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Remedy Completion Report for the Investigation and Remediation of Solid Waste Management Unit 61-002 at Technical Area 61, Revision 1

Los Alamos
NATIONAL LABORATORY
EST. 1943

Prepared by the Environmental Programs Directorate

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November 2007

Responsible project leader:

David McInroy	[signature]	Deputy Program Director	Environmental Programs	11/20/07
Printed Name	Signature	Title	Organization	Date

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David R. Gregory	[signature]	Project Director	DOE-LASO	11/29/07
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Professional Engineer Certification

This certification was prepared in accordance with generally accepted engineering principles and practice pursuant to the requirements of Section VII.E.6 of the March 1, 2005, Compliance Order on Consent for a registered professional engineer's certification. These activities have been performed with the care and skill ordinarily exercised by members of the profession practicing under similar conditions in the same manner or in a similar locality. I make no other warranty either expressed or implied. The finding and certification are based on (1) review of the NMED-approved work plan, (2) review of the remedy completion report and supporting records and documentation, and (3) reviewing the analytical results and supporting documentation.

With the signature and seal below, I certify that, except for the deviations presented in section 3.3, the investigation and/or remediation of this site, Solid Waste Management Unit 61-002, was conducted in accordance with the "Accelerated Corrective Action Work Plan for the Investigation and Remediation of Solid Waste Management Unit 61-002," approved by NMED on May 2, 2006. The information presented in this report is, to the best of my knowledge and belief, true, accurate, and complete.

CHARLES J. ENGLISH, JR.
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17350
LICENSED PROFESSIONAL ENGINEER

11/19/07

Charles J. English, Jr.
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CERTIFICATION

CERTIFICATION BY THE ENVIRONMENTAL PROGRAMS – CORRECTIVE ACTION PROGRAM TECHNICAL REPRESENTATIVES

Document Title: **Remedy Completion Report for the Investigation and Remediation of Solid Waste Management Unit 61-002 at Technical Area 61, Revision 1**

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 ensure 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.

Name: ______________________ Date: ______________

Gordon L. Dover, Program Manager
Corrective Actions Program
Los Alamos National Laboratory

OR

for C. Mangeng (signature) Date: 11/28/07

Susan G. Stiger, Associate Director
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David R. Gregory (signature) Date: 11/29/07

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Daniel E. Glenn, Acting Manager
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EXECUTIVE SUMMARY

This remedy completion report presents the results of accelerated corrective action (ACA) activities conducted at Solid Waste Management Unit (SWMU) 61-002, a former storage area at Technical Area 61 within the Upper Sandia Canyon Aggregate Area at Los Alamos National Laboratory (the Laboratory). This ACA was prompted by the construction of a new Laboratory security perimeter road. SWMU 61-002 is located within the proposed construction design footprint and was investigated and remediated before the commencement of construction activities and in conjunction with construction activities, as described in the approved ACA work plans. The ACA objectives included (1) removing potentially contaminated soil from SWMU 61-002, and (2) collecting confirmation samples to define the nature and extent of contamination and assess the potential risk at the site.

During the 2005 investigation and remediation of residual polychlorinated biphenyl contamination associated with SWMU 61-002, petroleum hydrocarbon contamination was discovered in the subsurface of the northwestern portion of the SWMU. The source of the subsurface petroleum hydrocarbon contamination is unknown, but it may have been associated with the storage of petroleum products. Two underground product lines and a total of 424 yd^3 of soil were removed in August 2005. The area of subsurface petroleum hydrocarbon contamination was further characterized in 2006.

The results of the 2005 and 2006 data evaluations show that the nature and extent of contamination have been defined for SWMU 61-002. In addition, the results of the human health screening assessments for SWMU 61-002 indicate no potential unacceptable risk to human health under industrial and construction worker scenarios. Ecological screening assessment results show no potential risk to ecological receptors from residual contamination at SWMU 61-002. As a result, the Laboratory requests that a Certificate of Completion (corrective action complete with controls) be granted for SWMU 61-002.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security, LLC. The Laboratory is located in northcentral New Mexico, approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons. These canyons contain ephemeral and intermittent streams that run west to east. Mesa tops range in elevation from approximately 6200 ft to 7800 ft. The plateau's eastern portion stands 300 ft to 900 ft above the Rio Grande valley.

The Laboratory's Environmental Programs (EP) Directorate (which includes the former Environmental Restoration [ER] Project) is involved in a national DOE effort to reduce risk to human health and the environment at its facilities. The goal of the EP Directorate is to ensure that past operations do not threaten human or environmental health and safety in and around Los Alamos County. To achieve this goal, the EP Directorate is investigating and, as necessary, remediating sites potentially contaminated by past Laboratory operations. The EP Directorate has recently performed accelerated corrective action (ACA) activities at Solid Waste Management Unit (SWMU) 61-002 located within the Upper Sandia Canyon Aggregate Area.

In accordance with the March 1, 2005, Compliance Order on Consent (hereafter, Consent Order), the investigation work plan for the Upper Sandia Canyon Aggregate Area is due to the New Mexico Environment Department (NMED) in March 2008. The Laboratory conducted the ACA at SWMU 61-002 within the aggregate area in advance of the implementation of the aggregate area work plan because this site was in the path of construction activities related to the recently completed security perimeter road project.

This remedy completion report describes the ACA activities completed at SWMU 61-002. The original ACA work plan was submitted to NMED on December 2, 2004 (LANL 2004, 087474) and was subsequently approved by NMED with modifications on March 14, 2005 (NMED 2005, 087835). The ACA activities implemented in 2005 were described in the "Remedy Completion Report for the Investigation and Remediation of Area of Concern 03-001(i) and Solid Waste Management Units 03-029 and 61-002" submitted to NMED on December 15, 2005 (LANL 2005, 091150). On March 14, 2006, LANL submitted the "Addendum to the Accelerated Work Plan for the Investigation and Remediation of Area of Concern 03-001(i) and Solid Waste Management Units 03-029 and 61-002" to NMED (LANL 2006, 091675) and on April 1, 2006, LANL submitted an ACA work plan to complete corrective action work at SWMU 61-002 (LANL 2006, 092564). NMED approved this ACA work plan with modifications on May 2, 2006 (NMED 2006, 092371). A notice of disapproval (NOD) was issued by NMED on May 12, 2006, on the remedy completion report for AOC 03-001 and SWMUs 03-029 and 61-002 (NMED 2006, 091524); LANL responded to NMED's NOD comments on July 17, 2006 (LANL 2006, 092076). The remedy completion report for AOC 03-001 and SWMUs 03-029 and 61-002 was subsequently approved with modifications by NMED on September 13, 2006 (NMED 2006, 095113).

SWMU 61-002 is located within the construction design footprint of the security perimeter road project and was investigated and remediated before the commencement of construction activities in 2005 and in conjunction with construction activities in 2006, in accordance with the approved ACA work plan (LANL 2006, 092087). At the request of NMED (NMED 2006, 092371), all information related to ACA activities implemented in 2005 at SWMU 61-002 are included with all information from ACA activities implemented at the site in 2006 in this remedy completion report.

1.1 Location of ACA Activities

SWMU 61-002 is located within the construction footprint associated with the Laboratory's security perimeter road project in the northern portion of Technical Area (TA) 03 and the southwestern portion of TA-61 (Figures 1.1-1 and 1.1-2). SWMU 61-002 is a former storage area that was used to store capacitors and transformers adjacent to the former Radio Repair Shop (former Building 61-23). Most recently, the area was used to store spools of cable and conduit.

1.2 Purpose of ACA Activities

The purpose of the ACA activities described in this remedy completion report was to complete investigation and remediation activities in support of obtaining a Certificate of Completion for SWMU 61-002. The ACA activities included the excavation of potentially contaminated soil, soil sampling to confirm that the lateral and vertical extent of contamination has been determined, and the evaluation of the sampling results to determine if there are potential risks to human health and the environment.

ACA investigation and remediation activities were implemented at SWMU 61-002 because the site may be inaccessible during and after the construction of the security perimeter road. The investigation and remediation activities were conducted in accordance with the approved ACA work plan (LANL 2006, 092087).

1.3 Report Organization

This report follows the approved format for remedy completion reports for accelerated corrective actions submitted by LANL to NMED on August 8, 2005 (LANL 2005, 089553). This remedy completion report describes investigation and remediation activities performed at SWMU 61-002 and contains information on the sampling results from these activities. Section 2 presents background information on the site, including a site description, operational history, types of waste historically present at the site, and a summary of previous investigations. Section 3 describes the characterization and remediation activities implemented in accordance with the approved ACA work plan (LANL 2006, 092087) and regulatory criteria. Deviations from the work plan and a description of the final disposition of the site are provided as well. Section 4 summarizes the data and risk assessment results and includes a request for a Certificate of Completion for SWMU 61-002. Appendix A provides an acronyms and abbreviations list, glossary, and metric conversion table. Appendix B presents site photographs taken during ACA activities, while Appendix C (on compact disc [CD]) provides copies of the sample collection logs (SCLs), original field-screening and monitoring data, and sample coordinates. Appendix D (on CD) contains chain-of-custody (COC) forms, analytical data, data packages, and data validation reports. Appendix E presents the risk assessment and Tier One Evaluation results. Appendix F (on CD) provides copies of waste characterization data, shipping manifests, disposal records, and waste tables.

2.0 BACKGROUND

2.1 Facility Description

SWMU 61-002 is located in the western portion of TA-61, which was created during the Laboratory technical area redesignations in 1989. With the exception of a 1-mi^2, privately owned residential trailer park, the few buildings at TA-61 were previously part of TA-03. A major feature at TA-61 is the municipal landfill, established in 1974, that is still in use and operated by the County of Los Alamos. SWMU 61-002 is located directly northwest of the landfill (Figure 1.1-2).

2.1.1 SWMU 61-002, Former Storage Area

SWMU 61-002 is located adjacent to the eastern end of the former Radio Repair Shop (former Building 61-23) on the south side of East Jemez Road. From the 1970s until 1992, the 81-ft-by-91-ft fenced area was used as a storage area for capacitors, transformers, drums containing polychlorinated biphenyl (PCB)-contaminated oil, and oil-filled vessels. Ahead of the recent ACA and construction activities, large spools of wire and cable were staged in the storage area. The Radio Repair Shop (former Building 61-23) was decontaminated and demolished in the spring of 2006 to make way for the security perimeter road project.

2.2 Facility Process

2.2.1 SWMU 61-002, Former Storage Area

SWMU 61-002 was a staging area for capacitors, transformers, containers of PCB-contaminated oil, and unmarked drums. Before 1985, the storage area was unpaved and containers of PCB-contaminated oil stored on the unpaved surface were known to have leaked (LANL 1990, 007514). In 1986, sampling was conducted in the storage area and in an approximately 600-ft^2 area directly south and downgradient of the fenced storage area that may have been impacted by PCB-contaminated sediments transported off-site. Sampling data confirmed the presence of PCBs in surface soils. The area was subsequently excavated, backfilled, and paved and used again until 1992 for the storage of oil-filled electrical equipment, some containing PCBs (LANL 1993, 020947). Oil stains were observed on the asphalt within the storage area during a 1992 site inspection (LANL 1993, 020947). The area outside the fenced storage area was used for parking by Los Alamos County landfill employees and for equipment storage by the county.

2.3 Description of Waste

2.3.1 SWMU 61-002, Former Storage Area

Waste stored at SWMU 61-002 historically included transformers and capacitors, containers of PCB-contaminated oil, and oil-filled vessels. Chemicals of potential concern (COPCs) at this site include PCBs, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and petroleum hydrocarbons.

2.4 Previous Investigation Activities

Several investigations were previously conducted at SWMU 61-002 related to PCB contamination in surface and shallow-subsurface soils. Historical data collected at SWMU 61-002 are discussed in the following section; all analytical results were included in Appendix B of the initially approved ACA work plan (LANL 2004, 087474).

2.4.1 SWMU 61-002, Former Storage Area

In 1986, the storage area was characterized and remediated in accordance with Title 40, Part 761 of the U.S. Code of Federal Regulations (40 CFR 761), which contains PCB management regulations under the Toxic Substances Control Act. The Laboratory’s Environment, Safety, and Health Division collected 32 surface soil samples for PCB analysis from the storage area east of the Radio Repair Shop (former Building 61-23) and from the area directly south of the storage area. The analytical results showed PCB concentrations ranging from 0.31 mg/kg to 691 mg/kg. The entire equipment storage area and portions of the area south of the site were excavated to a minimum depth of 10 in. and resampled. The analytical results for the confirmation samples showed PCB concentrations ranging from 11.7 mg/kg to 51.3 mg/kg (LANL 1993, 020947). The excavated area was backfilled with clean fill and repaved with asphalt.

In the summer of 1994, the former ER Project conducted a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) at SWMU 61-002 to determine if PCBs were present in the stains on the asphalt or in surface soils downgradient from the site. Sampling locations were selected using the stained areas and a minor drainage area as reference points. Eighteen samples were collected from 16 locations and were field-screened for organic chemicals, including PCBs, and were submitted for the analysis of PCBs, VOCs, SVOCs, and target analyte list (TAL) metals. Zinc and cadmium were detected above their respective background values (BVs). PCBs were detected in all five fill samples, with maximum concentrations of 1.7 mg/kg for mixed aroclors and 1.6 mg/kg for Aroclor-1260 (LANL 1996, 052930). Aroclor-1254 was detected in one asphalt sample. The RFI report (LANL 1996, 052930) recommended the collection of additional samples to identify the extent of PCB contamination at SWMU 61-002.

3.0 ACCELERATED CORRECTIVE ACTION ACTIVITIES

In anticipation of construction activities associated with the security perimeter road project, the first phase of the ACA investigation and remediation activities was initiated in the spring of 2005, and a second phase of investigation activities was conducted in the summer of 2006. The scope of the ACA included the following activities at SWMU 61-002:

- mobilization and site preparation
- geodetic surveys
- drilling
- collection of characterization/confirmation samples
- excavation, packaging, hauling, and disposal of contaminated media
- site restoration

ACA investigation and remediation activities were performed in accordance with appropriate quality assurance (QA) requirements addressed in the EP-Environment and Remediation Support Services (ERSS) quality management plan (QMP), and thus were implemented by using applicable quality procedures (QPs), standard operating procedures (SOPs), and Laboratory requirement documents (e.g., Laboratory implementation requirements and Laboratory performance requirements), or equivalent Laboratory-approved subcontractor documents (e.g., statements of work or field implementation plans). Table 3.0-1 presents a summary of the investigation methods used during the ACA implemented at SWMU 61-002.

Details regarding the ACA investigation and remediation activities implemented at the site are presented in section 3.1. A discussion of the target cleanup goals selected for the site and the regulatory framework are presented in section 3.2. Additional details regarding deviations from the activities prescribed in the approved ACA work plan (LANL 2006, 092087) for SWMU 61-002 are summarized in section 3.3. The final site conditions are described in section 3.4.

3.1 ACA Investigation and Remediation Activities

The ACA investigation and remediation of SWMU 61-002 included site mobilization and preparation, excavation and removal, field-screening, collection of confirmation samples, characterization and disposal of waste, and site restoration. Historical records and previous investigations indicate that a historical release had occurred and that residual PCB contamination in surface and near-surface soils remained at the site; therefore, the main objective of the ACA remediation and confirmation sampling activities was to ensure that upon completion the site would meet target cleanup goals and that no further corrective action would be required.

Field-screening was conducted during all excavation and sampling activities to identify any areas of soil contamination. Shallow samples were extracted using a stainless scoop, while deeper samples were collected directly from the backhoe bucket. The sampled interval was described and recorded on applicable SCLs (Appendix C). Samples were collected in accordance with SOP-01.08, “Field Decontamination of Drilling and Sampling Equipment”; SOP-06.10, “Hand Auger and Thin-Wall Tube Sampler”; SOP-06.09, “Spade and Scoop Method for Collection of Soil Samples”; and SOP-6.26, “Core Barrel Sampling for Subsurface Earth Materials.” Core material from boreholes was logged and sampled in accordance with SOP-12.01, “Field Logging, Handling, and Documentation of Borehole Materials.” When appropriate and in-situ soils had not been disturbed, VOC samples were collected using EnCore samplers to ensure minimal loss of VOCs from the sampled media (Appendix C). Samples were also collected for QA/quality control (QC) purposes in accordance with SOP-01.05, “Field Quality Control Samples.” Field duplicates were collected to evaluate the reproducibility of the sampling technique. Field trip blanks were used to evaluate sample exposure to other VOCs. Sampling equipment was decontaminated after each use in accordance with the decontamination procedures outlined in SOP-01.08, “Field Decontamination of Drilling and Sampling Equipment.” Field rinsate samples were collected to evaluate the effectiveness of sampling decontamination procedures. Table 3.1-1 presents a summary of QA/QC samples collected during the ACA of SWMU 61-002 by sampling location, sample type, media, and the analyses requested. A post-investigation geodetic survey was conducted to confirm the exact sampling locations in accordance with SOP-03.11, “Coordinating and Evaluating Geodetic Surveys.” Sample survey coordinates are provided in Appendix C.

Sampled media were placed into preapproved sample containers in the field and stored on ice in accordance with SOP-01.02, “Sample Container and Preservation.” Samples remained in field-team custody until they were delivered to the Sample Management Office (SMO) for shipment to off-site laboratories for analysis in accordance with SOP-01.03, “Handling, Packaging, and Shipping of Samples.” All samples were field-screened on-site by the Health, Safety, and Radiation Protection (RP-1) Group for alpha, beta, and gamma activity before transporting and releasing them to the SMO. To document sample handling, COCs were completed for all samples and are provided in Appendix D. Sample analyses were requested in accordance with the Laboratory’s statement of work for analytical services (LANL 2000, 071233).

Field-screening for VOCs was conducted in conjunction with sample collection at the site. Headspace VOC screening was performed for all collected samples by using a MiniRae 2000 photo ionization detector (PID) equipped with an 11.7-eV lamp, and the results were recorded on daily field-screening logs in accordance with SOP-06.33, “Headspace Vapor Screening with a Photo Ionization Detector” and on each corresponding SCL (Appendix C). During excavation activities, random field-screening with a PID was also conducted of both soil and the ambient air within the work zone.

