINIT-TOLUENE	0.084	U
606-20-2	2,6-DINITROTOLUENE	0.082	U
121-14-2	2,4-DINITROTOLUENE	0.062	U
88-72-2	2-NITROTOLUENE	0.163	U
99-99-0	4-NITROTOLUENE	0.165	U
99-08-1	3-NITROTOLUENE	0.179	U

8/13/97 00016

APPENDIX E
CERTIFICATION OF COMPLETION

I certify that all the work pertaining to the voluntary corrective action PRS14-003 has been completed in accordance with the Department of Energy approved VCA plan entitled VCA Plan for Potential Release Site 14-003, Burn Area. Based on my personal involvement or inquiry of the person or persons who managed this cleanup, a review of all data gathered and a visit to the site, to the best of my knowledge and belief, all criteria of the plan have been met or exceeded. I believe that the completion of this VCA is protective of both human health and the environment. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Field Unit 2, Field Project Leader
Environmental Restoration Project
Los Alamos National Laboratory

9/23/97
Date Signed

VOLUNTARY CORRECTIVE ACTION (VCA) COMPLETION REPORT
APPROVAL/DISAPPROVAL FORM

PRS(s) 14-003

The undersigned have reviewed the VCA Completion Report and believe that the intent and goals of the VCA plan have been met.

FPL _____ Date 9/23/97

FPC _____ Date _____

I Theodore J. Taylor, DOE-LAAO, **APPROVE** _____, **DISAPPROVE** _____ the accompanying Voluntary Correction Report for PRS(s) 14-003,
TA- 14.

The following reasons reflect the decision for disapproval:

_____

_____

_____

_____

_____

_____

_____

Signed: _____ Date _____

Attachment C

14-003

Memo to File

Date: August 21, 2000

To: PRS 14-003 File

From: Richard Mirenda, EES-13 RJM

RE: ECOLOGICAL SCREENING EVALUATION FOR PRS 14-003

Attached is the ecological screening evaluation for Potential Release Site 14-003 conducted for the Los Alamos National Laboratory Environmental Restoration Project. This evaluation, originally completed in the summer of 1999, was revised in July 2000 to reflect the current ecological screening methodology and screening values. This packet includes the following items:

- screening evaluation and discussion,
- scoping checklist with conceptual model diagrams,
- site photo, and
- threatened and endangered habitat review by ESH-20.

Ecological Screening Evaluation for PRS 14-003

The PRS is a former high explosives burn area located within TA-14 (Q-Site). The PRS was 300-ft northeast of TA-14-5 at the end of an asphalt-paved access road. The burn area consists of a trash burning area, partially enclosed by a horse-shoe-shaped earthen berm. The site consisted of a level 5-ft x 20-ft area enclosed on three sides by a 3-ft high berm and open at the eastern end towards the road. This site was used for burning debris remaining from experimental test shots that left noncombustible residuals. Samples were collected from the center of the level area as well as from the berm and the area down gradient from the open end as part of the RFI and VCA conducted at this PRS. Samples were analyzed for metals, high explosives, semivolatile organic compounds, and radionuclides. Contamination in the form of elevated metal concentrations was found in the center of the level area and the berm during the RFI.

The VCA confirmation sampling conducted in 1997 at PRS 14-003 resulted in two inorganics (barium and silver) detected above their background values (BVs). Further examination of the barium detects found that the concentrations were outside of the range of background values for barium (21 mg/kg to 410 mg/kg), while silver does not have a background data set. Two high explosive (HE) compounds (2-amino-4,6-dinitrotoluene and 2,4,6-trinitrotoluene) were also detected in one of the samples. Therefore, two inorganics and two organics were subjected to an ecological screening evaluation. The maximum value for barium was detected in the surface soil (0-10 in) within the excavated area of the PRS, while the maximum value for silver was detected in the surface soil (0-6 in) at the mouth of the bermed area. Because the maximum detection limit for silver is slightly higher than the maximum detected value, the maximum detection limit for silver is used in the ecological screening evaluation.

The purpose of the ecological screening evaluation is to identify chemicals of potential ecological concern (COPECs) and not to calculate risk. The evaluation involves the calculation of hazard quotients (HQs) and hazard indices (HIs) for all chemicals of potential concern (COPCs) identified in the data review for all appropriate screening receptors as described in Ryti et al. (1999, 63303.2). The HQ analysis is based on the exposure concentration (i.e., maximum detected concentration, maximum detection limit, mean, or 95% upper confidence limit of the arithmetic mean) for each COPC and is calculated by dividing these values by the soil ESLs for the screening receptors. The screening receptors for which ESLs have been derived include a plant, the earthworm, deer mouse, vagrant shrew, desert cottontail, American robin (omnivore, insectivore, and herbivore), American kestrel (with and without an all meat diet), and the red fox. The ESLs for these receptors were based on similar species and derived from an experimentally determined no observed adverse effect levels (NOAELs), lowest observed adverse effect levels (LOAELs), or lethal doses to 50% of the population (LD50s). The rationale for these receptors

and the derivation of ESLs are based on the approach presented in Ryti et al. (1999, 63303.2) and LANL (1998, RPF Record Package 186).

The screening evaluation involves an initial comparison of the exposure concentration for a chemical to the minimum ecological screening level (ESL) to obtain a maximum HQ for the chemical. If the maximum HQ resulting from this comparison is 0.1 or greater, a more detailed HI analysis is conducted for that chemical to determine if the potential for adverse ecological impacts exists and the overall contribution of the chemical to the HI for each receptor. A HI is the sum of HQs across contaminants with like effects for a given screening receptor. The chemicals resulting in a HQ greater than 1.0 or contribute more than 0.1 to a HI greater than 1.0 are identified as COPECs. HQs or HIs greater than 1.0 are considered to be indicators of potential adverse impacts. The analysis is designed to be conservative (i.e., some assumptions may not represent actual conditions) in order to minimize the possibility of eliminating an analyte that may pose a potential ecological risk.