The analytical results of the ACA confirmation sampling for SWMU 61-002 are provided in Appendix D and summarized in section 4.1 of this report. ACA investigation and remediation activities at SWMU 61-002 are detailed in the following subsections.

3.1.1 Detailed Description of the ACA at SWMU 61-002

3.1.1.1 2005 ACA Investigation and Remediation Activities

Between March and June 2005, 55 characterization samples (47 soil samples and eight tuff samples) were collected from 28 locations across SWMU 61-002 (Figure 3.1-1). The sampling locations were selected using a 20-ft square grid established over the entire site and were based on the review of analytical results from confirmation samples collected at the site during previous investigations (LANL 2004, 087474). Samples were collected using a stainless-steel hand auger from 0.5 ft to 1.0 ft and 2.0 ft to 2.5 ft below the existing asphalt and/or fill material (Figures B-3 and B-4, Appendix B). The sampling intervals for the 10 sampling locations within the portion of the SWMU previously remediated and then backfilled and paved were adjusted to 1.5–2.0 ft below ground surface (bgs) and 3.0–3.5 ft bgs (LANL 2004, 087474). Because of hand auger refusal, samples were successfully collected from the 3.0–3.5-ft interval at only five of the 10 locations. A backhoe was commissioned in August 2005 to assist in completing the ACA characterization sampling campaign and was used to collect samples from deeper intervals (i.e., 4.0–4.5 ft, 5.0–5.5 ft, and 5.5–6.0 ft).

Immediately upon collection, sampled media from each corresponding depth interval were field-screened for VOCs using a PID (Figure B-16, Appendix B). The results ranged from nondetect ($\leq$1 ppm) to 3.1 ppm, which are near or below background PID readings (1 to 3 ppm) (Appendix C). Before the samples were removed from the site, they were screened for radioactivity by RP-1 to ensure that U.S. Department of Transportation shipping requirements were met. All radiological screening results showed no detectable activity. All radiological field-screening results obtained during the characterization sampling at SWMU 61-002 are provided on the SCLs in Appendix C.

All of the 2005 characterization samples were submitted to the SMO for off-site contract laboratory analysis of VOCs, SVOCs, TAL metals, and PCBs. In addition, field duplicates were collected and submitted for the same suites of analysis (Table 3.1-1). Table 3.1-2 presents a summary of investigation samples collected during the ACA at SWMU 61-002 by location identifier (ID), sample ID, sample type, corresponding sampled depths, media, and the analyses requested.

Excavation activities were initiated at SWMU 61-002 on August 10, 2005, using a backhoe and hand tools. Several potholes were excavated to identify the locations of buried utilities in the area (Figures B-5 and B-6, Appendix B). Once the utility lines were exposed, the top 4 ft of soil were removed from an area measuring 20 ft x 140 ft along the northern boundary of SWMU 61-002 (Figure 3.1-1; Figures B-7 and B-8 in Appendix B) in accordance with the original approved ACA work plan (LANL 2004, 087474; NMED 2005, 087835). The excavated depth corresponds to the approximate grade of the planned security perimeter road (Figure 3.1-1).

Field-screening for VOCs was conducted in conjunction with all excavation activities using a PID (Figure B-16, Appendix B). The field-screening results indicated BVs; however, elevated VOCs (100–200 ppm) were measured between 2 ft bgs and 4 ft bgs in the northwestern corner of the excavation adjacent to former Building 61-23. Petroleum hydrocarbon-contaminated soil and what appeared to be two old product lines with valves were observed at a depth of approximately 4 ft bgs adjacent to former Building 61-23. The two product lines and approximately 60 yd^3 of petroleum hydrocarbon-contaminated soil were removed during the 2005 ACA excavation activities, but there was no evidence of an underground storage tank. The presence of former Building 61-23 prevented the definition of the vertical and lateral extent of contaminated soil. Four characterization samples were collected from locations 61-24346 and 61-24347 within the petroleum hydrocarbon-contaminated area adjacent to former Building 61-23 (Figure 3.1-1).

In September 2005, a drill rig was mobilized to the site for the installation of four boreholes to further characterize the area of subsurface petroleum hydrocarbon contamination and define the vertical and lateral extent of the contamination. The boreholes were installed using a Central Mine Equipment (CME) 75, truck-mounted hollow stem auger rig equipped with a continuous core sample barrel. The borehole depths and locations were selected based on data gathered during the excavation activities. Borehole location 61-24352 was installed within the excavated area near the northern boundary of the former SWMU 61-002 storage area to determine the vertical extent of petroleum hydrocarbon contamination. The remaining three boreholes (locations 61-24351, 61-24353, and 61-24354) were placed immediately to the south and east of the excavated area to bound the lateral extent of the petroleum hydrocarbon contamination (Figure 3.1-1). Based on field-screening data, it was determined that four additional boreholes would be required to define the horizontal extent of the subsurface petroleum hydrocarbon contamination. However, at least two of these borehole locations would need to be located beneath former Building 61-23, which was scheduled for removal in the spring of 2006.

Additional confirmation samples were collected in September 2005 from two depth intervals within the total petroleum hydrocarbon-contaminated area (at two sampling locations [61-24346 and 61-24347] and four boreholes advanced [61-24351, 61-24352, 61-24353, and 61-24354] to a maximum depth of 20 ft bgs within and around the petroleum hydrocarbon-contaminated area). Two samples were collected from each borehole, one from the sampling interval that exhibited the highest field headspace screening results and one from the bottom of the borehole. Each confirmation sample was submitted to the SMO for an off-site analysis of VOCs (including methyl tertiary butyl ether [MTBE]), SVOCs, TAL metals, TPH-diesel range organic (DRO), TPH-gasoline range organic (GRO), and PCBs. One field duplicate was collected and submitted for the same suite of analyses. Table 3.1-2 presents a summary of all confirmation samples collected during the ACA at SWMU 61-002 by location ID, sample ID, sampling depths, media, sample type, and analyses requested.

Approximately 60 yd^3 of petroleum hydrocarbon-contaminated soil were excavated from the northwestern corner of SWMU 61-002 and placed into five roll-off waste bins. Approximately 364 yd^3 of soil potentially contaminated with PCBs were removed from the remainder of the excavation at the northern end of the site and placed into roll-off waste bins. Three waste characterization samples were collected from each bin, using the spade-and-scoop method in accordance with SOP-06.09, "Spade and Scoop Method for the Collection of Soil Samples," and sent to an off-site laboratory for an analysis of VOCs, SVOCs, PCB, TAL metals, TPH (DRO and GRO), MTBE, and ignitability. A summary of the waste characterization data is presented in Appendix F, Table F.1-2. The excavated material was loaded into 20-yd^3 dump trucks and hauled to the Waste Control Specialists facility in Andrews, Texas for disposal. A total of 424 yd^3 of material were removed from the northern portion of SWMU 61-002 in August 2005. All of the waste management documentation is provided in Appendix F.

3.1.1.2 2006 ACA Investigation Activities

The results of the 2005 ACA activities indicated that residual PCB contamination associated with SWMU 61-002 met target cleanup levels. Therefore, the 2006 ACA investigation of SWMU 61-002 included site mobilization and preparation, field-screening, and the collection of subsurface characterization samples to determine the nature and extent of the petroleum hydrocarbon contamination discovered during the 2005 ACA and if remediation was needed.

During the 2006 ACA investigation at SWMU 61-002, a total of 15 samples (two soil samples and 13 tuff samples) were collected from eight borehole locations in and around the area of petroleum hydrocarbon contamination discovered during the 2005 ACA of SWMU 61-002 (Figure 3.1-1). Using a drill rig, characterization and confirmation samples were collected to define the nature and extent of contamination and to determine if, and to what extent, remedial action (e.g., removal of contaminated media) was required for the site to achieve completion. In August 2006, five boreholes were installed in and around the area of petroleum hydrocarbon contamination identified during the 2005 ACA investigation and as proposed in the approved 2006 ACA work plan (LANL 2006, 092564; NMED 2006, 092371). During the installation of these five boreholes and subsequent field-screening, it was determined that additional boreholes would be required to fully define the lateral and vertical extent of petroleum hydrocarbon-contaminated soil. Based on this information, three additional borings were installed, for a total of eight boreholes. Former Building 61-23 was removed in the spring of 2006, which allowed two of the boreholes (locations 61-26619 and 61-26986) to be installed within the building footprint. One borehole (location 61-26985) was installed adjacent to the shoulder of East Jemez Road. One borehole (location 61-26620) was installed adjacent to the northwestern corner of the former building footprint and three boreholes (locations 61-26621, 61-26622, and 61-26987) were installed along the northern boundary of SWMU 61-002 (Figure 3.1-1). One borehole (location 61-26223) was installed east of location 61-26622 to help define the eastern extent of the petroleum hydrocarbon contamination.

Each of the boreholes was advanced to a minimum depth of approximately 25 ft bgs. The vertical extent of contamination was defined by advancing borehole location 61-26621 to a depth of 95 ft bgs at the location anticipated to have the highest petroleum hydrocarbon concentrations based on the 2005 investigation and remediation results. This depth corresponds to the interval 25 ft below the last field-screening detection. To define the lateral extent of soil contamination, it was necessary to “step out” several of the boreholes until field-screening indicated that petroleum hydrocarbon contamination was no longer present. Field-screening for VOCs was conducted in conjunction with sample collection. When sufficient core recovery was obtained, at least one headspace VOC and analytical sample was collected from each core barrel. Two samples were collected from each borehole—one from the sampling interval that exhibited the highest field headspace screening results and one from the bottom of the borehole.

Immediately upon collection, sampled media from each corresponding depth interval were field-screened for VOCs using a PID. The field-screening results ranged from nondetect (≤1 ppm) to >10,000 ppm, with background PID readings ranging from 1 ppm to 3 ppm (Appendix C). The highest headspace readings were measured in samples collected from boreholes 61-26619, 61-26622, and 61-26623.

All of the 2006 characterization samples were submitted to the SMO for the analysis of VOCs, SVOCs, TPH-DRO, TPH-GRO, TAL metals, and PCBs. In addition, field duplicates were collected and submitted for the same suites of analysis (Table 3.1-1). Table 3.1-2 presents a summary of investigation samples collected during the ACA at SWMU 61-002 by location ID, sample ID, sample type, corresponding sampled depths, media, and the analyses requested.

As stated in the approved 2006 ACA work plan (LANL 2006, 092564; NMED 2006, 092371), remediation activities were to be conducted to remove petroleum hydrocarbon-contaminated soil and potentially to remediate the remaining soil in-situ. After a review of the field and site characterization data, it was determined that the excavation was not practical because of the depth to which contamination extends (approximately 25 ft bgs in some locations) and the proximity of the site to East Jemez Road. In-situ remediation was considered since areas of elevated petroleum hydrocarbon concentrations are relatively deep and the porosity of the weathered tuff is high. As specified in the approved 2006 ACA work plan (LANL 2006, 092564; NMED 2006, 092371), two boreholes (locations 61-26621 and 61-26623) were completed as soil vapor extraction (SVE) wells in case the results of the risk assessment indicated that in-situ remediation would be needed. However, analytical data collected in 2006 confirmed that the residual petroleum hydrocarbon contamination is limited to a small subsurface area at concentrations that do not pose an unacceptable risk to site workers or ecological receptors (section 4). In addition, results of the Tier One Evaluation conducted in accordance with Title 20, Chapter 5, Part 12 of the New Mexico

Administrative Code (20.5.12 NMAC) shows that the residual contamination does not pose a potential future threat to groundwater (Appendix E). Therefore, in-situ remediation by SVE was not implemented.

Investigation derived waste (IDW) consisting of borehole cuttings, sampling waste, and personal protective equipment (PPE) were placed in a single 20-yd^3 roll-off bin. Waste characterization results indicated that the drill cuttings were hazardous waste; therefore, the IWD generated during the 2006 ACA was managed as hazardous waste. The total volumes of solid media excavated and removed from SWMU 61-002 are presented in Appendix F, Table F1-1. Table F1-2 presents a summary of all waste characterization samples collected during the ACA remediation activities. The analytical results of waste samples, manifests for each off-site waste shipment, the tables of the total volumes, and the waste analytical data are provided in Appendix F.

3.2 Regulatory Criteria and Target Cleanup Levels

This section describes the regulatory criteria used for screening COPCs and for evaluating the potential risk to human and ecological receptors. Regulatory screening criteria identified in the Consent Order include cleanup standards, risk-based screening levels, and risk-based cleanup goals and are established by medium. These criteria are discussed in the following subsections, and applicable criteria identified are included in tables in Appendix E.

3.2.1 Current and Future Land Use

Historically, SWMU 61-002 has been used for industrial purposes only. Current land use remains industrial, and access control, including controls on intrusive activities, is maintained by the Laboratory. The site is located in an industrially developed area adjacent to the security perimeter road complex. The surrounding area consists of asphalt pavement, gravel surfacing, and fill with sparse vegetation. It is expected that the land use of SWMU 61-002 and the immediate surrounding area will remain industrial in the reasonably foreseeable future, but the future industrial land use may also include construction activities. Any future construction activities at the site would be implemented in accordance with Laboratory procedures to ensure that disturbance of soil containing residual contamination is conducted in accordance with appropriate worker health and safety requirements.

3.2.2 Screening Levels and Cleanup Standards

The screening levels for chemicals in soil are NMED's soil screening levels (SSLs) as presented in NMED's technical background document for the development of soil screening levels (NMED 2006, 092513). If a NMED SSL is unavailable for a chemical, the U.S. Environmental Protection Agency (EPA) Region 6 screening level is used (adjusted to 10^{-5} for carcinogens) (EPA 2006, 094321). As specified in Section VIII.B.1 of the Consent Order, the appropriate SSLs will be used as soil cleanup levels unless determined to be impracticable or unless SSLs do not exist for the current and reasonably foreseeable future land use. Because the current and reasonably foreseeable future land use is industrial, the industrial SSLs are the cleanup levels. However, the potential also exists for construction activities to take place and COPCs are screened against NMED construction worker SSLs. Exceedance of construction worker SSLs does not preclude future construction activities but requires that appropriate construction worker protection requirements be established. SWMU 61-002 also was evaluated under a residential scenario as required by the Consent Order.

Section VIII.B.1.b of the Consent Order indicates that cleanup levels for PCBs may either be a default value of 1 mg/kg or a risk-based concentration established through performing a health risk assessment. PCBs are COPCs for SWMU 61-002 and risk-based concentrations from NMED guidance (NMED 2004, 085615) were used for this site instead of the default cleanup level of 1 ppm. Although PCBs were historically the primary COPC for SWMU 61-002, they were not detected above action levels in ACA confirmation samples.

While TPH was detected at SWMU 61-002, TPH is not considered a contaminant as defined by the Consent Order, and the cleanup levels specified in Section VIII of the Consent Order are not applicable to TPH (although they are applicable to the chemical components of TPH). TPH results were compared with NMED's TPH screening guidelines for industrial and residential land uses (NMED 2006, 094614).

Ecological risk was screened using ecological screening levels (ESLs) established through LANL's screening level ecological risk assessment methods (LANL 2004, 087630). The ESLs were obtained from the ECORISK Database, Version 2.2 (LANL 2005, 090032).

3.2.3 Cleanup Goals

The cleanup goals specified in Section VIII of the Consent Order consist of a target risk level of 1×10^{-5} for carcinogens or a hazard index (HI) of 1 for noncarcinogens.

3.3 Deviations from the Accelerated Corrective Action Work Plan

The following sections discuss deviations from the two approved ACA work plans for SWMU 61-002 (LANL 2006, 092087).

The approved ACA work plan implemented in 2005 called for collecting samples at a depth of 0.0–0.5 ft (LANL 2006, 092087). The sampling intervals for the 10 sampling locations within the portion of the SWMU that was previously remediated and then backfilled and paved were adjusted to 1.5 ft bgs to 2.0 ft bgs and 3.0 ft bgs to 3.5 ft bgs to ensure that original fill/soil material underlying the clean fill was sampled.

Eighteen samples were collected at nine locations using a backhoe instead of a hand or power auger. The initial attempts to collect these samples at the appropriate depths were unsuccessful when using a hand or power auger as a result of refusal.

The excavation and removal of material was not conducted in the southern portion of SWMU 61-002 or on Los Alamos County Landfill property, as proposed in the originally approved ACA (LANL 2006, 092087) because field-screening and characterization sampling results did not warrant remediation in those areas.

To help define the lateral and vertical extent, additional excavation and sampling were conducted when petroleum hydrocarbon contamination was discovered adjacent to former Building 61-23. Using a backhoe, four additional confirmation samples were collected from locations 61-24346 and 61-24347 within the petroleum hydrocarbon-contaminated area. Four boreholes were drilled to 20 ft bgs adjacent to former Building 61-23, and two samples were collected from each borehole.

The approved ACA work plan implemented in 2006 called for the installation of at least five boreholes to determine the vertical and lateral extent of subsurface petroleum hydrocarbon contamination discovered during the 2005 ACA activities (LANL 2006, 092087). The boreholes were to be advanced until background PID readings were obtained. Based on field-screening results, it was determined that three additional boreholes would be required to adequately characterize the site. Therefore, three additional boreholes were installed and additional samples were collected in accordance with the approved 2006 ACA work plan (LANL 2006, 092087). Because the three additional locations were step-outs of the original borehole, only the boreholes serving to define either the lateral or vertical extent were advanced until headspace readings were near background levels. Although all boreholes were not advanced until background PID readings were obtained, the number, location, and depths of the boreholes were adequate to define the lateral and vertical extent of contamination (see section 4.1.2.4). The installation of step-out boreholes 61-26986, 61-26622, and 61-26987 was unanticipated and is a deviation from the ACA activities described for SWMU 61-002 in the approved 2006 ACA work plan (LANL 2006, 092564; NMED 2006, 092371).