Table 1 presents a comparison of the maximum values in the surface soil for each inorganic and organic to the minimum terrestrial ESL for each analyte. Because the maximum HQs for barium and silver are greater than 1.0, these inorganics are considered to be COPECs and are further evaluated using a HI analysis (Table 2). The maximum HQs for 2-amino-4,6-dinitrotoluene and 2,4,6-trinitrotoluene are less than their respective ESLs and are not evaluated further.

TABLE 1
MAXIMUM DETECTED SOIL CONCENTRATION/DETECTION LIMITS AND ESLs FOR PRS 14-003

Analyte	Maximum Value	BV	Minimum ESL	Receptor	HQ
Barium	1800	295	40.1	Vagrant Shrew	44.9
Silver	2.6(U)	1	0.2	Plant	13
2-Amino-4,6-DNT	0.11	NA	6.1	Deer Mouse	0.02
2,4,6-TNT	0.13	NA	0.3	Earthworm	0.4

TABLE 2
HAZARD INDEX ANALYSIS FOR PRS 14-003

Analyte	HQ Plant	HQ Earthworm	HQ Mouse	HQ Shrew	HQ Cottontail	HQ Robin[a]	HQ Kestrel	HQ Red Fox
Barium	1.8	NA[b]	42.9	44.9	5.8	33.3	4.5	0.5
Silver	13	NA	0.05	0.03	0.04	2.9	0.1	0.0006
HI	**14.8**	**NA**	**43.0**	**44.9**	**5.8**	**36.2**	**4.6**	**0.5**

[a] HQ and HI are based on the ESL for the insectivorous robin for barium and ESL for the omnivorous robin for silver.
[b] NA = not available

The HI is the sum of HQs for chemicals with common toxicological endpoints for a given receptor. For the purposes of ecological screening, it is assumed nonradionuclides could have a common

toxicological effect because the ESLs are generally derived from reproductive effect endpoints. Although it is likely that this assumption is incorrect, the COPCs are grouped together in the comparison to ESLs. Using the maximum detected concentrations, the HIs are greater than 1.0 for the plant, deer mouse, shrew, cottontail, robin, and kestrel and less than 1.0 for the red fox. The HIs greater than 1.0 are driven by barium, except for the plant, which is driven by silver. Based on the mean concentration, the HIs are greater than 1.0 for the plant, deer mouse, shrew, and robin, approximately 1.0 for the cottontail and kestrel, and less than 1.0 for the fox. The HIs based on the mean concentration are also approximately ¼ to 1/3 the HIs based on the maximum concentrations.

The samples collected at this PRS were from within the bermed area as well as down gradient from the mouth of the bermed area. The site conceptual model for releases assumed that the bermed area would contain the maximum concentrations of contaminants remaining after remediation and that concentrations would decrease as the distance from the bermed area increases. The sampling results supported this assumption in that the concentrations of barium and silver decreased to below background in the down gradient samples. The concentrations of the HE COPCs also decreased in the samples collected down gradient from the bermed area. Therefore, the extent of the contamination from releases at this PRS is localized and is confined to the flat grassy area encompassed by the earthen berm.

The relatively low HQs and HIs in Table 2 of approximately 6 or less for the cottontail, kestrel, and red fox suggest that there is little or no potential for adverse ecological impacts for these receptors. Although there are elevated concentrations of barium and silver in the bermed area, these and the other wildlife receptors have a much larger home range than is encompassed by the PRS. The bermed area covers approximately 1250 square feet or 0.03 acres. The home range for the short-tailed shrew (assumed to be similar for the vagrant shrew) is approximately ½ - 1 acre and the deer mouse is approximately ½ - 3 acres, according to Burt and Grossenheider (1976, 59097). The adult American robin has a home range of approximately 0.4 acres for supporting nestlings and approximately 2.0 acres for fledglings (EPA 1993, 59109). The other wildlife receptors have larger home ranges. As a result, exposure to the elevated concentrations of barium and silver would be infrequent and do not pose the potential for adverse ecological impacts for these receptors. In addition, the floor of the bermed area, where the elevated concentrations of barium and silver were detected, was covered with the uncontaminated soil from the berm and graded. As a result, the soil containing elevated barium and silver is covered with approximately 2-3 ft of relatively clean soil making any residual contamination less accessible to receptors. There has also been some revegetation of the site by grasses and wildflowers since the completion of remedial activities. Based on the localized nature of the residual contamination, the re-colonization of the vegetative community, and the depth at which

the remaining inorganic contaminants have been covered, there is no potential for adverse ecological impacts to receptors.

References

Burt and Grossenheider, 1976. "Field Guide to the Mammals of North America, North of Mexico," Third Edition, Houghton Mifflin Company. (Burt and Grossenheider 1976, 59097)

EPA (Environmental Protection Agency) December 1993. "Wildlife Exposure Factors Handbook," Washington, D.C. (EPA 1993, 59109)

R. Ryti, Kelly, E., M. Hooten, and L. Soholt, April 1999. "Screening Level Ecological Risk Assessment Methods," Los Alamos National Laboratory LA-UR-99-1405, Los Alamos New Mexico. (Ryti et al. 1999, 63303.2)

LANL (Los Alamos National Laboratory) October 1998. "Los Alamos National Laboratory Environmental Restoration Project ECORISK Database," Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 1998, RPF Record Package 186)