The approved work plan implemented in 2006 called for headspace VOC vapor screening to be performed in accordance with SOP-06.33, “Headspace Vapor Screening with a Photo Ionization Detector,” by placing samples in resealable plastic baggies and allowing them to equilibrate with pore gas. Instead of using plastic baggies, samples were placed in glass jars and sealed with foil (LANL 2006, 092564; NMED 2006, 092371). Although use of the jars instead of the baggies is a deviation from the approved work plan, both methods (baggies and jars) are allowed by SOP-06.33. Therefore, field screening was performed in accordance with SOP-06.33 (LANL 2006, 092564; NMED 2006, 092371).

Petroleum hydrocarbon-contaminated soil was not excavated because of the depths to which the contamination extends (greater than 25 ft bgs) and the proximity of the site to East Jemez Road. Because the 2006 ACA confirmation sampling data indicates that the residual petroleum hydrocarbon contamination does not pose an unacceptable risk to human health or environment, additional remediation is not warranted as long as effective land use controls are maintained. Corresponding proposed activities, such as confirmation sampling within the excavation and backfilling, were not performed.

3.4 Final Site Conditions

The excavated area was backfilled from August 18, 2005, through September 1, 2005. Clean backfill material from Classic Rock in Santa Fe, New Mexico, was placed in the excavated area (Figures B-10 and B-13, Appendix B). The backfill material was compacted by a trackhoe and wheel-rolled by a front-end loader for compaction. Loose soil was swept off the remaining asphalt surface area, and the northern end of SWMU 61-002 was reseeded. All silt fencing temporarily installed for erosion control during the ACA remediation was left in place until the completion of the security perimeter road construction activities.

Since the investigation area was not disturbed by the 2006 ACA activities (beyond the disturbance created by the construction of the security perimeter road), site restoration activities consisted of borehole abandonment. Two of the boreholes (locations 61-26621 and 61-26623) were completed as potential SVE wells with slotted 2-in. polyvinyl chloride (PVC) pipe. If NMED concurs that in-situ soil remediation is not warranted at this site, the two soil vapor extraction wells will be abandoned in accordance with SOP-05.03, “Monitoring Well and Borehole Abandonment.”

The five other boreholes were abandoned in accordance with SOP-05.03. Each location was marked with a pin flag for later identification during the geodetic survey of these points. Subsequent site restoration activities associated with the security perimeter road included grading the entire site flat and placing approximately 2 ft of compacted fill over the site and reseeding the area.

4.0 REQUEST FOR CERTIFICATE OF COMPLETION

The review and evaluation of all of the analytical results for the samples collected at SWMU 61-002 demonstrate that characterization and remediation are complete. The results show that the nature and extent of contamination is defined for SWMU 61-002. The results of the human health screening assessments indicate no potential unacceptable risk to human health for the industrial and construction worker scenarios under current conditions, but there is potential unacceptable risk under a residential scenario. The ecological screening assessment found no potential risk to ecological receptors.

The following discussion presents a detailed evaluation of COPC identification at SWMU 61-002 and the nature and extent of inorganic and organic COPCs. A summary of the results of the risk screening assessments is presented in section 4.2, and the detailed risk screening assessment results are presented in Appendix E.

4.1 Nature and Extent of Contamination

The data were used for (1) the identification of COPCs at SWMU 61-002, (2) the evaluation of the nature and extent of contamination, and (3) a comparison with appropriate target cleanup levels and goals (section 4.2).

An evaluation of the nature and extent of contamination is presented below for SWMU 61-002.

4.1.1 Data Quality Review

A total of 104 samples, plus 13 field duplicates, were collected from 42 locations at SWMU 61-002. Two samples each from locations 61-24313 and 61-24317 were excavated and are no longer present (other samples from these two locations were not excavated and are representative of current conditions). The data are of good quality, except as described below, and are representative of current site conditions.

Several inorganic chemical results were qualified as estimated (J) because the results were less than the estimated detection limit but greater than the method detection limit (MDL). Chromium (17 sampling results), potassium (four sampling results), and thallium (14 sampling results) were qualified as J (undetected results were qualified as estimated detection limits [UJ]) because the duplicate relative percent difference (RPD) was greater than 35%. Two thallium results were qualified as J because the sampling results were greater than, or equal to, five times the reporting limit and the difference between the sampling and duplicate results is greater than two times the reporting limit. One barium sampling result and one lead sampling result were qualified as J because the serial dilution sample RPD was greater than 10% and the sampling result was greater than 50 times the MDL. One mercury result was qualified as estimated and biased high (J+) because the associated initial calibration value or the continuing calibration value was above the upper warning limit but less than, or equal to, the upper acceptance limit. Aluminum (11 sampling results), barium, and manganese (12 sampling results each) were qualified as J+ because the matrix spike recoveries were above 150%. Barium (11 sampling results), cobalt (12 sampling results), iron (11 sampling results), manganese (16 sampling results), mercury (10 sampling results), potassium (two sampling results), and selenium (seven sampling results) were qualified as J+ because the matrix spike recoveries were above the upper acceptance level but less than 150%. Aluminum (15 sampling results) was qualified as J+ because the associated laboratory control sample recovery was above the upper warning limit. Antimony (17 sampling results), barium (two sampling results), calcium (18 sampling results), copper (12 sampling results), and selenium (20 sampling results) were qualified as estimated and biased low (J-) (undetected results were qualified as UJ) because the matrix spike recoveries were less than the lower acceptance level but greater than 30%. Sampling results for aluminum, arsenic, calcium, chromium, iron, magnesium, selenium, thallium, and vanadium were qualified as undetected (U) because the results were less than five times the amount in the preparation blank. Barium (six sampling results) and manganese (11 sampling results) results were qualified as rejected (R) because the matrix spike recovery was less than 30%.

One Aroclor-1254 sampling result was qualified as J+ because the associated surrogate was recovered above the upper acceptance limit. Two sampling results each of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260 were qualified as UJ because the associated surrogate was recovered below the lower acceptance limit but above 10%. Aroclor-1260 was either qualified as J (two sampling results) or UJ (four sampling results) because the associated percent relative standard deviation (%RSD) or percent difference (%D) exceeded the criteria in the initial or continuing calibration standards.

Several SVOC results were qualified as J because the results were less than the estimated quantitation limit (EQL) but greater than the MDL. Sampling results for several SVOCs were qualified as J- (undetected results were qualified as UJ) because the extraction holding time was exceeded by less than two times the published method holding time. Sampling results for several SVOCs were qualified as UJ because the associated laboratory control sample recovery was less than the lower acceptance limit but greater than 10%. Sampling results for several SVOCs were qualified as UJ because the associated internal standard area counts were less than 50% but greater than 10%. Sampling results for several SVOCs were qualified as UJ because the associated %RSD/%D exceeded the criteria in the initial or continuing calibration standards.

Five chlorodibromomethane sampling results were qualified as UJ because the associated laboratory control sample recoveries were less than the lower acceptance level but greater than 10%. One acetone sampling result was qualified as J+ because the associated laboratory control sample recovery was greater than the upper acceptance level. Sampling results for several VOCs were qualified as UJ and one isopropyltoluene[4-] sampling result was qualified as J because the associated internal standard area counts were less than 50% but greater than 10%. Two xylene[1,3+1,4-] sampling results and one sampling result each of acetone, xylene[1,2-], trimethylbenzene[1,3,5-], and dichloroethene[1,1-] were qualified as J because the results were less than the EQL but greater than the MDL. Thirty-eight acetone, two butanone[2-], and 51 methylene chloride sampling results were qualified as U because the associated sampling results were less than 10 times the blank concentrations. Twenty-eight bromomethane, one butylbenzene[n-], two dichlorobenzene[1,2-], one ethylbenzene, two hexanone[2-], one methyl-2-pentanone[4-], four stryene, four tetrachloroethene, five toluene, nine trimethylbenzene[1,2,4-], one xylene[1,2-], and three xylene[1,3+1,4-] sampling results were qualified as U because the associated sampling results were less than five times the blank concentrations. Sampling results for several VOCs were qualified as UJ and five acetone sampling results were qualified as J because the associated %RSD/%D exceeded the criteria in the initial or continuing calibration standards. One to eight sampling results for several VOCs were qualified as U because the associated mass spectrum did not meet specifications. Three acetone sampling results were qualified as J- because the extraction/analytical holding time was exceeded by less than two times the published method holding time requirement.

Three TPH sampling results (two DRO and one GRO) were qualified as J because the results were less than the EQL but greater than the MDL. Three TPH-GRO sampling results were qualified as J+ because the surrogate recovery was greater than the upper acceptance level.

4.1.2 SWMU 61-002 Data Evaluation

Data from 42 sampling locations at SWMU 61-002 represent current conditions. The data for samples remaining in place form the basis for the evaluation of the nature and extent of contamination. These data are summarized in the following paragraphs.

4.1.2.1 Evaluation of Inorganic Chemical

One hundred samples and 13 field duplicates were collected from 42 locations that were not excavated at SWMU 61-002. Samples were analyzed for TAL metals. Table 3.1-2 summarizes the samples collected and the inorganic chemical analyses requested for each sample.

Seventeen inorganic chemicals (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, mercury, nickel, selenium, sodium, and zinc) were detected or detected above BVs in at least one soil sample (LANL 1998, 059730) (Table 4.1-1). Antimony, cadmium, and selenium had detection limits above the soil and/or tuff BVs in eight, two, and 11 samples, respectively. Figure 4.1-1 presents the inorganic chemicals detected above background at SWMU 61-002.

Beryllium, chromium, iron, magnesium, and sodium concentrations were within the range of soil or tuff background concentrations for each inorganic chemical (LANL 1998, 059730). Beryllium was detected in four samples above the soil BV at 2 mg/kg, 2.2 mg/kg, 2.9 mg/kg, and 3.2 mg/kg, while the soil background concentrations ranged from 0.04 mg/kg to 3.95 mg/kg (LANL 1998, 059730). Chromium was detected in one sample above the Quaternary Tshirege Member of Bandelier Tuff (Qbt) 4 BV at a concentration of 8.09 mg/kg compared with background concentrations from 0.25 mg/kg to 13 mg/kg (LANL 1998, 059730). Iron was detected in one sample above the Qbt 4 BV at 16,400 mg/kg, while the background concentrations ranged from 190 mg/kg to 19,500 mg/kg (LANL 1998, 059730). Magnesium was detected in two samples above the Qbt 4 BV at concentrations of 1730 mg/kg and 2370 mg/kg, compared with background concentrations ranging from 39 mg/kg to 2820 mg/kg (LANL 1998, 059730). Sodium was detected in one sample above the soil BV at 978 mg/kg, while the soil background concentrations ranged from 58 mg/kg to 1800 mg/kg (LANL 1998, 059730). None of these inorganic chemicals were retained as COPCs. Calcium was detected in one sample (14,900 mg/kg) above the range of soil background concentrations (500 mg/kg to 14,000 mg/kg). Calcium was also not retained as a COPC because it is an essential nutrient infrequently detected above background (one of 100 samples) and only slightly above background concentrations (approximately 6% above the maximum background concentration).

Aluminum, arsenic, barium, cobalt, copper, lead, mercury, selenium, and zinc were each detected at a concentration above their soil and/or Qbt 4 BVs and above the range of background concentrations in at least one sample (LANL 1998, 059730). In addition, antimony was not detected above BV but had detection limits above the Qbt 4 BV in eight samples. These inorganic chemicals were retained as COPCs at SWMU 61-002.

Cadmium was detected above the soil BV and within the range of soil background concentrations (0.2 mg/kg to 2.6 mg/kg) in two samples. In addition, one detection limit was above the soil BV but within the range of soil background concentrations, and one detection limit was above the Qbt 4 BV at 23–25 ft bgs. The nature and extent of cadmium is discussed in section 4.1.2.4, but cadmium was not a COPC for the risk assessments because it was not above background in the depth intervals of interest for the different scenarios (0–0.5 ft for industrial, 0–20 ft for construction worker, and 0–12 ft for residential).

Nickel was detected above the soil BV and within the range of soil background concentrations (1 mg/kg to 29 mg/kg) in five samples. In addition, one detected concentration of nickel (7.55 mg/kg) was above the Qbt 4 BV and slightly above the range of background concentrations (0.5 mg/kg to 7 mg/kg) at 23–25 ft bgs. The nature and extent of nickel is discussed in section 4.1.2.4, but nickel is not a COPC for the risk assessments because it was not above background in the depth intervals of interest for the different scenarios (0–0.5 ft for industrial, 0–20 ft for construction worker, and 0–12.0 ft for residential).

4.1.2.2 Evaluation of Organic Chemicals

One hundred samples and 13 field duplicates were collected from 42 locations that were not excavated at SWMU 61-002. Samples were analyzed for VOCs, SVOCs, PCBs, TPH-DRO, and TPH-GRO. Table 3.1-2 summarizes the samples collected and the organic chemical analyses requested for each sample.

Forty-nine organic chemicals as well as TPH-DRO and TPH-GRO were detected in at least one sample (Table 4.1-2). All of the detected organic chemicals were retained as COPCs. Plate 1 presents the detected organic chemicals at SWMU 61-002.

4.1.2.3 Summary of COPCs at SWMU 61-002

The COPCs identified for SWMU 61-002 are presented in Table 4.1-3.

4.1.2.4 Spatial Distribution of COPCs at SWMU 61-002

The inorganic COPCs exceeded background at various locations across the site with little or no collocation among the COPCs. Therefore, the spatial distribution for inorganic chemicals focuses on specific locations where an inorganic COPC was detected above background in order to determine if the extent of contamination has been defined. Figure 4.1-1 depicts the spatial distribution of inorganic chemicals at SWMU 61-002.

Cadmium, copper, nickel, and zinc were detected above BVs in two to six samples at two to six locations. Concentrations for these inorganic COPCs either were less than the maximum soil background concentrations and/or decreased with depth, except that nickel was detected at the bottom of the borehole at location 61-26619 (23–25 ft bgs) at a concentration of 7.55 mg/kg. This nickel concentration is slightly above the maximum Qbt 4 background concentration of 7 mg/kg and was not detected above Qbt 4 background in any other boreholes. The extent of cadmium, copper, nickel, and zinc is defined.

Aluminum was detected above Qbt 4 background in four boreholes (locations 61-26620, 61-26985, 61-26986, and 61-26987). Aluminum concentrations decreased with depth at locations 61-26985 and 61-26986 to below background. Aluminum concentrations at location 61-26987 decreased from 16,800 mg/kg in fill at 13–15 ft bgs to 10,200 mg/kg (above Qbt 4 background) at 23–25 ft bgs. The maximum aluminum concentration was detected at location 61-26620 at 23–25 ft bgs, which is the bottom of the borehole. However, the borehole at location 61-26621, which is located approximately 15 ft east/southeast of location 61-26620, did not show aluminum above background at 28–30 ft bgs and 93–95 ft bgs. The extent of aluminum is defined.

Arsenic was detected above the Qbt 4 BV (2.79 mg/kg) in seven tuff samples, but only three sampling results (locations 61-26619, 61-26620, and 61-26986) were above the maximum Qbt 4 background concentration (5 mg/kg). The exceedances were at 23-25 ft bgs at each location (arsenic was not detected above background at shallower depths), but they were only slightly above the maximum background concentration (5.22 mg/kg, 6.19 mg/kg, and 6.49 mg/kg compared with the maximum of 5 mg/kg). Arsenic was not detected above the maximum Qbt 4 background concentration at location 61-26621 at 28–30 ft bgs and 93–95 ft bgs, which is approximately 15–17 ft from locations 61-26619 and 61-26620. The extent of arsenic is defined.

Barium was detected above the soil BV (295 mg/kg) in five soil samples and above the Qbt 4 BV (46 mg/kg) in four tuff samples. Concentrations in four soil samples (locations 61-24313, 61-24315, 61-24317, and 61-24351) were less than the maximum barium soil background concentration

(410 mg/kg). The concentrations in two boreholes (locations 61-26985 and 61-26986) decreased to below the Qbt 4 BV with depth. The barium concentrations at location 61-26987 decreased from 157 mg/kg in fill at 13–15 ft bgs to 95 mg/kg (above Qbt 4 background) at 23–25 ft bgs. The barium concentration at location 61-26620 was above background at 23–25 ft bgs, which is the bottom of the borehole. However, the borehole at location 61-26621, which is located approximately 15 ft east/southeast of location 61-26620, did not detect barium above background at 28–30 ft bgs and 93–95 ft bgs. Barium was detected above soil background at 676 mg/kg at 3–3.5 ft at location 61-24334. However, barium was not detected above soil background in the shallower samples at this location and the exceedance is less than twice the maximum background concentration for barium. In addition, the sampling location is east of the SWMU 61-002 boundary and may not be related to site operations. The extent of barium is defined.

Cobalt was detected above soil background at two locations (locations 61-24317 and 61-24315). Cobalt was detected above the soil BV at location 61-24320 at 9 mg/kg, which is less than the maximum soil background concentration (9.5 mg/kg), and decreased to below the soil BV with depth. The cobalt concentration at location 61-24317 (10.2 mg/kg) decreased to below the soil BV with depth. The concentration at location 61-24315 (14.1 mg/kg) was in the deepest sample at this location (5–5.5 ft bgs). However, the concentration is less than twice the maximum soil background concentration, and cobalt was not detected above background in any other samples. The extent of cobalt is defined.

Lead was detected above soil background at locations 61-24314, 61-24332, 61-24352, and 61-24515. Lead was detected above Qbt 4 background in four boreholes (locations 61-26621, 61-26622, 61-26623, and 61-26986). At locations 61-24314, 61-24332, and 61-24515, lead concentrations decreased to below the soil BV with depth. In borehole location 61-24352 the lead concentrations did not change significantly at 10–10.5 ft bgs and 17–17.5 ft bgs (the deepest samples collected in this borehole). The concentrations (39.2 mg/kg and 35.4 mg/kg) are slightly above the maximum soil background concentration of 28 mg/kg. In addition, lead concentrations in the deep borehole (location 61-26621), located approximately 15 ft to the south, were lower at 28–30 ft bgs and 93–95 ft bgs. Lead concentrations in the other boreholes decreased with depth and were either less than the Qbt 4 BV (11.2 mg/kg) or slightly above the maximum Qbt 4 background concentration (15.5 mg/kg) at the bottom of the boreholes. The extent of lead is defined.

Mercury was detected above the soil BV (0.1 mg/kg) in four samples at locations 61-24315, 61-24321, 61-24347, and 61-24515. The concentrations at locations 61-24315 and 61-24515 were slightly above the BV and decreased with depth. The highest concentration at location 61-24347 (0.15 mg/kg) was at 4.5–5 ft bgs but was not above the soil BV in shallower samples. This concentration is slightly above the BV and mercury was not detected at location 61-24346, which is less than 10 ft north of location 61-24347. The mercury concentration at location 61-24321 (2.2 mg/kg) was at 5.5–6 ft bgs, and mercury was not detected above BV in the shallower samples. In addition, mercury was not detected above the soil BV at locations 61-24320 and 61-24322 (approximately 20 ft west and east of location 61-24321) at similar depths. The extent of mercury is defined.

Selenium was detected above the soil BV in one sample (location 61-24334) at a concentration of 1.7 mg/kg, which is equal to the maximum soil background concentration. Selenium was also detected above Qbt 4 background in six boreholes (locations 61-26619, 61-26620, 61-26622, 61-26623, 61-26985, and 61-26986). The selenium concentrations were confined to the area around the former Radio Repair Shop building and generally decreased laterally from the TPH-contaminated area, particularly at 23–25 ft bgs. Selenium concentrations also decreased with depth in three boreholes (locations 61-26620, 61-26623, and 61-26986) and were less in the two deeper boreholes (locations 61-26621 and 61-26623). Selenium was not detected at 28–30 ft bgs and 93–95 ft bgs in borehole location 61-26621. The extent of selenium is defined.

The concentrations for the majority of the VOCs and SVOCs detected at SWMU 61-002 decrease with depth and/or are detected at trace levels (near or below the EQL). The extent of these organic chemicals is defined and further sampling is not warranted. Plate 1 depicts the spatial distribution of organic COPCs at SWMU 61-002.

Approximately half of the organic COPCs (acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, benzene, benzoic acid, butylbenzene[n-], butylbenzene[sec-], butylbenzylphthalate, chlorobenzene, chloroethane, chrysene, dibromo-3-chloropropane[1,2-], dibromoethane[1,2-], dichlorobenzene[1,2-], dichlorobenzene[1,4-], dichloroethene[cis/trans 1,2-], di-n-octyl phthalate, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, methyl-2-pentanone[4-], phenanthrene, pyrene, and styrene) were detected at low levels at one to six sampling locations. With the few exceptions described below, concentrations of these COPCs decreased with depth and were bounded by surrounding sampling locations. Chlorobenzene was detected in the 1.5–2.5-ft-bgs sample at location 61-24327 at a concentration below the EQL; it was not detected in the shallower samples at this location. Benzoic acid was detected in borehole location 61-24353 at 17.6–18.1 ft bgs at a concentration below the EQL; it was not detected in the shallower sample in this borehole or in other boreholes drilled in the northwestern corner of the SWMU. Dichloroethene[cis/trans 1,2-] was detected in the 1.5-2.0 ft bgs sample at location 61-24324 at a concentration below the EQL; it was not detected in the shallower sample at this location. Fluoranthene and pyrene were detected in the 2.5–3.5-ft-bgs sample at location 61-24322 at concentrations below the EQLs; neither organic chemical was detected in the shallower samples at this location. Based on the trace level concentrations and the isolated detections, the extent of these organic COPCs is defined and no further sampling for extent is warranted.

The highest concentration of Aroclor-1254 (11 mg/kg) was detected at 1.5-2.0 ft bgs at location 61-24316. The vertical extent of Aroclor-1254 at this location is defined by undetected results in deeper samples. The lateral extent of Aroclor-1254 is defined by decreasing concentrations in the surrounding sampling locations. At each of the surrounding locations where Aroclor-1254 was detected, the vertical extent is defined by decreasing concentrations with depth. The extent of Aroclor-1254 is defined.

The highest concentration of Aroclor-1260 (1.3 mg/kg) was detected 1.5-2.0 ft bgs at location 61-24322. The vertical extent of contamination at this location is defined by undetected results in deeper samples. The lateral extent of Aroclor-1260 is defined by decreasing concentrations in the surrounding sampling locations. At each of the surrounding locations where Aroclor-1260 was detected, the vertical extent is defined by decreasing concentrations with depth. The extent of Aroclor-1260 is defined.

Butanone[2-] was detected at five locations in shallow soil (0.0–0.5 ft bgs and 1.5–2.0 ft bgs). Concentrations at four locations were near or below the EQL and above the EQL at the fifth location. Concentrations decreased with depth at each location or remained at trace levels. Butanone[2-] was also detected in five boreholes (locations 61-24351, 61-24353, 61-24354, 61-26619, and 61-26621). The detected concentrations in three boreholes (locations 61-24351, 61-24353, and 61-24354) were in the deepest samples (approximately 17–19.5 ft bgs). The detected concentrations at locations 61-26619 and 61-26621 were in deeper samples (23–25 ft bgs and 28–30 ft bgs, respectively). Butanone[2-] was not detected in the deepest sample (93–95 ft bgs) at location 61-26621. The extent of butanone[2-] is defined.

Acetone was generally detected at concentrations near or below the EQL (approximately 0.024 mg/kg). The higher concentrations of acetone were in the area of the former Radio Repair Shop building in the northwestern corner and to a lesser degree outside of the SWMU boundary to the south and west of the SWMU. The concentrations decreased with depth or were present at trace levels at depth. Acetone concentrations were detected only in the deepest samples at locations 61-24314 (3.0–3.5 ft bgs) and

61-24319 (1.5–2.0 ft bgs), and increased slightly with depth at locations 61-24326 and 61-24514 from the surface to 1.5 and 2.0 ft, respectively. However, the concentrations at these locations were less than 0.07 mg/kg and are bounded by surrounding sampling locations. The detected concentrations of acetone in the boreholes in the northwestern corner of the SWMU were reported in the deepest samples at locations 61-24346, 61-24352, and 61-26619. However, acetone was not detected at 23–25 ft bgs at locations 61-26620 and 61-26622 nor in deeper samples at locations 61-26623 (38–40 ft bgs and 53–55 ft bgs) and 61-26621 (93–95 ft bgs). Boreholes drilled laterally around this area (locations 61-26685, 61-26686, and 61-26687) did not detect acetone in any samples. The extent of acetone is defined.

Bis(2-ethylhexyl)phthalate was detected at locations 61-24513 and 61-24324. The concentration at location 61-24513 at 0.0–0.5 ft bgs (0.34 mg/kg) was equivalent to the EQL and it was undetected at depth. The concentration at location 61-24324 at 1.5–2.0 ft bgs (1.3 mg/kg) was below the EQL for this sample (1.9 mg/kg) and it was not detected in the surface sample. No other samples reported detected concentrations of bis(2-ethylhexyl)phthalate. The extent of bis(2-ethylhexyl)phthalate is defined.

Chloromethane was detected at locations 61-24310, 61-24312, 61-24313, 61-24315, 61-24316, and 61-24317 and in borehole location 61-24352. Concentrations decreased with depth at locations 61-24310, 61-24313, 61-24317, and 61-24352. Concentrations of chloromethane at locations 61-24312, 61-24315, and 61-24316 were below the EQLs, and chloromethane was not detected in the shallow sample at each location. The extent of chloromethane is defined.

Hexanone[2-] was detected in three boreholes (locations 61-24351, 61-24353, and 61-24354) in the deepest samples. Concentrations were at, below, or slightly above the EQLs. Hexanone[2-] was also detected in the 28–30-ft-bgs sample from borehole location 61-26621 at a concentration below the EQL. However, hexanone[2-] was not detected in the 93–95-ft-bgs sample at location 61-26621 or in the samples collected from the other boreholes drilled in 2006. The extent of hexanone[2-] is defined.

Isopropylbenzene and isopropyltoluene[4-] were detected either exclusively or primarily in the northwestern corner of the SWMU. Isopropyltoluene[4-] was detected in two other locations (61-24324 and 61-24333). The isopropyltoluene[4-] concentration at location 61-24324 was below the EQL at 1.5–2.0 ft bgs and was undetected in the deeper sample at location 61-24333. Isopropylbenzene concentrations increased slightly at location 61-24346, decreased in borehole location 61-24352, and were detected only in the deepest sample in borehole location 61-26622. Isopropyltoluene[4-] was detected in the deepest sample at locations 61-24346 and 61-24347 (5.5–6.0 ft bgs) and was detected in the deepest sample in borehole location 61-24352. Isopropylbenzene and isopropyltoluene[4-] were not detected in the deepest samples in borehole locations 61-26621 (28–30 ft bgs and 93–95 ft bgs) and 61-26623 (38–40 ft bgs and 53–55 ft bgs), nor in any of the other boreholes drilled in 2006. The extent of isopropylbenzene and isopropyltoluene[4-] is defined.

Methylene chloride was detected in the deepest sample collected from the borehole at location 61-24352 at 3.9 mg/kg, but it was not detected in the 10.0–10.5-ft-bgs sample and was not detected at a similar depth (15.0–17.0 ft bgs) in borehole location 61-26622. Methylene chloride was detected in the deepest sample collected in this area (93–95 ft bgs) in borehole location 61-26621 at a concentration less than the EQL. Methylene chloride was detected in borehole location 61-26987 at 13.0–15.0 ft bgs but decreased to nondetect in the deeper samples (23.0–25.0 ft bgs). Methylene chloride was not detected in the other boreholes drilled in 2006. The extent of methylene chloride is defined.

Tetrachloroethene was detected in three borehole locations (61-24314, 61-24324, and 61-24351) at concentrations below the EQL. Concentrations below the EQL were either in the deepest sample for that location or were undetected in the deeper sample at the location. The extent of tetrachloroethene is defined.

Ethylbenzene, methylnaphthalene[2-], naphthalene, propylbenzene[1-], trimethylbenzene[1,2,4-], trimethylbenzene[1,3,5-], and xylenes (total) (including xylene[1,2-] and xylene[1,3+1,4-]) were only detected in the northwestern corner of the SWMU near the former Radio Repair Shop building. Toluene was also detected at the highest concentrations in this area but was detected at several other locations at concentrations below the EQL. Concentrations of these organic chemicals were elevated in samples from locations 61-24346 and 61-24347 as well as in borehole location 61-24352. Concentrations increased with depth at 5.5–6.0 ft bgs in the former locations and decreased with depth in the borehole at 17–17.5 ft bgs. Subsequent boreholes drilled in 2006 detected these organic chemicals in borehole location 61-26622 at depths of 15–17 ft bgs and 23–25 ft bgs, with concentrations decreasing slightly, increasing slightly, or remaining unchanged with depth. However, these organic chemicals were not detected in borehole location 61-26621 at depths of 28–30 ft bgs and 93–95 ft bgs and were either not detected or detected at concentrations below the EQL (methylnaphthalene[2-] and naphthalene) in borehole location 61-26623 at depths of 38–40 ft bgs and 53–55 ft bgs. Borehole location 61-26621 was drilled in the vicinity of locations 61-24346 and 61-24347 (within approximately 5–10 ft) and south of borehole location 61-24352 (within approximately 10 ft). The field-screening results for borehole location 61-26621 indicated an elevated PID reading of >10,000 ppm at 28–30 ft bgs and decreasing PID readings to 93–95 ft bgs (0 ppm) indicating that the borehole was drilled through the contaminated zone and represents the depths below the contamination (Appendix C). The results from borehole location 61-26623, which is less than 25 ft east of borehole location 61-26622, indicate this borehole is outside and below the contaminated area because no organic chemicals were detected at or below 38–40 ft bgs. Boreholes drilled at locations 61-26985, 61-26986, 61-26987, 61-24351, and 61-24353 bound the contaminated area laterally. Concentrations of ethylbenzene, methylnaphthalene[2-], naphthalene, propylbenzene[1-], toluene, trimethylbenzene[1,2,4-], trimethylbenzene[1,3,5-], and xylenes [including xylene(1,2-) and xylene(1,3+1,4-)] were either not detected or were reported below the EQLs (propylbenzene[1-] and trimethylbenzene[1,3,5-] in borehole location 61-26985 at 15–17 ft bgs).

In addition to the organic chemicals discussed above, the TPH-DRO and TPH-GRO concentrations help define the extent of the contamination. Each TPH was detected in samples from locations 61-24346 and 61-24347 as well as in borehole location 61-24352. TPH concentrations were also elevated in borehole location 61-26622 at 15–17 ft bgs and 23–25 ft bgs, with concentrations either slightly increasing or decreasing with depth. TPH concentrations in borehole location 61-26621 were lower at 28–30 ft bgs (79.8 mg/kg and 0.221 mg/kg for TPH-DRO and TPH-GRO, respectively) and decreased with depth at 93–95 ft bgs (TPH-DRO undetected and TPH-GRO at 0.0901 mg/kg). TPH concentrations were also several orders of magnitude less than those observed in samples collected from borehole location 61-26621 and decreased with depth in borehole location 62-26623 to 53–55 ft bgs. Boreholes drilled at locations 61-26985, 61-26986, 61-26987, 61-24351, and 61-24353 bound the contaminated area laterally with low level or undetected TPH-DRO and low level concentrations (less than EQL) of TPH-GRO. Based on the TPH and organic chemical results, the extent of the petroleum hydrocarbon contamination in the northwestern corner of SWMU 61-002 is defined.

The results of the sampling at SWMU 61-002 also indicate that migration of contaminants as a free liquid phase is not occurring. Ethylbenzene, toluene, trimethylbenzene[1,2,4-], trimethylbenzene[1,3,5-], and xylene concentrations exceeded the C_{sat} SSLs at one or two sampling locations. Ethylbenzene and toluene concentrations were above C_{sat} SSLs in the 10- to 10.5-ft-bgs sample at location 61-24352 and decreased by approximately an order of magnitude in the 17- to 17.5-ft-bgs sample; neither is detected above the C_{sat} SSLs at other locations or other samples. Trimethylbenzene[1,2,4-], trimethylbenzene[1,3,5-], and xylene concentrations were above the C_{sat} SSLs in the 10- to 10.5-ft-bgs sample and in the 17- to 17.5-ft-bgs sample at location 61-24352 as well as in the 17- to 17.5-ft-bgs sample and the 23- to 25–ft-bgs sample at location 61-26622. The concentrations of these three organic chemicals decreased with depth at each location. None of the COPCs were detected in the deepest boreholes (locations 21-26623 and 21-26621) at 40 to 55 ft bgs and 30 to 95 ft bgs, respectively. (The borehole at location 21-26621 was drilled through the middle of the petroleum-contaminated area based on field screening.) Borehole location 61-26621 was drilled south of borehole location 61-24352 (within approximately 10 ft), and borehole location 61-26623 is less than 25 ft east of location 61-26622. Therefore, these COPCs at SWMU 61-002 are not migrating vertically to groundwater.

4.2 Cleanup Levels

The industrial SSLs are the most appropriate target cleanup levels for the evaluations because the current and reasonably foreseeable future use at the site is industrial. Construction worker SSLs were evaluated because construction activity may occur in the future. Residential SSLs were also evaluated as required by the Consent Order.

The EPCs for noncarcinogenic COPCs were less than their respective industrial SSLs. The industrial HI for the noncarcinogenic COPCs is approximately 0.04 (Appendix E, Table E-1.1-4), which is less than NMED's target HI of 1.0 (NMED 2006, 092513). The EPCs for carcinogenic COPCs were less than their respective industrial SSLs and resulted in a total excess cancer risk of approximately 6×10^{-6} (Table E-1.1-5), which is less than the NMED target level for carcinogenic risk of 1×10^{-5} (NMED 2006, 092513).

The EPCs for noncarcinogenic COPCs did not exceed their respective construction worker SSLs (Table E-1.1-6), but the construction worker HI of approximately 2.0 exceeded the NMED target level. The EPCs for carcinogenic COPCs were less than their respective construction worker SSLs and resulted in a total excess cancer risk of approximately 9×10^{-7} (Tables E-1.1-7), which is less than the NMED target level.

The EPCs for noncarcinogenic COPCs did not exceed their respective residential SSLs, except for naphthalene (Table E-1.1-8). The residential HI of approximately 4.0 exceeded the NMED target level. The total excess cancer risk for the residential scenario is approximately 2×10^{-5} (Table E-1.1-9), which is slightly above the NMED target level.

The TPH-DRO concentrations were above NMED's industrial and residential screening guidelines for unknown oil (NMED 2006, 094614) (Table E-1.1-10). Although there are no NMED screening guidelines for TPH-GRO, the detected concentrations indicate a release of gasoline. Even though SWMU 61-002 is not regulated as a petroleum storage tank site, a release of petroleum product apparently occurred and a Tier One Evaluation was performed for information purposes based on New Mexico Petroleum Storage Tank Bureau corrective action guidelines (Title 20 of the New Mexico Administrative Code, Chapter 5, Part 12, Section 1213). The Tier One Evaluation is intended to determine whether soil contamination poses a threat to groundwater in the future and is presented in section E-4.0 of this report's Appendix E. The Tier One Evaluation indicates that the residual subsurface petroleum hydrocarbon concentrations do not exceed New Mexico Petroleum Storage Tank Bureau risk-based screening levels for any current or reasonably foreseeable future exposure pathway.

4.3 Controls

The determination of site status is, in part, based on the results of the risk screening assessments. Depending upon the scenario used as the basis for a decision, the site status is identified as either corrective action complete with or without controls. The residential scenario is the only scenario under which corrective action complete without controls is applicable; that is, no additional corrective actions or conditions are necessary. The other scenarios (industrial and construction worker) result in corrective action complete with controls; that is, some type of land use and/or other institutional controls must be in place to ensure that the land use remains consistent with site cleanup levels and goals. Therefore, if the investigation of a site is determined to be complete, a Certificate of Completion for a site is requested under one of these provisions.