ECOLOGICAL SCOPING CHECKLIST

PART A—SCOPING MEETING DOCUMENTATION

Site ID	PRS 14-003
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential areas of release. Reference locations on a map as appropriate.	The site was a burn area used to burn trash so the form of the release would have been solid. The mechanism would have been from dumping materials into the horseshoe shape area and setting the materials on fire. The area of release would have been confined to the burn area. The PRS was surrounded by a berm on except to the east where an asphalt road and turnout area was built. Releases may have occurred during the burning via smoke and dispersion of materials by the wind.
List of Primary Impacted Media (Indicate all that apply.)	Surface soil – XX – primary impacted medium from the disposal and burning of materials. Surface water/sediment – Subsurface – XX – may be impacted over time due to accumulation of material and deposition of soil on top. Groundwater – Other, explain –
FIMAD vegetation class based on Arcview vegetation coverage (Indicate all that apply.)	Water – Bare Ground/Unvegetated – The PRS is currently bare ground with some invasive/successional vegetation having become established. VCA report indicated that the area would be seeded with native grasses but it has not been to date. Spruce/fir/aspen/mixed conifer – Ponderosa pine – The surrounding area is primarily ponderosa pine, low shrubs, and grasses. Piñon juniper/juniper savannah – Grassland/shrubland – Developed –
Is T&E Habitat Present? If applicable, list species known or suspected to use the site for breeding or foraging.	Yes. The PRS is approximately 120 ft away from potential Mexican spotted owl nesting habitat and is entirely within an area in which the spotted owl may be assumed to forage with a relatively medium frequency. The PRS is also in the vicinity of potential peregrine falcon nesting habitat (approximately 13,800 ft away) and entirely within an area in which the peregrine falcon may conservatively be assumed to forage with a relatively medium frequency. The PRS is entirely within and in which the bald eagle is conservatively assumed to forage at a low frequency.
Provide list, of Neighboring/ Contiguous/ Upgradient sites, includes a brief summary of COPCs and the form of releases for relevant sites and reference a map as appropriate. (Use this information to evaluate the need to aggregate sites for screening.)	The PRS is located in the area known as East Site and is situated at the eastern edge of this area. The closest PRSs are associated with the firing area and include PRSs 14-002(c), a bunker, 14-002(d and e), firing pads, C-14-009, a magazine. These PRSs are located approximately 150-250 ft from the burn area and drain to the southeast. COPCs associated with these PRSs include high explosives and inorganics. The activities at these sites did not influence the burn area.
Surface Water Erosion Potential Information Summarize information from SOP 2.01, including the run-off subscore (maximum of 46); terminal point of surface water transport; slope; and surface water runon sources.	The Erosion Matrix score for this PRS is 31.4, with 9.1 for runoff (evidence of runoff, terminates on mesa top, and sheet erosion from site) and 7.0 for run-on (natural drainage patterns) scores. The score also reflects it is a mesa top site (1.0), ground cover is <25% (13), and slope is 0-10% (1.3). No potential exists for soil erosion at this site. The terminal point of any runoff is the Canon de Valle drainage.
Other Scoping Meeting Notes	None

PART B—SITE VISIT DOCUMENTATION

Site ID	PRS 14-003
Date of Site Visit	6/3/99
Site Visit Conducted by	Richard Mirenda, Dave Bradbury, Steve Veenis

Receptor Information:

Estimate cover	Relative vegetative cover (high, medium, low, none) = low; the PRS is only sparsely vegetated primarily with grasses and weeds. There are two small ponderosa pine trees at the eastern end of the PRS. Relative wetland cover (high, medium, low, none) = none Relative structures/asphalt, etc. cover (high, medium, low, none) = low; there is an asphalt road and turnout area to the south and east of the PRS and provided access to the PRS from the main complex.
Field notes on the FIMAD vegetation class to assist in ground-truthing the Arcview information	The area is listed as ponderosa pine habitat. This is the predominant overstory in the area with an understory of shrubs and grasses.
Field notes on T&E Habitat, if applicable. Consider the need for a site visit by a T&E subject matter expert to support the use of the site by T&E receptors.	The PRS is well removed from the mesa edge above Canon de Valle to the south. This portion of the mesa top may provide nesting habitat for the Mexican spotted owl but does not provide appropriate habitat for nesting for the peregrine falcon. The use of this area for foraging by these birds of prey may be adequate but not excellent. There is no foraging available for the bald eagle in this area.
Are ecological receptors present at the site? (yes/no/uncertain) Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.	Yes. The PRS has been covered with the dirt from the berm and there is evidence of burrowing activity from gophers. The surrounding area is well vegetated with native plants and provides habitat for a variety of ecological receptors, including rodents and birds. The area is all terrestrial habitat with no aquatic systems present in the area.

Contaminant Transport Information:

Surface water transport Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable).	No drainage channels exit the PRS because of the surrounding berm and road that served to impede runoff from the site. Beyond the road approximately 50-100 ft to the east of the PRS is a shallow gully that drains to the southeast towards Canon de Valle.
Are there any off-site transport pathways (surface water, air, or groundwater)? (yes/no/uncertain) Provide explanation	Surface water runoff to the east would have been the main off-site transport pathway. Another potential pathway would have been through the air when the burn area was being used. Smoke and particulates from the burning of material could have transported contaminants off-site. Currently, the PRS is exposed to the wind that could transport particulates and fugitive dust off-site but any residual contamination has been buried and is not available for transport by this pathway.
Interim action needed to limit off-site transport? (yes/no/uncertain) Provide explanation/ recommendation to project lead for IA SMDP.	BMPs in the form a straw bales were put in place following the VCA and remain there to impede surface water runoff. The area should be re-seeded as indicated in the VCA Completion report to minimize movement of soil via surface runoff.

Ecological Effects Information:

Physical Disturbance (Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)	The only physical disturbance was the collapsing of the berm and covering the site with the dirt from the berm. The area is primarily bare ground and should be re-seeded with native grasses.
Are there obvious ecological effects? (yes/no/uncertain) Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).	No. The contamination has been removed and the area covered with dirt from the berm. There is no evidence of erosion from the site but there is evidence of gopher activity. The area is primarily bare ground and should be re-seeded with native grasses.
Interim action needed to limit apparent ecological effects? (yes/no/uncertain) Provide explanation and recommendations to mitigate apparent exposure pathways to project lead for IA SMDP.	No. The site has been covered with dirt from the berm and any residual contamination is not available for transport. The area is slowly being revegetated by natural succession but should be re-seeded with native grasses to further impede surface runoff and provide additional forage and habitat.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors onsite and no transport pathways to offsite receptors, the remainder of the checklist should not be completed. Stop here and provide additional explanation/justification for proposing an ecological No Further Action recommendation (if needed). At a minimum, the potential for future transport should include likelihood that future construction activities could make contamination more available for exposure or transport. Not applicable.