Both the original approved work plan (LANL 2004, 087474, p. 4; NMED 2005, 087835 and the subsequent approved work plan (LANL 2006, 092564, p. 3; NMED 2006, 092371) for SWMU 61-002 indicated that the current and reasonably foreseeable future land use of the site is industrial. The 2004 work plan states that the Laboratory planned to complete corrective actions as needed to obtain corrective action complete without controls (LANL 2004, 087474, p. 1); it does not propose using either residential or industrial SSLs as cleanup levels. However, the work plan acknowledges that the sites might be recommended for corrective action complete with controls, which implies that SSLs for a scenario other than residential (e.g., industrial) may be used to evaluate risk and as cleanup levels. The 2006 work plan states that the Laboratory plans to complete corrective actions at SWMU 61-002 for NMED to issue a Certificate of Completion for corrective actions complete with controls (LANL 2006, 092564, p. 1) and thereby implying that a scenario other than residential would be used as the basis for a decision. In addition, the Laboratory evaluated SWMU 61-002 for potential residential risk as required by the Consent Order and the NMED approval with modification of the original approved work plan (LANL 2004, 087474; NMED 2005, 087835). The requirements do not mean the site must meet cleanup goals and base site decisions on the residential scenario; rather, the Laboratory must provide residential risk results for comparison purposes as stipulated in the Consent Order and as presented in the original approved investigation report (LANL 2005, 091150; NMED 2006, 092371) and this investigation report (Appendix E).

The Laboratory is requesting a Certificate of Completion for Corrective Action Complete with Controls from NMED for SWMU 61-002 based on the results of the ACA investigation and remediation activities. The current and reasonably foreseeable future land use is industrial. The recommendation for Corrective Action Complete with Controls is appropriate for SWMU 61-002 because the cleanup levels and goals under an industrial scenario are met. In addition, because of the site's close proximity to the Los Alamos County landfill and East Jemez Road, and the depth of residual contamination beneath the roadway, additional remediation is not warranted. Based on the results of the investigation, controls are required to restrict land use of the property. The Laboratory intends to retain ownership of the property indefinitely and will continue to restrict the property to industrial use only. Controls on future construction activities will be implemented to assure protection of construction workers through LANL's Permits and Requirements Identification System and Excavation Permit System.

4.4 Conclusions and Recommendations

The review and evaluation of the data collected from SWMU 61-002 demonstrate that the ACA activities conducted at the site have addressed the Consent Order and approved work plan (LANL 2006, 092564; NMED 2006, 092371) requirements. The site data demonstrate that inorganic chemical and organic chemical contamination is characterized and that the nature and extent is defined. The human health risk assessment conducted for SWMU 61-002 indicated no potential unacceptable risk to human health under the industrial scenario. For a construction worker, the HI is slightly above the NMED target level of 1.0 and the cancer risk is less than the NMED target level of 1×10^{-5}. However, based on the uncertainty analysis the construction worker HI is overestimated and reduced to approximately 1.0, which is equivalent to the NMED target level (Appendix E). As noted above, controls on future construction activities will be implemented to ensure workers are protected. The ecological screening assessment indicates that contamination at SWMU 61-002 does not pose a potential ecological risk to receptors (Appendix E).

Detected concentrations in soil exceeding C_{sat} SSLs indicate that further evaluation is appropriate. In the case of SWMU 61-002, the evaluations included an analysis to determine if nature and extent are defined and risk screening assessments. The evaluation of the data determined that nature and extent, especially vertical extent, are defined by the sampling conducted (COPCs were detected at trace levels or not detected below 50 ft bgs). The site was assessed for potential risk using NMED and EPA guidance. The 95% UCLs for the COPCs were calculated to represent the reasonable maximum exposure across the site for the industrial, construction worker, and residential scenarios, not the worst-case conditions. In doing so, none of the 95% UCLs exceeded the C_{sat} SSLs provided by NMED and EPA Region 6 (NMED 2006, 092513; EPA 2006, 094321).

Based on the sampling results and the risk screening assessments, the nature and extent of contamination is defined and there is no potential unacceptable risk to human health for the industrial and construction worker scenarios at SWMU 61-002. Therefore, based on the results of the assessments as well the proximity of the site to the Los Alamos County landfill and East Jemez Road and the depth of residual contamination beneath the roadway, no further investigation or soil removal is necessary. As a result, the Laboratory requests that SWMU 61-002 be approved as Corrective Action Complete with Controls.

5.0 REFERENCES AND MAP DATA SOURCES

5.1 References

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the EP Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the DOE–Los Alamos Site Office (LASO); EPA, Region 6; and the EP Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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5.2 Map Data Sources

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Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; 06 January 2004; as published 27 March 2007.

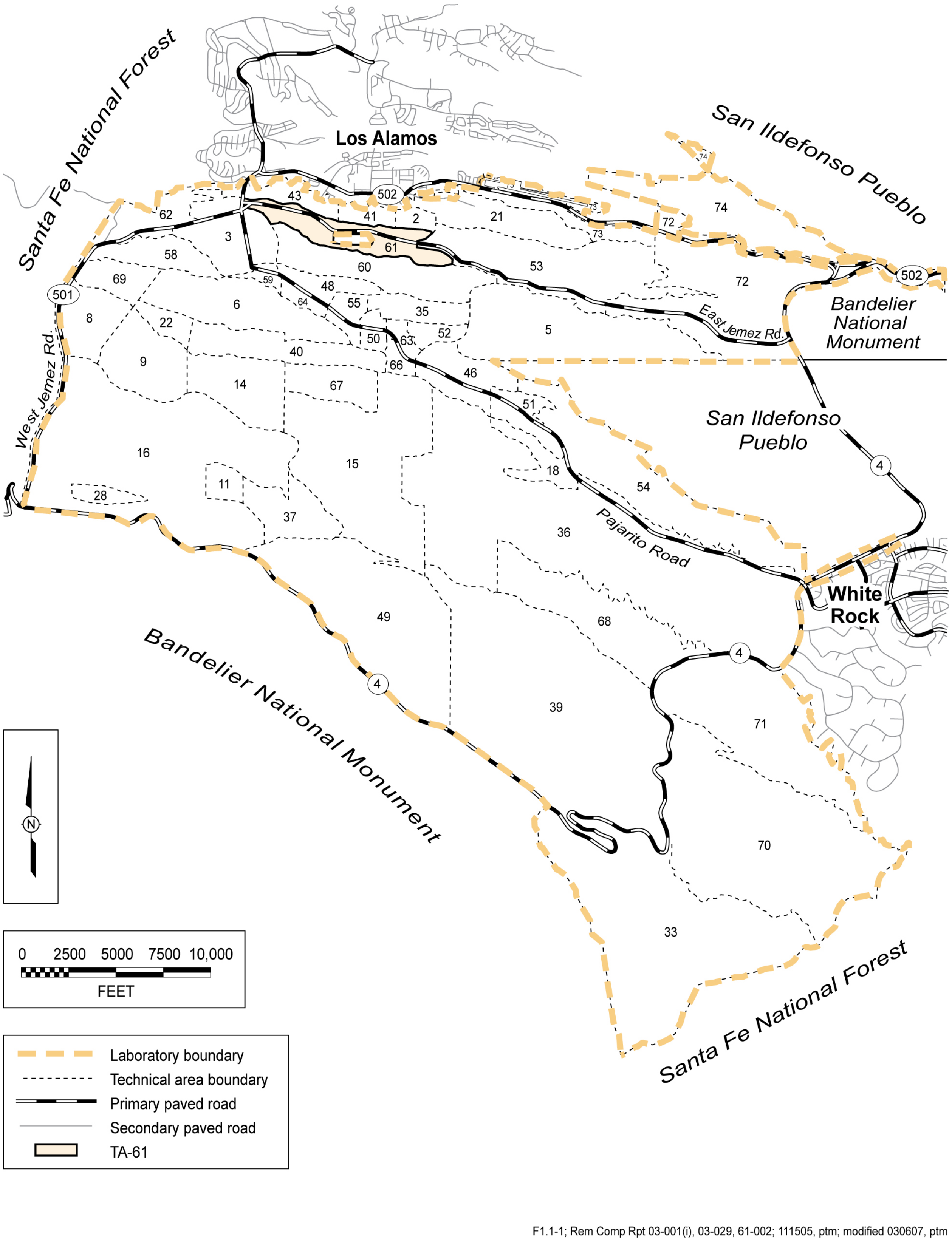

Figure 1.1-1 Location of TA-61 with respect to the Laboratory boundary

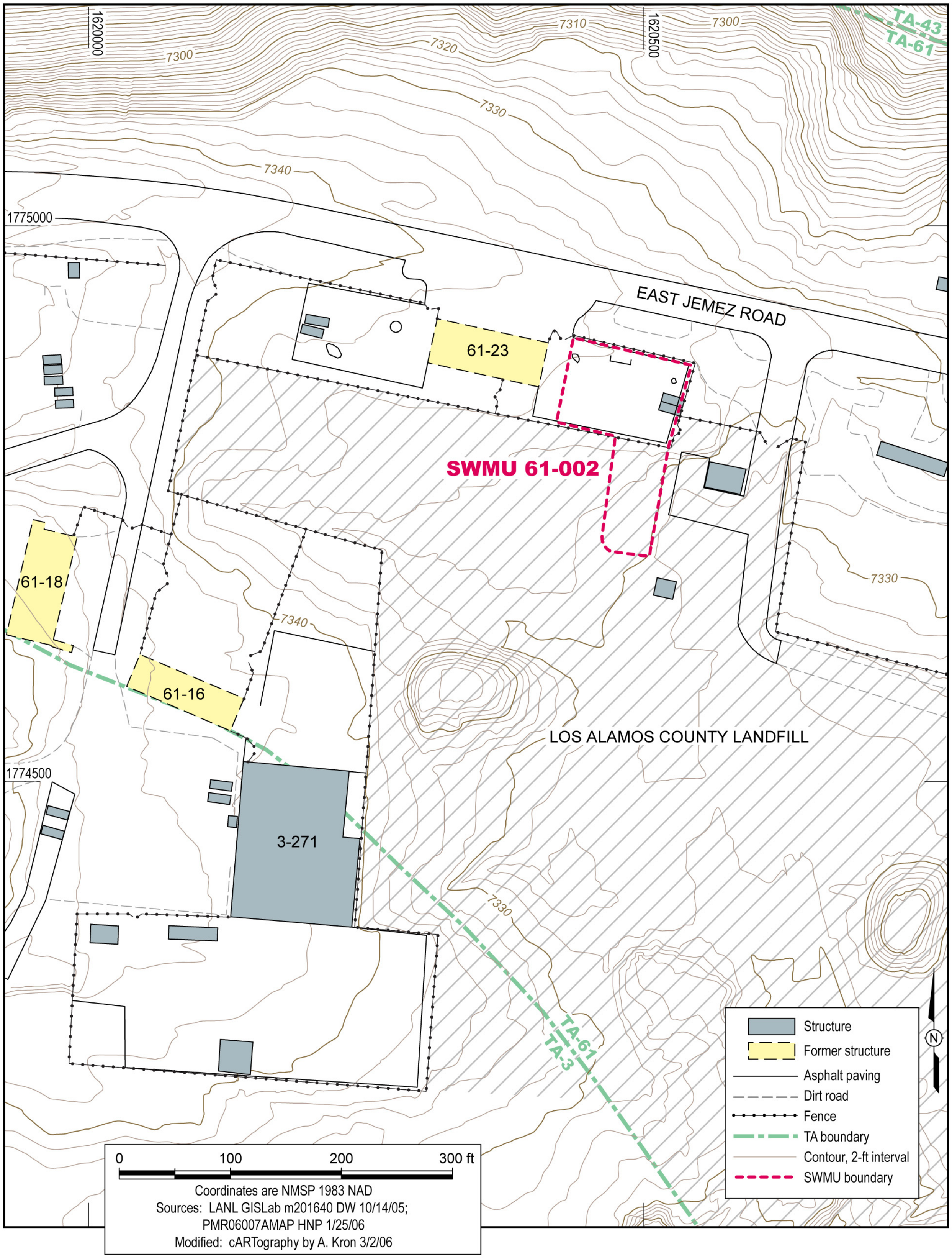

Figure 1.1-2 Location of SWMU 61-002

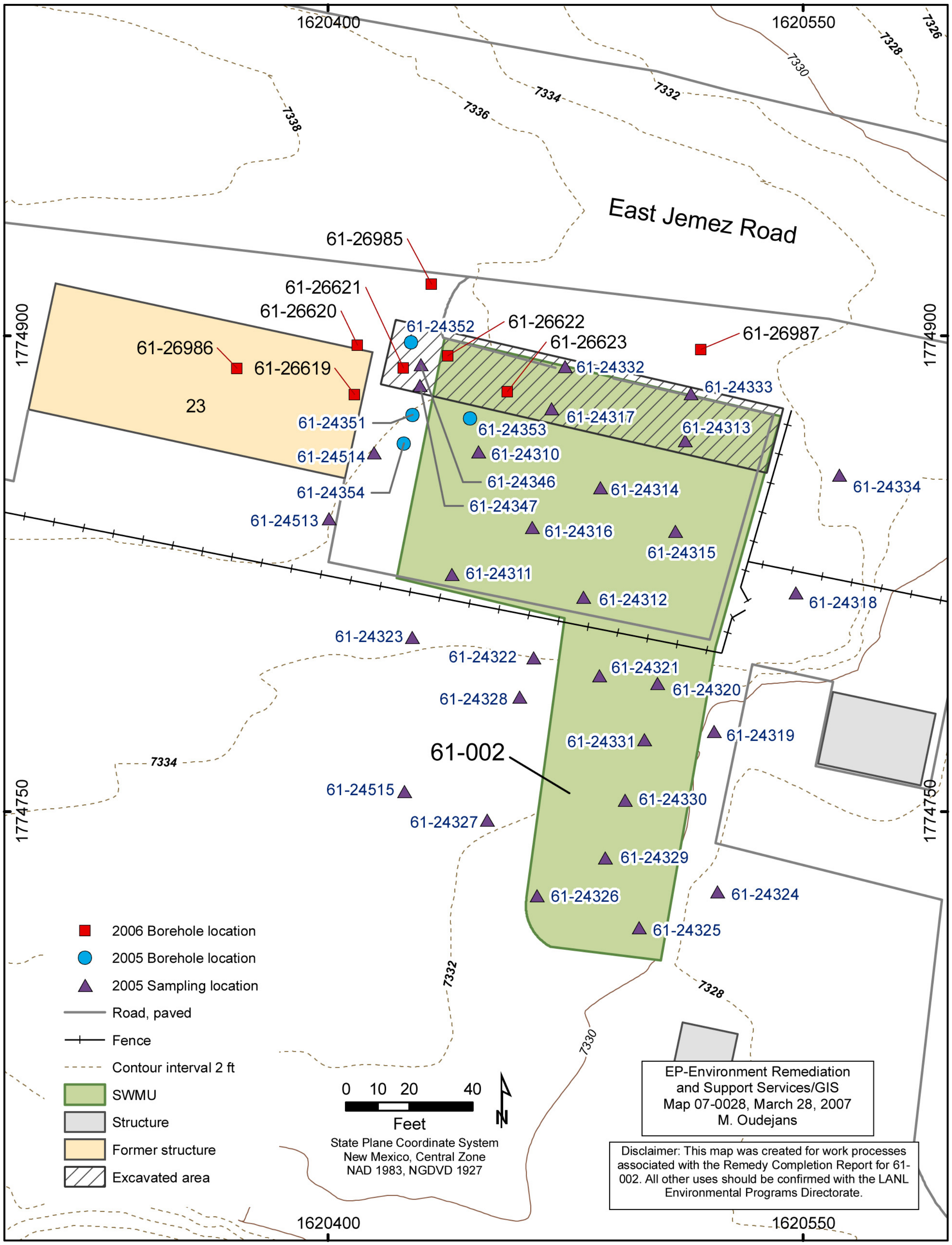

Figure 3.1-1 ACA sampling locations at SWMU 61-002

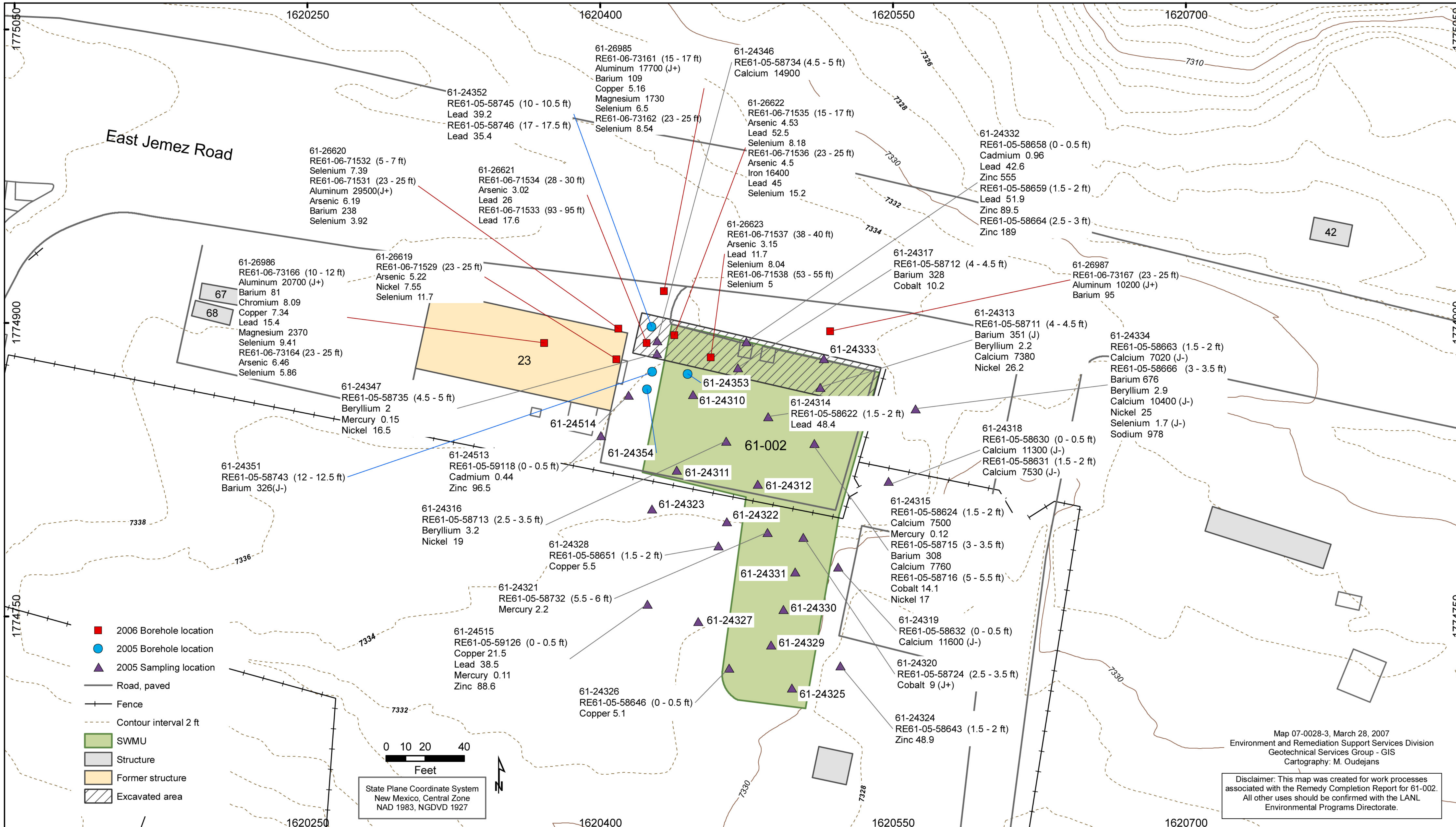

Figure 4.1-1 Inorganic chemicals detected above background at SWMU 61-002 (in mg/kg)