Adequacy of Site Characterization:

Do existing or proposed data provide information on the nature, rate and extent of contamination? (yes/no/uncertain) Provide explanation (Consider if the maximum value was captured by existing sample data.)	Yes. The data collected as part of the VCA includes fixed analytical data from the floor of the burn area and berm surrounding as well as the are down gradient towards the shallow gully. In addition, the area outside of the berm was extensively field screened to ensure that no contamination had been introduced to the surrounding area. No contaminants were detected in the drainage area beyond the PRS.
Do existing or proposed data for the site address potential transport pathways of site contamination? (yes/no/uncertain) Provide explanation (Consider if other sites should aggregated to characterize potential ecological risk.)	Yes. Samples were collected and analyzed by field screening and/or fixed analytical around the outside of the berm and towards the main surface water runoff drainage area to the east. No contaminants were detected in the drainage area beyond the PRS.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors.

PART C—ECOLOGICAL PATHWAYS CONCEPTUAL EXPOSURE MODEL

Question A:

Could soil contaminants reach receptors via vapors?

- **Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant $>10^{-5}$ atm-me/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Volatile organic compounds were not a COPC for this site because the burning activity would have eliminated these compounds from the material disposed at this PRS.

Question B:

Could the soil contaminants reach receptors through fugitive dust carried in air?

- **Soil contamination would have to be on the actual surface of the soil to become available for dust.**

- **In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.**

Answer (likely/unlikely/uncertain): Likely

Provide explanation: The material disposed of and burned at this PRS was on the surface and exposed to the wind. Although there was no evidence of burrowing activity at this PRS prior to the VCA, the area now has evidence of gopher activity within the PRS boundaries.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off score and terminal point of surface water runoff to help answer this question)?

- **If the SOP 2.01 run-off score* for each PRS included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).**

- **If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The burn area was surrounded by a berm around about ¾ of the site. The eastern end was open but was bordered by an asphalt road and turnout area that would have impeded any surface water runoff.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?

Known or suspected presence of contaminants in groundwater.

- **The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.**

- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**

- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: There are no seeps or springs in the area of this PRS. Ground water does not appear to be near the surface in this area of the Laboratory.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?

- **Suspected ability of contaminants to migrate to groundwater.**
- **The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

Answer (likely/unlikely/uncertain): **Unlikely**

Provide explanation: **There is no hydraulic driver for the surface or potential subsurface contamination to reach alluvial, perched, or the main aquifer. Terrestrial plants are not near the groundwater and there are no aquatic plants in the vicinity.**

Question F:

Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?

- **This question is only applicable to release sites located on or near the mesa edge.**
- **Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.**

Answer (likely/unlikely/uncertain): **Unlikely**

Provide explanation: **This PRS is not near the mesa edge so mass wasting is not a viable release pathway. There are also no drainage channels or gully areas that indicate erosion activity is occurring in this area.**

Question G:

Could airborne contaminants interact with receptors through respiration of vapors?

- **Contaminants must be present as volatiles in the air.**
- **Consider the importance of inhalation of vapors for burrowing animals.**
- **Foliar uptake of organic vapors is typically not a significant exposure pathway.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: Volatile organics are not COPCs at this PRS.

Question H:

Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?

- **Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.**
- **Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Terrestrial Animals: 2

Provide explanation: There may have been some transport of contaminants as particulates or as fugitive dust because it was surface contamination and exposed to the wind. Residual contamination is available to burrowing animals and there is evidence of such activity at the site. Prior to the VCA, there was no evidence of burrowing activity at the PRS or the surrounding area.

Question I:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

- Contaminants in bulk soil may partition into soil solution, making them available to roots.
- Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 2

Provide explanation: The PRS is primarily bare ground with scattered grasses and weeds on the surface. In additional the residual contamination has been buried under the dirt from the berm.

Question J:

Could contaminants interact with receptors through food web transport from surficial soils?

- The chemicals may bioaccumulate in animals.
- Animals may ingest contaminated food items.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: Some potential bioaccumulators such as lead, copper, cadmium, mercury, nickel, and isotopic uranium were detected above background in the RFI sampling of the burn area. The VCA removed the soils with the highest concentrations of these COPCs and confirmatory samples did not detect any potential bioaccumulators in the remaining soil.

Question K:

Could contaminants interact with receptors via incidental ingestion of surficial soils?

- **Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 2

Provide explanation: Residual contamination has been buried and not readily available for surface soil ingestion. In the past, this was a major pathway because the contamination was on the surface of the burn area.

Question L:

Could contaminants interact with receptors through dermal contact with surficial soils?

- **Significant exposure via dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: Contaminants are not lipophilic.

Question M:

Could contaminants interact with plants or animals through external irradiation?

- External irradiation effects are most relevant for gamma emitting radionuclides.
- Burial of contamination attenuates radiological exposure.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: No gamma-emitting radionuclides were detected at the PRS. Isotopic uranium, alpha-emitters, were detected above background.

Question N:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

- Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.
- Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash) in an area that is only periodically inundated with water.
- Contaminants in sediment may partition into soil solution, making them available to roots.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Provide explanation: There are no surface water systems in the vicinity of the PRS.

Question O:

Could contaminants interact with receptors through food web transport from water and sediment?

- The chemicals may bioconcentrate in food items.
- Animals may ingest contaminated food items.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: There are no surface water systems in the vicinity of the PRS.

Question P:

Could contaminants interact with receptors via ingestion of water and suspended sediments?

- If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.
- Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: There are no surface water systems in the vicinity of the PRS.

Question Q:

Could contaminants interact with receptors through dermal contact with water and sediment?

- If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.
- Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Animals: 0

Provide explanation: There are no surface water systems in the vicinity of the PRS.

Question R:

Could contaminants interact with plants or animals through external irradiation?