Table 3.0-1
Brief Description of Field Investigation Methods

Method	Summary
Spade-and-Scoop Collection of Soil Samples	This method is typically used for the collection of shallow (i.e., approximately 0- to 12-in.) soil or sediment samples. The “spade-and-scoop” method involves digging a hole to the desired depth, as prescribed in the sampling and analysis plan, and collecting a discrete grab sample. The sample is typically placed in a clean stainless-steel bowl for transfer into various sample containers.
Hand Auger Sampling	This method is typically used for sampling soil or sediment at depths of less than 10 to 15 ft, but may in some cases be used for collecting samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically 3- to 4-in. inner diameter) and creating a vertical hole that can be advanced to the desired sampling depth. When the desired depth is reached, the auger is decontaminated before advancing the hole through the sampling depth. The sample material is transferred from the auger bucket to a stainless-steel sampling bowl before filling the various required sample containers.
Split-Spoon Core-Barrel Sampling	In this method, a stainless-steel core barrel (typically 4-in. inner diameter and 2.5 ft long) is advanced using a powered drilling rig. The core barrel extracts a continuous length of soil and/or rock that can be examined as a unit. The split-spoon core barrel is a cylindrical barrel split lengthwise so that the two halves can be separated to expose the core sample. Once extracted, the section of core is typically screened for radioactivity and organic vapors, photographed, and described in a geologic log. A portion of the core may then be collected as a discrete sample from the desired depth.
Headspace Vapor Screening	Individual soil, rock, or sediment samples may be field screened for volatile organic compounds by placing a portion of the sample in a plastic sample bag or in a glass container with a foil-sealed cover. The container is sealed and gently shaken and allowed to equilibrate for 5 min. The sample is then screened by inserting a photo ionization detector probe into the container and measuring and recording any detected vapors.
Sample Control and Field Documentation	The collection, screening, and transport of samples is documented on standard forms generated by the Sample Management Office (SMO). These forms include sample collection logs, chain-of-custody forms, and sample container labels. Collection logs are completed at the time of sample collection and are signed by the sampler and a reviewer who verifies the logs for completeness and accuracy. Corresponding labels are initialed and applied to each sample container, and custody seals are placed around container lids or openings. Chain-of-custody forms are completed and assigned to verify that the samples are not left unattended.
Field Quality Control Samples	Field quality control samples are collected as follows: Field Duplicate: At a frequency of 10%; collected at the same time as a regular sample and submitted for the same analyses. Equipment Rinsate Blank: At a frequency of one per day or 5%, whichever is greater; collected by rinsing sampling equipment with deionized water and submitting the rinsate for laboratory analysis. Trip Blanks: Trip blanks are collected at a frequency of one per day or 5%, whichever is greater. Required for all field events that include the collection of samples for volatile organic compound analysis. Trip blanks are containers of certified clean sand that are opened and kept with the other sample containers during the sampling process.

Table 3.0-1 (continued)

Method	Summary
Field Decontamination of Drilling and Sampling Equipment	Dry decontamination is the preferred method to minimize the generation of liquid waste. Dry decontamination may include the use of a wire brush or other tool for the removal of soil or other material adhering to the sampling equipment, followed by the use of a commercial cleaning agent (nonacid, waxless cleaners) and paper wipes. Dry decontamination may be followed by wet decontamination if necessary. Wet decontamination may include washing with a nonphosphate detergent and water, followed by a water rinse and a second rinse with deionized water. Alternatively, steam cleaning may be used.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on U.S. Environmental Protection Agency guidance for environmental sampling, preservation, and quality assurance. Specific requirements for each sample are printed on the sample collection logs provided by the SMO (size and type of container, such as glass, amber glass, polyethylene, preservative). All samples are preserved by placing them in insulated containers with ice to maintain a temperature of 4˚C. Other requirements, such as the use of nitric acid or other preservatives, may apply to different media or analytical requests.
Management of Environmental Restoration Project Waste	Wastes are characterized based on a review of historical site information, existing site data, and/or waste analysis. Means to store, control, and transport potential wastes are identified ahead of field operations. Wastes are segregated by classification and compatibility to prevent crosscontamination and are packaged to meet on-site and/or off-site waste acceptance criteria. Disposal is coordinated with an approved disposal facility or through Los Alamos National Laboratory's waste operations group. Wastes are managed in accordance with U.S. Department of Energy orders, state and federal regulations, and specific project policies.
Waste Characterization	Project wastes are characterized by the field waste management coordinator, field team leader, or other member of the project team using a waste characterization strategy form (WCSF). The waste characterization strategy involves a review of existing analytical data or documentation for the waste stream, development of a sampling strategy, and verification of facility waste acceptance criteria. The WCSF includes site characteristics; site activities; responsible parties; waste stream characterization information; and storage, treatment, and disposal options. The WCSF is reviewed, and waste management documentation is prepared.
Coordination and Evaluation of Geodetic Surveys	A designated project participant determines the type of survey to be performed. This consists of either a "stakeout" survey, used for surveying previously defined locations, or an "unknown location survey," when the surveying of unknown locations is performed using existing coordinates. Survey personnel who perform control, property, easement, or boundary surveys must be registered professional land surveyors. Preparation for survey activities includes communication of expectations and requirements (e.g., degree of accuracy, locations, type of survey) to survey personnel. Survey personnel must chronologically document all survey activities and mark, identify, and record all survey locations, as instructed. Survey personnel prepare geodetic survey data for quality assurance review. The survey data are submitted to the project team leader and the quality program project leader for review. When the data are determined to be acceptable, they are finalized (i.e., assigned point labels), uploaded to a survey location template, and saved to a local disk or hard drive.

Table 3.1-1
Summary of QA/QC Samples Collected and Analyses Performed during the ACA at SWMU 61-002

Location ID	Sample ID	Depth (ft)	QC Type[a]	Medium[b]	Analytical Suites Requested (by Request Number)					
					VOCs	SVOCs	TAL Metals	PCBs	TPH-DRO	TPH-GRO
61-24315	RE61-05-58667	1.5–2.0	FD	Soil	3024S	3024S	3025S	3024S	—[c]	—
61-24316	RE61-05-58768	5.0–5.5	FD	Soil	3772S	3772S	3773S	3772S	—	—
61-24317	RE61-05-58769	5.5–6.0	FD	Soil	3779S	3779S	3780S	3779S	—	—
61-24319	RE61-05-58668	0.0–0.5	FD	Soil	3030S	3030S	3031S	3030S	—	—
61-24325	RE61-05-58669	1.5–2.0	FD	Qbt 4	3042S	3042S	3043S	3042S	—	—
61-24328	RE61-05-58670	0.0–0.5	FD	Fill	3042S	3042S	3043S	3042S	—	—
61-24329	RE61-05-58671	0.0–0.5	FD	Qbt 4	3042S	3042S	3043S	3042S	—	—
61-24346	RE61-05-58770	5.5–6.0	FD	Soil	3835S	3835S	3836S	3835S	3835S	3835S
61-24354	RE61-05-58772	17.2–17.7	FD	Qbt 4	3916S	3916S	3917S	3916S	3916S	3916S
61-24513	RE61-05-59107	0.0–0.5	FD	Soil	3321S	3321S	3322S	3321S	—	—
61-26621	RE61-06-71539	93.0–95.0	FD	Qbt 4	5745S	5745S	5746S	5745S	5745S	5745S
61-26986	RE61-06-71540	23.0–25.0	FD	Qbt 4	5745S	5745S	5746S	5745S	5745S	5745S
61-26987	RE61-06-73180	23.0–25.0	FD	Qbt 4	6424S	6424S	6425S	6424S	6424S	6424S
n/a[d]	RE03-05-58531	0–0	FR	W	—	—	3044S	—	—	—
n/a	RE61-05-58672	0–0	FTB	S	3024S	—	—	—	—	—
n/a	RE61-05-59112	0–0	FTB	S	3774S	—	—	—	—	—
n/a	RE61-05-59113	0–0	FTB	S	3781S	—	—	—	—	—
n/a	RE61-05-59114	0–0	FTB	S	3837S	—	—	—	—	—
n/a	RE61-05-59115	0–0	FR	W	—	—	3322S	—	—	—
n/a	RE61-05-59116	0–0	FR	W	—	—	3775S	—	—	—
n/a	RE61-05-59117	0–0	FR	W	—	—	3782S	—	—	—
n/a	RE61-05-63806	0–0	FTB	S	3918S	—	—	—	—	—
n/a	RE61-06-71541	0–0	FTB	S	5732S	—	—	—	—	—
n/a	RE61-06-71542	0–0	FTB	S	5732S	—	—	—	—	—
n/a	RE61-06-71543	0–0	FR	W	—	—	5733S	—	—	—
n/a	RE61-06-71544	0–0	FR	W	—	—	5733S	—	—	—
n/a	RE61-06-71568	0–0	FTB	S	6083S	—	—	—	—	—
n/a	RE61-06-73183	0–0	FR	W	—	—	5744S	—	—	—
n/a	RE61-06-73184	0–0	FR	W	—	—	6425S	—	—	—
n/a	RE61-06-73186	0–0	FTB	S	5743S	—	—	—	—	—
n/a	RE61-06-73189	0–0	FTB	S	6424S	—	—	—	—	—

[a] FD = Field duplicate, FR = field rinsate, FTB = Field trip blank.

[b] S = Soil (Solid), W = water.

[c] — = Not requested.

[d] n/a = Not applicable.

Table 3.1-2
Summary of Characterization and
Confirmation Samples Collected and Analyses Performed during the ACA at SWMU 61-002

Location ID	Sample ID	Depth (ft)	Medium	Excavated? (Yes/No)	Analytical Suites Requested (by Request Number)					
					TAL Metals	PCBs	SVOCs	VOCs	TPH-DRO	TPH- GRO
61-24310	RE61-05-58614	1.5–2.0	Soil	No	3019S	3018S	3018S	3018S	—*	—
61-24310	RE61-05-58615	3.0–3.5	Soil	No	3019S	3018S	3018S	3018S	—	—
61-24311	RE61-05-58616	1.5–2.0	Soil	No	3019S	3018S	3018S	3018S	—	—
61-24311	RE61-05-58719	2.5–3.0	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24311	RE61-05-58720	5.0–5.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24312	RE61-05-58618	1.5–2.0	Soil	No	3019S	3018S	3018S	3018S	—	—
61-24312	RE61-05-58717	2.5–3.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24312	RE61-05-58718	5.0–5.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24313	RE61-05-58620	1.5–2.0	Soil	Yes	3019S	3018S	3018S	3018S	—	—
61-24313	RE61-05-58621	3.0–3.5	Soil	Yes	3019S	3018S	3018S	3018S	—	—
61-24313	RE61-05-58711	4.0–4.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24313	RE61-05-58723	5.5–6.0	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24314	RE61-05-58622	1.5–2.0	Soil	No	3019S	3018S	3018S	3018S	—	—
61-24314	RE61-05-58623	3.0–3.5	Soil	No	3019S	3018S	3018S	3018S	—	—
61-24315	RE61-05-58624	1.5–2.0	Soil	No	3025S	3024S	3024S	3024S	—	—
61-24315	RE61-05-58715	3.0–3.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24315	RE61-05-58716	5.0–5.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24316	RE61-05-58626	1.5–2.0	Soil	No	3025S	3024S	3024S	3024S	—	—
61-24316	RE61-05-58713	2.5–3.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24316	RE61-05-58714	5.0–5.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24317	RE61-05-58628	1.5–2.0	Soil	Yes	3025S	3024S	3024S	3024S	—	—
61-24317	RE61-05-58629	3.0–3.5	Soil	Yes	3025S	3024S	3024S	3024S	—	—
61-24317	RE61-05-58712	4.0–4.5	Soil	No	3773S	3772S	3772S	3772S	—	—
61-24317	RE61-05-58721	5.5–6.0	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24318	RE61-05-58630	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24318	RE61-05-58631	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24319	RE61-05-58632	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24319	RE61-05-58633	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24320	RE61-05-58634	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24320	RE61-05-58635	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24320	RE61-05-58724	2.5–3.5	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24320	RE61-05-58722	5.5–6.0	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24321	RE61-05-58636	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24321	RE61-05-58637	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—

Table 3.1-2 (continued)

Location ID	Sample ID	Depth (ft)	Medium	Excavated? (Yes/No)	Analytical Suites Requested (by Request Number)					
					TAL Metals	PCBs	SVOCs	VOCs	TPH-DRO	TPH-GRO
61-24321	RE61-05-58725	2.5–3.5	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24321	RE61-05-58732	5.5–6.0	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24322	RE61-05-58638	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24322	RE61-05-58639	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24322	RE61-05-58727	2.5–3.5	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24322	RE61-05-58726	5.5–6.0	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24323	RE61-05-58640	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24323	RE61-05-58641	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24323	RE61-05-58728	2.5–3.5	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24323	RE61-05-58729	5.5–6.0	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24324	RE61-05-58642	0.0–0.5	Soil	No	3043S	3042S	3042S	3042S	—	—
61-24324	RE61-05-58643	1.5–2.0	Soil	No	3043S	3042S	3042S	3042S	—	—
61-24325	RE61-05-58644	0.0–0.5	Soil	No	3043S	3042S	3042S	3042S	—	—
61-24325	RE61-05-58645	1.5–2.0	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24326	RE61-05-58646	0.0–0.5	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24326	RE61-05-58647	1.0–1.5	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24327	RE61-05-58648	0.0–0.5	Fill	No	3043S	3042S	3042S	3042S	—	—
61-24327	RE61-05-58649	1.0–1.5	Fill	No	3043S	3042S	3042S	3042S	—	—
61-24327	RE61-05-58730	1.5–2.5	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24327	RE61-05-58731	2.5–3.5	Soil	No	3780S	3779S	3779S	3779S	—	—
61-24328	RE61-05-58650	0.0–0.5	Fill	No	3043S	3042S	3042S	3042S	—	—
61-24328	RE61-05-58651	1.5–2.0	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24329	RE61-05-58652	0.0–0.5	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24329	RE61-05-58653	1.5–2.0	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24330	RE61-05-58654	0.0–0.5	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24330	RE61-05-58655	1.5–2.0	Qbt 4	No	3043S	3042S	3042S	3042S	—	—
61-24331	RE61-05-58656	0.0–0.5	Soil	No	3043S	3042S	3042S	3042S	—	—
61-24331	RE61-05-58657	1.5–2.0	Soil	No	3043S	3042S	3042S	3042S	—	—
61-24332	RE61-05-58658	0.0–0.5	Soil	No	3025S	3024S	3024S	3024S	—	—
61-24332	RE61-05-58659	1.5–2.0	Soil	No	3025S	3024S	3024S	3024S	—	—
61-24332	RE61-05-58664	2.5–3.0	Soil	No	3025S	3024S	3024S	3024S	—	—
61-24333	RE61-05-58660	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24333	RE61-05-58661	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24333	RE61-05-58665	2.5–3.0	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24334	RE61-05-58662	0.0–0.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24334	RE61-05-58663	1.5–2.0	Soil	No	3031S	3030S	3030S	3030S	—	—

Table 3.1-2 (continued)

Location ID	Sample ID	Depth (ft)	Medium	Excavated? (Yes/No)	Analytical Suites Requested (by Request Number)					
					TAL Metals	PCBs	SVOCs	VOCs	TPH-DRO	TPH-GRO
61-24334	RE61-05-58666	3.0–3.5	Soil	No	3031S	3030S	3030S	3030S	—	—
61-24346	RE61-05-58734	4.5–5.0	Soil	No	3836S	3835S	3835S	3835S	3835S	3835S
61-24346	RE61-05-58733	5.5–6.0	Soil	No	3836S	3835S	3835S	3835S	3835S	3835S
61-24347	RE61-05-58735	4.5–5.0	Soil	No	3836S	3835S	3835S	3835S	3835S	3835S
61-24347	RE61-05-58736	5.5–6.0	Soil	No	3836S	3835S	3835S	3835S	3835S	3835S
61-24351	RE61-05-58743	12–12.5	Soil	No	3905S	3905S	3905S	3905S	3905S	3905S
61-24351	RE61-05-58744	19–19.5	Qbt 4	No	3905S	3905S	3905S	3905S	3905S	3905S
61-24352	RE61-05-58745	10–10.5	Soil	No	3917S	3916S	3916S	3916S	3916S	3916S
61-24352	RE61-05-58746	17–17.5	Soil	No	3917S	3916S	3916S	3916S	3916S	3916S
61-24353	RE61-05-58747	10–10.5	Soil	No	3917S	3916S	3916S	3916S	3916S	3916S
61-24353	RE61-05-58748	17.6–18.1	Soil	No	3917S	3916S	3916S	3916S	3916S	3916S
61-24354	RE61-05-58749	10–10.5	Soil	No	3917S	3916S	3916S	3916S	3916S	3916S
61-24354	RE61-05-58750	17.2–17.7	Qbt 4	No	3917S	3916S	3916S	3916S	3916S	3916S
61-24513	RE61-05-59118	0.0–0.5	Soil	No	3322S	3321S	3321S	3321S	—	—
61-24513	RE61-05-59119	1.5–2.0	Soil	No	3322S	3321S	3321S	3321S	—	—
61-24514	RE61-05-59122	0.0–0.5	Soil	No	3322S	3321S	3321S	3321S	—	—
61-24514	RE61-05-59123	1.5–2.0	Soil	No	3322S	3321S	3321S	3321S	—	—
61-24515	RE61-05-59126	0.0–0.5	Soil	No	3322S	3321S	3321S	3321S	—	—
61-24515	RE61-05-59127	1.5–2.0	Soil	No	3322S	3321S	3321S	3321S	—	—
61-26619	RE61-06-71529	23–25	Qbt 4	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26620	RE61-06-71532	5.0–7.0	Soil	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26620	RE61-06-71531	23–25	Qbt 4	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26621	RE61-06-71534	28–30	Qbt 4	No	5746S	5745S	5745S	5745S	5745S	5745S
61-26621	RE61-06-71533	93–95	Qbt 4	No	5746S	5745S	5745S	5745S	5745S	5745S
61-26622	RE61-06-71535	15–17	Qbt 4	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26622	RE61-06-71536	23–25	Qbt 4	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26623	RE61-06-71537	38–40	Qbt 4	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26623	RE61-06-71538	53–55	Qbt 4	No	5733S	5732S	5732S	5732S	5732S	5732S
61-26985	RE61-06-73161	15–17	Qbt 4	No	5744S	5743S	5743S	5743S	5743S	5743S
61-26985	RE61-06-73162	23–25	Qbt 4	No	5744S	5743S	5743S	5743S	5743S	5743S
61-26986	RE61-06-73166	10–12	Qbt 4	No	5744S	5743S	5743S	5743S	5743S	5743S
61-26986	RE61-06-73164	23–25	Qbt 4	No	5744S	5743S	5743S	5743S	5743S	5743S
61-26987	RE61-06-73168	13–15	Fill	No	6425S	6424S	6424S	6424S	6424S	6424S
61-26987	RE61-06-73167	23–25	Qbt 4	No	6425S	6424S	6424S	6424S	6424S	6424S

*— = Not requested.

Table 4.1-1
Inorganic Chemicals above BVs at SWMU 61-002

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Soil Background Values[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**
Qbt 2,3,4 Background Values[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**
Industrial Soil Screening Levels[b]				**100000**	**454**	**17.7**	**100000**	**2250**	**564**	**na[c]**	**5000[d]**	**20500**
Construction Worker Soil Screening Level[b]				**14400**	**124**	**85.2**	**60200**	**56.2**	**154**	**na**	**na**	**61**
Residential Soil Screening Level[b]				**77800**	**31.3**	**3.9**	**15600**	**156**	**39**	**na**	**2100[d]**	**1520**
RE61-05-58711	61-24313	4.5–5.0	Soil	—[e]	—	—	351(J)	2.2	—	7380	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	—	—	—	—	—	—	7500	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	308	—	—	7760	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	—	—	—	14.1
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	3.2	—	—	—	
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	328		—	—	—	10.2
RE61-05-58630	61-24318	0.0–0.5	Soil	—	—	—	—	—	—	11300(J-)	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	—	—	—	—	—	—	7530(J-)	—	—
RE61-05-58632	61-24319	0.0–0.5	Soil	—	—	—	—	—	—	11600(J-)	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	—	—	—	—	—	—	—	—	9(J+)
RE61-05-58732	61-24321	5.5–6.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	0.55(UJ)	—	—	—	—	—	—	—
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	—	0.56(UJ)	—	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	0.57(UJ)	—	—	—	—	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	0.61(UJ)	—	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	0.6(UJ)	—	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	0.63(UJ)	—	—	—	—	—	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Soil Background Values[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**
Qbt 2,3,4 Background Values[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**
Industrial Soil Screening Levels[b]				**100000**	**454**	**17.7**	**100000**	**2250**	**564**	**na[c]**	**5000[d]**	**20500**
Construction Worker Soil Screening Level[b]				**14400**	**124**	**85.2**	**60200**	**56.2**	**154**	**na**	**na**	**61**
Residential Soil Screening Level[b]				**77800**	**31.3**	**3.9**	**15600**	**156**	**39**	**na**	**2100[d]**	**1520**
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	0.59(UJ)	—	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	0.61(UJ)	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	—	—	—	0.96	—	—	—
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	7020(J-)	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	676	2.9	—	10400(J-)	—	—
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	—	—	—	—	14900	—	—
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	2	—	—	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	—	—	326(J-)	—	—	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58746	61-24352	17–17.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	—	0.44	—	—	—
RE61-05-59126	61-24515	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	—	5.22	—	—	—	—	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	0.53(U)	—	—	—
RE61-06-79531	61-26620	23–25	Qbt 4	29500(J+)	—	6.19	238	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	—	3.02	—	—	—	—	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	4.53	—	—	—	—	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt
Soil Background Values[a]				**29200**	**0.83**	**8.17**	**295**	**1.83**	**0.4**	**6120**	**19.3**	**8.64**
Qbt 2,3,4 Background Values[a]				**7340**	**0.5**	**2.79**	**46**	**1.21**	**1.63**	**2200**	**7.14**	**3.14**
Industrial Soil Screening Levels[b]				**100000**	**454**	**17.7**	**100000**	**2250**	**564**	**na[c]**	**5000[d]**	**20500**
Construction Worker Soil Screening Level[b]				**14400**	**124**	**85.2**	**60200**	**56.2**	**154**	**na**	**na**	**61**
Residential Soil Screening Level[b]				**77800**	**31.3**	**3.9**	**15600**	**156**	**39**	**na**	**2100[d]**	**1520**
RE61-06-71536	61-26622	23–25	Qbt 4	—	—	4.5	—	—	2.9(U)	—	—	—
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	3.15	—	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	17700(J+)	—	—	109	—	—	—	—	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73166	61-26986	10–12	Qbt 4	20700(J+)	—	—	81	—	—	—	8.09	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	6.46	—	—	—	—	—	—
RE61-06-73167	61-26987	23–25	Qbt 4	10200(J+)	—	—	95	—	—	—	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Copper	Iron	Lead	Magnesium	Mercury	Nickel	Selenium	Sodium	Zinc
Soil Background Values[a]				**14.7**	**21500**	**22.3**	**4610**	**0.1**	**15.4**	**1.52**	**915**	**48.8**
Qbt 2,3,4 Background Values[a]				**4.66**	**14500**	**11.2**	**1690**	**0.1**	**6.58**	**0.3**	**2770**	**63.5**
Industrial Soil Screening Levels[b]				**45400**	**100000**	**800**	**na**	**340[d]**	**22700**	**5680**	**na**	**100000**
Construction Worker Soil Screening Level[b]				**12400**	**92900**	**800**	**na**	**927[f]**	**6190**	**1550**	**na**	**92900**
Residential Soil Screening Level[b]				**3130**	**23500**	**400**	**na**	**23[d]**	**1560**	**391**	**na**	**23500**
RE61-05-58711	61-24313	4.5–5.0	Soil	—	—	—	—	—	26.2	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	48.4	—	—	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	—	—	—	—	0.12	—	—	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	17	—	—	—
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	—	19	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58632	61-24319	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58732	61-24321	5.5–6.0	Soil	—	—	—	—	2.2	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	—	—	—	—	—	—	—	48.9
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	—	—	—	—	—	0.54(U)	—	—
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	5.1	—	—	—	—	—	0.45(U)	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	—	—	—	—	—	0.41(U)	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	5.5	—	—	—	—	—	0.81(U)	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	—	—	—	—	—	0.31(U)	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	—	—	—	—	—	0.83(U)	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Copper	Iron	Lead	Magnesium	Mercury	Nickel	Selenium	Sodium	Zinc
Soil Background Values[a]				**14.7**	**21500**	**22.3**	**4610**	**0.1**	**15.4**	**1.52**	**915**	**48.8**
Qbt 2,3,4 Background Values[a]				**4.66**	**14500**	**11.2**	**1690**	**0.1**	**6.58**	**0.3**	**2770**	**63.5**
Industrial Soil Screening Levels[b]				**45400**	**100000**	**800**	**na**	**340**[d]	**22700**	**5680**	**na**	**100000**
Construction Worker Soil Screening Level[b]				**12400**	**92900**	**800**	**na**	**927**[f]	**6190**	**1550**	**na**	**92900**
Residential Soil Screening Level[b]				**3130**	**23500**	**400**	**na**	**23**[d]	**1560**	**391**	**na**	**23500**
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	—	—	—	—	—	0.7(U)	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	—	—	—	—	—	0.46(U)	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	42.6	—	—	—	—	—	555
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	51.9	—	—	—	—	—	89.5
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	—	—	—	—	—	189
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	—	—	25	1.7(J-)	978	—
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	0.15	16.5	—	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	39.2	—	—	—	—	—	—
RE61-05-58746	61-24352	17–17.5	Soil	—	—	35.4	—	—	—	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	—	—	—	—	96.5
RE61-05-59126	61-24515	0.0–0.5	Soil	21.5	—	38.5	—	0.11	—	—	—	88.6
RE61-06-71529	61-26619	23–25	Qbt 4	—	—	—	—	—	7.55	11.7	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	—	7.39	—	—
RE61-06-79531	61-26620	23–25	Qbt 4	—	—	—	—	—	—	3.92	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	—	26	—	—	—	1.6(U)	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	17.6	—	—	—	1.47(U)	—	—

Table 4.1-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Copper	Iron	Lead	Magnesium	Mercury	Nickel	Selenium	Sodium	Zinc
Soil Background Values[a]				**14.7**	**21500**	**22.3**	**4610**	**0.1**	**15.4**	**1.52**	**915**	**48.8**
Qbt 2,3,4 Background Values[a]				**4.66**	**14500**	**11.2**	**1690**	**0.1**	**6.58**	**0.3**	**2770**	**63.5**
Industrial Soil Screening Levels[b]				**45400**	**100000**	**800**	**na**	**340[d]**	**22700**	**5680**	**na**	**100000**
Construction Worker Soil Screening Level[b]				**12400**	**92900**	**800**	**na**	**927[f]**	**6190**	**1550**	**na**	**92900**
Residential Soil Screening Level[b]				**3130**	**23500**	**400**	**na**	**23[d]**	**1560**	**391**	**na**	**23500**
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	52.5	—	—	—	8.18	—	—
RE61-06-71536	61-26622	23–25	Qbt 4	—	16400	45	—	—	—	15.2	—	—
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	11.7	—	—	—	8.04	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	—	—	—	—	5	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	5.16	—	—	1730	—	—	6.5	—	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	8.54	—	—
RE61-06-73166	61-26986	10–12	Qbt 4	7.34	—	15.4	2370	—	—	9.41	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	—	—	—	—	5.86	—	—
RE61-06-73167	61-26987	23–25	Qbt 4	—	—	—	—	—	—	1.62(U)	—	—

Note: All units are mg/kg.

[a] BVs are from LANL (1998, 059730).

[b] SSLs are from NMED (2006, 092513), unless noted otherwise.

[c] na = Not available.

[d] Screening value from EPA Region 6 (2006, 094321).

[e] — = Not detected or detected below BV.

[f] Construction worker SSL is for elemental mercury from NMED (2006, 092513).

Table 4.1-2
Organic Chemicals Detected at SWMU 61-002

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzene	Benzo(a)anthracene	Benzo(a)pyrene
Industrial Soil Screening Level[a]				**33500**	**100000**	**100000**	**8.26**	**8.26**	**25.8**	**23.4**	**2.34**
Construction Worker Soil Screening Level[a]				**14100**	**98500**	**86000**	**4.28**	**4.28**	**174**	**212**	**21.2**
Residential Soil Screening Level[a]				**3730**	**28100**	**22000**	**1.12**	**1.12**	**10.3**	**6.21**	**0.621**
RE61-05-58614	61-24310	1.5–2.0	Soil	—[b]	—	—	—	0.2(J)	—	—	—
RE61-05-58615	61-24310	3.0–3.5	Soil	—	—	—	—	0.13(J)	—	—	—
RE61-05-58616	61-24311	1.5–2.0	Soil	—	—	—	0.082(J+)	—	—	—	—
RE61-05-58618	61-24312	1.5–2.0	Soil	—	—	—	0.45	—	—	—	—
RE61-05-58717	61-24312	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58718	61-24312	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58711	61-24313	4.0–4.5	Soil	—	—	—	0.28	—	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	2.4	—	—	—	—
RE61-05-58623	61-24314	3.0–3.5	Soil	—	0.025	—	0.44	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	—	—	—	—	—	0.0045(J)	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58626	61-24316	1.5–2.0	Soil	—	—	—	11	—	—	—	—
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58714	61-24316	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	—	0.059	—	—	—	—	0.18(J-)	0.16(J-)
RE61-05-58631	61-24318	1.5–2.0	Soil	—	0.045	—	—	—	—	—	—
RE61-05-58632	61-24319	0.0–0.5	Soil	—	—	—	—	0.08	0.0012(J)	0.1(J-)	0.096(J-)