- External irradiation effects are most relevant for gamma emitting radionuclides.
- Burial of contamination attenuates radiological exposure.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Terrestrial Plants: 0

Terrestrial Animals: 0

Provide explanation: There are no surface water systems in the vicinity of the PRS. Also, no gamma-emitting radionuclides were detected.

Question S:

Could contaminants bioconcentrate in free floating aquatic, attached aquatic plants, or emergent vegetation?

- Aquatic plants are in direct contact with water.
- Contaminants in sediment may partition into pore water, making them available to submerged roots.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants/Emergent Vegetation: 0

Provide explanation: There are no aquatic communities in the area.

Question T:

Could contaminants bioconcentrate in sedimentary or water column organisms?

- Aquatic receptors may actively or incidentally ingest sediment while foraging.
- Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.
- Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no aquatic communities in the area.

Question U:

Could contaminants bioaccumulate in sedimentary or water column organisms?

- **Lipophillic organic contaminants and some metals may concentrate in an organism's tissues**
- **Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Animals: 0

Provide explanation: There are no aquatic communities in the area.

Question V:

Could contaminants interact with aquatic plants or animals through external irradiation?

- **External irradiation effects are most relevant for gamma emitting radionuclides.**
- **The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.**

Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

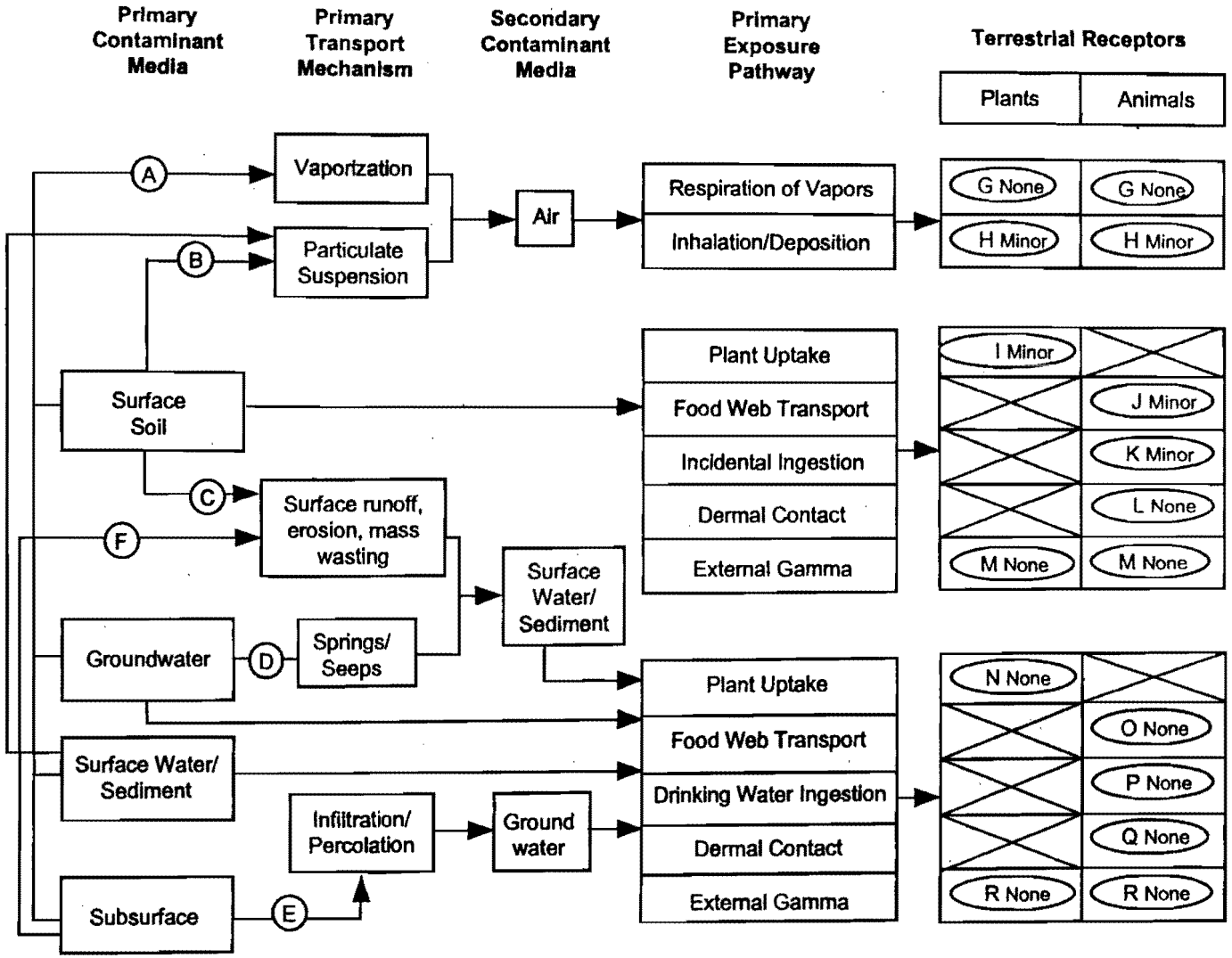
Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: There are no aquatic communities in the area.

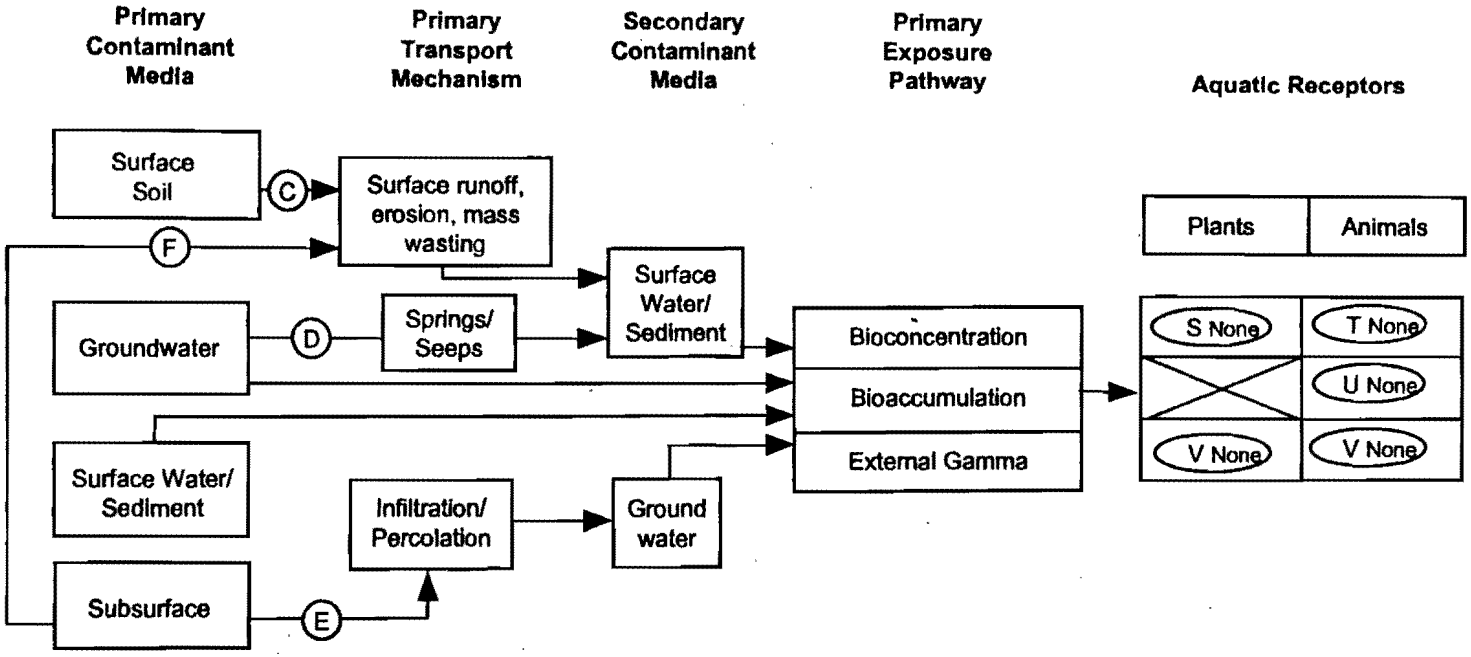
Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the Scoping Checklist



Ecological Scoping Checklist
Aquatic Receptors
Ecological Pathways Conceptual Exposure Model

NOTE:
Letters in circles refer to questions on the Scoping Checklist



Signatures and certifications:

Checklist completed by (provide name, organization and phone number):

Name (printed): Richard Mirenda, Ph.D.
Name (signature): Richard Mirenda
Organization: MK/PMC
Phone number: (505)662-1329

Date completed: 6/8/99

Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number):

Name (printed): LARS F. SOHOLT, Ph.D.
Name (signature): Lars F. Soholt
Organization: E/ER
Phone number: 505/667-2258

Los Alamos
NATIONAL LABORATORY

memorandum
Environmental, Safety, & Health Division
Ecology Group, ESH-20, MS M887

To/Ms: Dr. David Bradbury, EM-ER, MS M992
From/Ms: Gil Gonzales, ESH-20/MS M887
Phone/FAX: *5-6630/7-0731*
Symbol: *ESH-20/Ecol-99-0190*
Date: June 1, 1999

SUBJECT: **Review of PRS #14-003 for Threatened and Endangered Species Habitat for The Purpose of Ecological Screening/Risk Assessment.**

Resulting from your request, the purpose of this memo is to communicate whether threatened and endangered (T&E) species may be present in Environmental Restoration Potential Release Sites (PRS's) that are under consideration for ecological screening and/or risk assessment. This information will help:

(1) to establish whether contaminant pathways might exist to T&E species nesting within or in the vicinity of a PRS,
(2) to notify, when necessary, risk assessors to pay particular attention to relevant contaminant Toxicity Reference Values primarily for birds,
(3) to notify, when necessary, risk assessors to pay particular attention to PRS aggregation issues relative to foraging patterns of T&E species.

Information about PRS 14-003 was reviewed to determine whether or not this site is in or near nesting habitat of federally-listed T&E species, whether it is in a foraging area and, if so, the relative amount of potential foraging at or in the vicinity of the specific PRS.

PRS location information maintained by the Facility for Information Management and Display was intersected with T&E species habitat using GIS databases maintained by the Ecology Group, ESH-20. PRS 14-003 is approximately 120 feet away from potential Mexican spotted owl nesting habitat and is entirely within an area in which the spotted owl can be conservatively assumed to forage at a relatively medium frequency. The PRS is also in the vicinity of American peregrine falcon nesting habitat, which is approximately 13,800 ft. away. PRS 14-003 is entirely within an area in which the falcon can be conservatively assumed to forage at a relatively medium frequency. The PRS is entirely within an area in which the bald eagle is conservatively assumed to forage at a low frequency.

If you need more detailed or more extensive information please do not hesitate to contact me.

GG:rm

Cy: Elizabeth Kelly, TSA-11, MS ~~K557~~ F600

Attachment D

14-003

From: BONNIE KOCH
To: smtp."d_srapp@rtd.com"
Date: 1/31/97 11:23am
Subject: retry mtg min -Reply

Pat,

Here are specific comments marked by a "*" (star) on the minutes below. Hopefully, by searching on the star you easily identify the additions. Also, a general comment is to refer to LANL as instead the ER Program or Project because it also includes DOE.

>>> david rappaport <d_srapp@rtd.com> 01/30/97 09:08pm >>>
DRAFT
January 29, 1997
Meeting Minutes
NMED HRMB and LANL Monthly Technical Meeting

Attendees:

HRMB: Teri Davis, Micheal Chacon, John Kieling,

DOE OB: Steve Yanicak, Martyne Kieling

SWQB: Barbara Hoditschek

EPA: Allan Chang (via conference call)

DOE: Bonnie Koch

UC: Dave McInroy, Tracy McFarland*, Rich Mirenda*, Steve Veenis,
Pat Shanley, Doug Pippin*, Tom Fogg*, Roy Michelotti*, Don Hickmott*, John McCann*

T. Davis kicked off the meeting by indicating that HRMB viewed the upcoming VCA Pilot (presentation of planned VCAs) as a positive step. She also indicated extreme dissatisfaction with the changes LANL had proposed to the RFI accelerated process and said NMED would not agree to them. (the changes were to call the accelerated cleanup plan a VCA + plan).

Teri Davis also stated that water quality concerns must be included in the accelerated process so that when an NFA determination receives regulatory review, the site does not have to be revisited. (Pat, I was concerned about exact wording on this so I even called Teri to check with her about this statement).*

HRMB views VCAs as simplistic cleanups and accelerated actions are a different beast. D. McInroy indicated that LANL views all the proposed cleanups as simplistic and that

(HRMB had changed the screen from the December meeting) I do not understand what this means? HRMB asked that there be some change and we told them we would come up with it. I said that it was really no problem to change the process back.

. T. Davis disagreed.

Stu Dinwiddie, present for the first five minutes, asked why the SRS was done if all PRSs were simplistic. D. McInroy indicated LANL views excavation and removal as simplistic. T. Davis indicated that HRMB plans to place VCA plans on the shelf and needs to know the actions are not significant prior to determining HRMB will have no further involvement. B. Hoditschek expressed concern that plans are put on the shelf.

* B Koch siad to BH that even though the plans are placed on the shelf, the Program has AP-4.5 to use in getting out in the field and ensuring that controls are in place ahead of VCA actions being initiated.*

T. Davis also indicated dissatisfaction with presence of the eco risk agenda item as NMED does not want this issue addressed during HRMB/LANL technical and policy meetings except as five minute updates presented once a

month. B. Koch stated it was an oversight that it had not been removed from the agenda.

S. Dinwiddie indicated that there would be an NMED internal meeting with Ed Kelley to discuss the eco risk issues. He also stated that LANL's RFI deliverables must be initiated in March to assure submittal by the May deadline and needs a list of what is due. T. Davis indicated that LANL should employ the eco risk approach to the extent that it is developed and the remaining issues would be dealt with in NODs.

Agenda Item 1. VCA Pilot

T. Davis provided the following suggestions to enhance the VCA Fact Sheets: unit type identified (e.g., container storage area, sump); SRS score and modified SRS score; state that the action will be a FINAL REMEDY; indicate it is a VCA with a presumptive remedy; schedule of implementation; cost; media cleanup standards; waste management (where waste will go); Phase I sampling results, if complete; is nature and extent of contamination known; and, corrective action history (e.g., interim action done?, BMPs placed?).

B Hoditscheck also requested that the fact sheets identify whether the site is on the list of 686 sites identified in the Phase I deliverable and/or distance to watercourse.

T. Davis indicated the tables were good and would like to continue to see them providing the PCOCs, maximum concentrations, cleanup levels, SALs. B.

B Koch asked if it would also be relevant to include the PRGs on the tables and Tdavis indicated that this would be useful

Hoditschek inquired as to how surface water issues would be addressed. Fact sheets for Interim actions should also be generated.

T. Davis stated that HRMB intends to provide a determination whether they will have further involvement in a VCA at the end of each VCA presentation. That involvement will first be a site visit and then a determination that an accelerated cleanup plan is needed or a VCA plan.

B. Hoditschek questioned the box in the accelerated RFI process flow diagram which says "Do data support VCA?".

(B.H. indicated that FIMAD has problems provided all data, so what did this mean.) *This sentence is unclear. BH asked if the data used all came out of FIMAD. Is this what you mean? Dave replied that some of it may not have but eventually it would all be in FIMAD (what BH was probably getting at here is, if one of these sites is 686 unit, can FIMAD be used for the water quality searches; the implied anwer is that maybe not if the data hasn't made it into FIMAD yet – this of course doesn't need to be in the notes, but I'm guessing that's why she asked).*

D. McInroy answered that it represented all data available, whether or not it was in FIMAD.

Agenda Item 1.a.

The PRS 14-003, Q-Site Pilot was presented by Tom Fogg and provided handouts containing photographs and other data. Doug Pippin, Rich Mirenda, and Tracy MacFarland also participated.

Briefly, the site is an old bermed burn pad. Two samples have been collected and high metals warrant site cleanup. The extent of contamination has not been bounded. The cleanup will be done by removing contaminated soil with shovels using screening instruments to guide removal. Confirmation samples will be collected after removal to ensure the cleanup was effective.

T. Davis indicated that, per box 7 of the diagram, that "is further investigation required?" had not been completely answered. *NMED had previously assumed YES for box 7 means is that extent has been defined.*

Bkoch said that many VCAs have been conducted successfully without extent being defined prior to initiating the actiivity. The screening performed during the removal allows extent to be determined as the VCA proceeds. If migration has occurred beyond the projected bounds of the SWMU, it can be chased with the screening instruments during the removal. The confirmatory sampling also validates that extent has been defined.

D. McInroy stated that this type of activity had been done successfully last year. NMED *B Hoditschek specific

comment, I believe* expressed concern that contaminants may have been dispersed *due to small explosions that might have taken place while burning trash. *

S. Veenis explained that BMPs were already in place at this site.

It was agreed that a grid screening survey would be conducted of the area to determine if operation of the burn area had resulted in contamination of land surrounding the pad. This will be part of the VCA plan.

The depth of confirmation samples was identified as a programmatic issue.

Agenda Item 1.b

PRS-15-012(b) was presented by Tom Fogg.

The PRS is a wash area where HE testing spheres were cleaned and the wash water discharged to a bermed area. Metals and radiological contamination warrant cleanup. Excavation and removal will be performed using heavy equipment. Confirmation samples will be collected.

B Hoditschek requested that the fact sheets identify is the distance to watercourse in addition to whether it is within the group of 686 sites.

T Davis explained that her review of the fact sheets indicated that the sites were probably candidates for increased regulatory involvement. However the presentation made it clear that the sites were in fact suitable for VCA. T. Davis agrees that these two sites fit the VCA criteria and HRMB would not require additional involvement. However, coordination with other NMED Bureaus would be necessary and that hopefully, they would be represented at future presentations. (The omnibus provision of RCRA was provided as a rationale for this approach.) Surface Water Quality Bureaus opinion is still needed. *Teri said that in the future, the fact sheets should be received ahead of time so that the bureaus can meet previous to the briefing to consider which path the cleanup will take. B. Koch said that the ER Program goal is to send the support material such as the fact sheets 7 days ahead of the meeting; would this give the bureaus enough time to review and meet? Davis and the ER Program agreed that the fact sheets and if available, the overheads for the presentation, would be provided a minimum of 7 days prior to the briefing date.*

Davis also asked why the SRS score was so high for 15-012(b)? Tom Fogg said the reason may be because the area is a posted rad area. Dave McInroy said that re-ranking the site based on the Phase I data might have reduced the score. Teri said that all sites should be re-ranked when new data becomes available. *Teri would like the 14-003 plan to include screening for shrapnel.*

Agenda Item 1. c and d

The VCA for PRSs for at V-Site and Building 27 was presented by Roy Michelotti and John McCann with assistance from Don Hickmott.

Briefly, the setting of V-Site and Building 27 was presented, as well as the PRSs involved and the upcoming D&D operations scheduled at these locations. Currently, 16 PRSs will be addressed at these locations. There is no existing data for these units. NMED assistance in selecting cleanup levels and bounding strategies was requested.

The D&D operations will be conducted around or at the PRSs, so the advantages to conducting the investigation and cleanup while PRSs are exposed will be a time and cost savings. *Waiting to perform the VCA after the D&D activities could create problems in that some of the units would be filled and re-seeded by D&D and this would obscure locations of some important structures such as the exact exit of pipes relative to buildings, leak points and joint boundaries, etc.; resurveying would be more difficult and perhaps inaccurate.*

An explanation of the type of HE activities and wastewater discharges at the buildings was provided. The plan for characterization of the PRSs and cleanup using screening techniques and confirmation sampling were identified. The D&D and ER Project successfully used this approach last year when the 90s line was decommissioned and the associated PRSs remediated.

T. Davis indicated that the HRMB finds this a complex cleanup. D. McInroy stated that the complexity is not tied to risk.

B. Hoditschek requested a copy of the storm water pollution prevention plan.

Action Item: S. Veenis will provide SWPP plan, possibly obtained from R. Michelotti.

NMED had asked many questions, such as: How will vertical and lateral bounding be done? How it the Main Drainage ditch in the area being addressed? When did EPA have this activity scheduled? What does it cost to reopen the site?

B. Hoditschek had the specific question of drainages associated with the aggregate of PRSs. Don Hickmott replied that much of the water from V-site went to the pond, which is PRS-16-029(x); however, Building 27 went out to a drainage that is called 'the Mother Drainage.' This drainage has a sampling plan in OU-1082 Work Plan, Addendum 1, but it does not carry a PRS number (it is refered to as the Main Drainage in the Work Plan). Hickmott commented that the Mother Drainage is not specifically grouped with the Building 27 Aggregate because drainages other than those associated with Buidling 27 also feed into it; hence the term Mother Ditch. Teri Davis commented that the description of this site indicates it meets the definition of a SWMU. Pat Shanley said if need be it could become a new PRS. Michelotti said that the Building 27 VCA extends close to the drainage but not include it.

D. Hickmott stated the cleanup Plan should be prepared by the end of February. The 45-day clock for NMED review would end in mid-April if this is an accelerated cleanup (AC) plan. (Note: all indications are that NMED will require this to be an AC plan). *Teri made the point that for the Accelerated Process, the 45-day time period for administrative review would not begin until NMED had received the Plan (as opposed to letting it begin at the briefing or during the site visit).* *B Koch said the the team had identifed cleanup levels and bounding as the most pressing areas to which the regulators would provide input; if this is true, could the stage be set for potentially having to proceed partly at risk by working specifically on these two areas? Teri asked if the removals and associated sampling generally followed the Workplan? McCann replied that the amount of sampling was much more enhanced than that shown be the Work Plan. Dave McInroy said it would be best to actually see the D&D schedule relative to the remediation schedule to see how serious the mid-April date might be. *

LANL expressed concern for any delays in the project due to imminent fixed-price contract D&D settlements. LANL indicated their desire to obtain as much input as possible from NMED as soon as possible. It was recognized that the accelerated RFI process is still taking shape and that LANL's projects, the schedule of compliance, NMED's grant commitments and work schedules need to be more aligned and will be in the future.

T. Davis requested a site visit to determine if the VCA should continue as a VCA or become an accelerated cleanup. The visit will occur on February 14 at 11:00. A site visit to PRS 16-021c will also be conducted. As much information as possible will be presented to NMED during the visit to facilitate their determination.

Action Item: LANL will provide a list of all VCAs planned this year within the next month. Additionally, LANL will do the following prior to presenting fact sheets: provide fact sheets at least one week in advance of presentation; send SWQB and EPA the fact sheets; rerank the sites (SRS) prior to or during fact sheet presentation.

Agenda Item 2: Site Statusing Segment- PRS 16-021c.

This item was dropped due to time constraints. To the extent possible, it will be covered during NMEDs visit on February 14.

Agenda Item 3: Accelerated RFI Process.

Dave McInroy indicated that the change to the accelerated RFI process was not an endaround and did not represent a change in the process. It was a name change to a document. NMED was still providing review. However, LANL will change back the Accelerated RFI Process documentation to include the title accelerated cleanup plan.

* Teri Davis re-iterated and emphasized that the ER Program should submit what has been developed for Ecorisk by March.*

B. Hoditschek indicated concern as to how SWQB was to be involved in the process and how the SWQB Phase I 686 sites would be addressed. This will be addressed offline.
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