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzene	Benzo(a)anthracene	Benzo(a)pyrene
Industrial Soil Screening Level[a]				**33500**	**100000**	**100000**	**8.26**	**8.26**	**25.8**	**23.4**	**2.34**
Construction Worker Soil Screening Level[a]				**14100**	**98500**	**86000**	**4.28**	**4.28**	**174**	**212**	**21.2**
Residential Soil Screening Level[a]				**3730**	**28100**	**22000**	**1.12**	**1.12**	**10.3**	**6.21**	**0.621**
RE61-05-58633	61-24319	1.5–2.0	Soil	—	0.023(J)	—	—	—	—	—	—
RE61-05-58634	61-24320	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58635	61-24320	1.5–2.0	Soil	—	0.029	—	—	0.13	—	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	0.16(J)	—	0.3(J)	—	0.081	—	0.59	0.52
RE61-05-58722	61-24320	5.5–6.0	Soil	—	—	—	—	0.049	—	—	—
RE61-05-58636	61-24321	0.0–0.5	Soil	—	0.038	—	—	—	—	—	—
RE61-05-58637	61-24321	1.5–2.0	Soil	—	0.035	—	—	0.5	—	—	—
RE61-05-58725	61-24321	2.5–3.5	Soil	—	—	—	—	0.52	—	—	—
RE61-05-58638	61-24322	0.0–0.5	Soil	—	0.087	—	—	0.27	—	—	—
RE61-05-58639	61-24322	1.5–2.0	Soil	—	0.053	—	—	1.3	—	—	—
RE61-05-58727	61-24322	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58640	61-24323	0.0–0.5	Soil	—	4.5(J-)	—	—	0.052	—	—	—
RE61-05-58641	61-24323	1.5–2.0	Soil	—	1(J-)	—	—	0.11	—	—	—
RE61-05-58642	61-24324	0.0–0.5	Soil	—	0.023(J)	—	—	—	0.00028(J)	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58644	61-24325	0.0–0.5	Soil	—	0.17	—	—	—	0.0011(J)	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	0.05	—	—	—	0.00029(J)	—	—
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	—	0.059	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	0.064	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzene	Benzo(a)anthracene	Benzo(a)pyrene
Industrial Soil Screening Level[a]				**33500**	**100000**	**100000**	**8.26**	**8.26**	**25.8**	**23.4**	**2.34**
Construction Worker Soil Screening Level[a]				**14100**	**98500**	**86000**	**4.28**	**4.28**	**174**	**212**	**21.2**
Residential Soil Screening Level[a]				**3730**	**28100**	**22000**	**1.12**	**1.12**	**10.3**	**6.21**	**0.621**
RE61-05-58648	61-24327	0.0–0.5	Fill	—	0.06	—	—	0.096	—	—	—
RE61-05-58649	61-24327	1.0–1.5	Fill	—	0.032	—	—	—	—	—	—
RE61-05-58730	61-24327	1.5–2.5	Soil	—	—	—	0.11	0.067	—	—	—
RE61-05-58650	61-24328	0.0–0.5	Fill	—	0.26(J)	—	—	0.13	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	0.075	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	0.12	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	0.14	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	0.024(J)	—	—	—	—	—	—
RE61-05-58656	61-24331	0.0–0.5	Soil	—	0.083	—	—	—	0.00063(J)	—	—
RE61-05-58657	61-24331	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	—	0.47	—	—	—	—
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	—	—	0.13	—	—	—
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	0.052	0.067	—	—	—
RE61-05-58660	61-24333	0.0–0.5	Soil	—	0.054	—	—	—	—	—	—
RE61-05-58661	61-24333	1.5–2.0	Soil	—	0.063	—	0.33	—	—	—	—
RE61-05-58665	61-24333	2.5–3.0	Soil	—	0.032	—	0.22	—	—	—	—
RE61-05-58662	61-24334	0.0–0.5	Soil	—	0.75(J-)	—	—	0.068	—	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	0.093	—	—	—	—	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	0.1	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzene	Benzo(a)anthracene	Benzo(a)pyrene
Industrial Soil Screening Level[a]				**33500**	**100000**	**100000**	**8.26**	**8.26**	**25.8**	**23.4**	**2.34**
Construction Worker Soil Screening Level[a]				**14100**	**98500**	**86000**	**4.28**	**4.28**	**174**	**212**	**21.2**
Residential Soil Screening Level[a]				**3730**	**28100**	**22000**	**1.12**	**1.12**	**10.3**	**6.21**	**0.621**
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58733	61-24346	5.5–6.0	Soil	—	2	—	—	—	—	—	—
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58736	61-24347	5.5–6.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	0.59	—	—	—	—	—	—
RE61-05-58744	61-24351	19–19.5	Qbt 4	—	0.39	—	—	—	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	—	—	—	27	—	—
RE61-05-58746	61-24352	17–17.5	Soil	—	2.4(J)	—	—	—	0.11(J)	—	—
RE61-05-58748	61-24353	17.6–18.1	Soil	—	—	—	—	—	—	—	—
RE61-05-58750	61-24354	17.2–17.7	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	0.018(J)	—	0.08	0.029(J)	—	—	—
RE61-05-59119	61-24513	1.5–2.0	Soil	—	0.0055(J)	—	—	—	—	—	—
RE61-05-59122	61-24514	0.0–0.5	Soil	—	0.0057(J)	—	0.2	—	—	—	—
RE61-05-59123	61-24514	1.5–2.0	Soil	—	0.014(J)	—	—	—	—	—	—
RE61-05-59126	61-24515	0.0–0.5	Soil	—	0.038	—	—	0.1	—	—	—
RE61-05-59127	61-24515	1.5–2.0	Soil	—	0.028	—	—	—	—	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	0.045(J+)	—	—	—	—	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	—	—	—
RE61-06-71531	61-26620	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	0.447	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Acetone	Anthracene	Aroclor-1254	Aroclor-1260	Benzene	Benzo(a)anthracene	Benzo(a)pyrene
Industrial Soil Screening Level[a]				**33500**	**100000**	**100000**	**8.26**	**8.26**	**25.8**	**23.4**	**2.34**
Construction Worker Soil Screening Level[a]				**14100**	**98500**	**86000**	**4.28**	**4.28**	**174**	**212**	**21.2**
Residential Soil Screening Level[a]				**3730**	**28100**	**22000**	**1.12**	**1.12**	**10.3**	**6.21**	**0.621**
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71536	61-26622	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73168	61-26987	13–15	Qbt 4	—	—	—	0.00642	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Butylbenzene[n-]	Butylbenzene[sec-]
Industrial Soil Screening Level[a]				**23.4**	**30900[c]**	**234**	**100000[d]**	**1370**	**48700[e]**	**62.1[e]**	**60.6[e]**
Construction Worker Soil Screening Level[a]				**212**	**9010[c]**	**2120**	**100000[d]**	**4660**	**48700[e]**	**62.1[e]**	**60.6[e]**
Residential Soil Screening Level[a]				**6.21**	**2290[c]**	**62.1**	**100000[d]**	**347**	**31800**	**62.1[e]**	**60.6[e]**
RE61-05-58614	61-24310	1.5–2.0	Soil	—	—	—	—	—	—	0.00054(J)	—
RE61-05-58615	61-24310	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58616	61-24311	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58618	61-24312	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58717	61-24312	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58718	61-24312	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58711	61-24313	4.0–4.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58623	61-24314	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58626	61-24316	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58714	61-24316	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	0.13(J-)	—	0.17(J-)	0.28(J-)	—	—	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Butylbenzene[n-]	Butylbenzene[sec-]
Industrial Soil Screening Level[a]				**23.4**	**30900[c]**	**234**	**100000[d]**	**1370**	**48700[e]**	**62.1[e]**	**60.6[e]**
Construction Worker Soil Screening Level[a]				**212**	**9010[c]**	**2120**	**100000[d]**	**4660**	**48700[e]**	**62.1[e]**	**60.6[e]**
Residential Soil Screening Level[a]				**6.21**	**2290[c]**	**62.1**	**100000[d]**	**347**	**31800**	**62.1[e]**	**60.6[e]**
RE61-05-58632	61-24319	0.0–0.5	Soil	0.082(J-)	—	0.11(J-)	—	—	0.012(J)	—	—
RE61-05-58633	61-24319	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58634	61-24320	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58635	61-24320	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	0.39	0.34(J)	0.54	—	—	—	—	—
RE61-05-58722	61-24320	5.5–6.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58636	61-24321	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58637	61-24321	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58725	61-24321	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58638	61-24322	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58639	61-24322	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58727	61-24322	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58640	61-24323	0.0–0.5	Soil	—	—	—	—	—	0.17	—	—
RE61-05-58641	61-24323	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58642	61-24324	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	—	—	—	1.3(J)	—	—	—
RE61-05-58644	61-24325	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Butylbenzene[n-]	Butylbenzene[sec-]
Industrial Soil Screening Level[a]				**23.4**	**30900[c]**	**234**	**100000[d]**	**1370**	**48700[e]**	**62.1[e]**	**60.6[e]**
Construction Worker Soil Screening Level[a]				**212**	**9010[c]**	**2120**	**100000[d]**	**4660**	**48700[e]**	**62.1[e]**	**60.6[e]**
Residential Soil Screening Level[a]				**6.21**	**2290[c]**	**62.1**	**100000[d]**	**347**	**31800**	**62.1[e]**	**60.6[e]**
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58648	61-24327	0.0–0.5	Fill	—	—	—	—	—	—	—	—
RE61-05-58649	61-24327	1.0–1.5	Fill	—	—	—	—	—	—	—	—
RE61-05-58730	61-24327	1.5–2.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58650	61-24328	0.0–0.5	Fill	—	—	—	0.15(J)	—	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58656	61-24331	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58657	61-24331	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58660	61-24333	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58661	61-24333	1.5–2.0	Soil	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Butylbenzene[n-]	Butylbenzene[sec-]
Industrial Soil Screening Level[a]				**23.4**	**30900**[c]	**234**	**100000**[d]	**1370**	**48700**[e]	**62.1**[e]	**60.6**[e]
Construction Worker Soil Screening Level[a]				**212**	**9010**[c]	**2120**	**100000**[d]	**4660**	**48700**[e]	**62.1**[e]	**60.6**[e]
Residential Soil Screening Level[a]				**6.21**	**2290**[c]	**62.1**	**100000**[d]	**347**	**31800**	**62.1**[e]	**60.6**[e]
RE61-05-58665	61-24333	2.5–3.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58662	61-24334	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58733	61-24346	5.5–6.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58736	61-24347	5.5–6.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	—	—	—	—	0.11	—	—
RE61-05-58744	61-24351	19–19.5	Qbt 4	—	—	—	—	—	0.11	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58746	61-24352	17–17.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58748	61-24353	17.6–18.1	Soil	—	—	—	0.23(J)	—	0.15	—	—
RE61-05-58750	61-24354	17.2–17.7	Qbt 4	—	—	—	—	—	0.06	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	0.34	0.0039(J)	—	—
RE61-05-59119	61-24513	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-59122	61-24514	0.0–0.5	Soil	—	—	—	—	—	0.0015(J)	—	—
RE61-05-59123	61-24514	1.5–2.0	Soil	—	—	—	—	—	0.0012(J)	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate	Butanone[2-]	Butylbenzene[n-]	Butylbenzene[sec-]
Industrial Soil Screening Level[a]				**23.4**	**30900[c]**	**234**	**100000[d]**	**1370**	**48700[e]**	**62.1[e]**	**60.6[e]**
Construction Worker Soil Screening Level[a]				**212**	**9010[c]**	**2120**	**100000[d]**	**4660**	**48700[e]**	**62.1[e]**	**60.6[e]**
Residential Soil Screening Level[a]				**6.21**	**2290[c]**	**62.1**	**100000[d]**	**347**	**31800**	**62.1[e]**	**60.6[e]**
RE61-05-59126	61-24515	0.0–0.5	Soil	—	—	—	—	—	0.01(J)	—	—
RE61-05-59127	61-24515	1.5–2.0	Soil	—	—	—	—	—	0.0054(J)	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	—	—	—	—	0.00565(J)	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	—	—	—
RE61-06-71531	61-26620	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	—	—	—	—	0.221	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	—	—	—	—	—	9.4
RE61-06-71536	61-26622	23–25	Qbt 4	—	—	—	—	—	—	—	8.74
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	—	—	—	—	—	—
RE61-06-73168	61-26987	13–15	Qbt 4	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Butylbenzylphthalate	Chlorobenzene	Chloroethane	Chloromethane	Chrysene	Di-n-octyl phthalate	Dibromo-3-chloropropane[1,2-]	Dibromoethane[1,2-]	Dichlorobenzene[1,2-]
Industrial Soil Screening Level[a]				**240[e]**	**245[e]**	**154**	**53.4**	**2310**	**25000[f]**	**9.68**	**1.31**	**37.4[e]**
Construction Worker Soil Screening Level[a]				**240[e]**	**245[e]**	**1420[e]**	**284**	**21200**	**11600[g]**	**6.48**	**24.8**	**37.4[e]**
Residential Soil Screening Level[a]				**240[e]**	**194**	**63.3**	**21.8**	**615**	**2400[f]**	**1.84**	**0.504**	**37.4[e]**
RE61-05-58614	61-24310	1.5–2.0	Soil	—	—	—	0.021	—	—	0.0015(J)	—	0.00074(J)
RE61-05-58615	61-24310	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58616	61-24311	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58618	61-24312	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58717	61-24312	2.5–3.5	Soil	—	—	—	0.0024(J)	—	—	—	—	—
RE61-05-58718	61-24312	5.0–5.5	Soil	—	—	—	0.0024(J)	—	—	—	—	—
RE61-05-58711	61-24313	4.0–4.5	Soil	—	—	—	0.0049(J)	—	—	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58623	61-24314	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	—	0.13	—	—	—	—	—	—	0.066
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	0.0029(J)	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	0.0024(J)	—	—	—	—	—
RE61-05-58626	61-24316	1.5–2.0	Soil	—	0.029	—	—	—	—	—	—	0.013
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	0.0029(J)	—	—	—	—	—
RE61-05-58714	61-24316	5.0–5.5	Soil	—	—	—	0.0021(J)	—	—	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	0.0036(J)	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	—	—	—	—	0.18(J-)	—	—	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Butylbenzylphthalate	Chlorobenzene	Chloroethane	Chloromethane	Chrysene	Di-n-octyl phthalate	Dibromo-3-chloropropane[1,2-]	Dibromoethane[1,2-]	Dichlorobenzene[1,2-]
Industrial Soil Screening Level[a]				**240[e]**	**245[e]**	**154**	**53.4**	**2310**	**25000[f]**	**9.68**	**1.31**	**37.4[e]**
Construction Worker Soil Screening Level[a]				**240[e]**	**245[e]**	**1420[e]**	**284**	**21200**	**11600[g]**	**6.48**	**24.8**	**37.4[e]**
Residential Soil Screening Level[a]				**240[e]**	**194**	**63.3**	**21.8**	**615**	**2400[f]**	**1.84**	**0.504**	**37.4[e]**
RE61-05-58632	61-24319	0.0–0.5	Soil	0.17(J-)	—	—	—	0.11(J-)	—	—	—	—
RE61-05-58633	61-24319	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58634	61-24320	0.0–0.5	Soil	0.66(J-)	—	—	—	—	—	—	—	—
RE61-05-58635	61-24320	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	—	—	—	—	0.67	—	—	—	—
RE61-05-58722	61-24320	5.5–6.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58636	61-24321	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58637	61-24321	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58725	61-24321	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58638	61-24322	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58639	61-24322	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58727	61-24322	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58640	61-24323	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58641	61-24323	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58642	61-24324	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58644	61-24325	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Butylbenzylphthalate	Chlorobenzene	Chloroethane	Chloromethane	Chrysene	Di-n-octyl phthalate	Dibromo-3-chloropropane[1,2-]	Dibromoethane[1,2-]	Dichlorobenzene[1,2-]
Industrial Soil Screening Level[a]				**240[e]**	**245[e]**	**154**	**53.4**	**2310**	**25000[f]**	**9.68**	**1.31**	**37.4[e]**
Construction Worker Soil Screening Level[a]				**240[e]**	**245[e]**	**1420[e]**	**284**	**21200**	**11600[g]**	**6.48**	**24.8**	**37.4[e]**
Residential Soil Screening Level[a]				**240[e]**	**194**	**63.3**	**21.8**	**615**	**2400[f]**	**1.84**	**0.504**	**37.4[e]**
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58648	61-24327	0.0–0.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58649	61-24327	1.0–1.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58730	61-24327	1.5–2.5	Soil	—	0.0013(J)	—	—	—	—	—	—	—
RE61-05-58650	61-24328	0.0–0.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58656	61-24331	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58657	61-24331	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	0.01	—	—	—	—	—	—	0.0057
RE61-05-58659	61-24332	1.5–2.0	Soil	—	0.0068	—	—	—	—	—	—	0.0036(J)
RE61-05-58664	61-24332	2.5–3.0	Soil	—	0.0069	—	—	—	—	—	—	0.0036(J)
RE61-05-58660	61-24333	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58661	61-24333	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Butylbenzylphthalate	Chlorobenzene	Chloroethane	Chloromethane	Chrysene	Di-n-octyl phthalate	Dibromo-3-chloropropane[1,2-]	Dibromoethane[1,2-]	Dichlorobenzene[1,2-]
Industrial Soil Screening Level[a]				**240[e]**	**245[e]**	**154**	**53.4**	**2310**	**25000[f]**	**9.68**	**1.31**	**37.4[e]**
Construction Worker Soil Screening Level[a]				**240[e]**	**245[e]**	**1420[e]**	**284**	**21200**	**11600[g]**	**6.48**	**24.8**	**37.4[e]**
Residential Soil Screening Level[a]				**240[e]**	**194**	**63.3**	**21.8**	**615**	**2400[f]**	**1.84**	**0.504**	**37.4[e]**
RE61-05-58665	61-24333	2.5–3.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58662	61-24334	0.0–0.5	Soil	0.31(J-)	—	—	—	—	—	—	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58733	61-24346	5.5–6.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58736	61-24347	5.5–6.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58744	61-24351	19–19.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	0.65(J)	0.44(J)	—	—	—	—	—
RE61-05-58746	61-24352	17–17.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58748	61-24353	17.6–18.1	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58750	61-24354	17.2–17.7	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	—	0.075(J)	—	—	—
RE61-05-59119	61-24513	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59122	61-24514	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59123	61-24514	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Butylbenzylphthalate	Chlorobenzene	Chloroethane	Chloromethane	Chrysene	Di-n-octyl phthalate	Dibromo-3-chloropropane[1,2-]	Dibromoethane[1,2-]	Dichlorobenzene[1,2-]
Industrial Soil Screening Level[a]				**240[e]**	**245[e]**	**154**	**53.4**	**2310**	**25000[f]**	**9.68**	**1.31**	**37.4[e]**
Construction Worker Soil Screening Level[a]				**240[e]**	**245[e]**	**1420[e]**	**284**	**21200**	**11600[g]**	**6.48**	**24.8**	**37.4[e]**
Residential Soil Screening Level[a]				**240[e]**	**194**	**63.3**	**21.8**	**615**	**2400[f]**	**1.84**	**0.504**	**37.4[e]**
RE61-05-59126	61-24515	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59127	61-24515	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	—	—	—	—
RE61-06-71531	61-26620	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71536	61-26622	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	—	—	—	—	—	—	—	0.000509(J)	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73168	61-26987	13–15	Qbt 4	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,4-]	Dichloroethene[cis/trans 1,2-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno[1,2,3-cd]pyrene	Isopropylbenzene	Isopropyltoluene[4-]
Industrial Soil Screening Level[a]				**103**	**300[h]**	**128[e]**	**24400**	**26500**	**48700[e,i]**	**23.4**	**389[e]**	**389[e,j]**
Construction Worker Soil Screening Level[a]				**1960**	**254[h]**	**128[e]**	**8730**	**10200**	**48700[e,i]**	**212**	**389[e]**	**389[e,j]**
Residential Soil Screening Level[a]				**39.5**	**76.5[h]**	**128[e]**	**2290**	**2660**	**31800[i]**	**6.21**	**271**	**271[j]**
RE61-05-58614	61-24310	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58615	61-24310	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58616	61-24311	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58618	61-24312	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58717	61-24312	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58718	61-24312	5.0–5.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58711	61-24313	4.0–4.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58623	61-24314	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	0.069	—	—	—	—	—	—	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58626	61-24316	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58714	61-24316	5.0–5.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	—	—	—	0.43(J-)	—	—	0.11(J-)	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,4-]	Dichloroethene[cis/trans 1,2-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno[1,2,3-cd]pyrene	Isopropylbenzene	Isopropyltoluene[4-]
Industrial Soil Screening Level[a]				**103**	**300[h]**	**128[e]**	**24400**	**26500**	**48700[e,i]**	**23.4**	**389[e]**	**389[e,j]**
Construction Worker Soil Screening Level[a]				**1960**	**254[h]**	**128[e]**	**8730**	**10200**	**48700[e,i]**	**212**	**389[e]**	**389[e,j]**
Residential Soil Screening Level[a]				**39.5**	**76.5[h]**	**128[e]**	**2290**	**2660**	**31800[i]**	**6.21**	**271**	**271[j]**
RE61-05-58632	61-24319	0.0–0.5	Soil	—	—	—	0.22(J-)	—	—	—	—	—
RE61-05-58633	61-24319	1.5–2.0	Soil	—	—	—	0.14(J-)	—	—	—	—	—
RE61-05-58634	61-24320	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58635	61-24320	1.5–2.0	Soil	—	—	—	0.083(J-)	—	—	—	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	—	—	—	1.7	0.16(J)	—	0.37(J)	—	—
RE61-05-58722	61-24320	5.5–6.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58636	61-24321	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58637	61-24321	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58725	61-24321	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58638	61-24322	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58639	61-24322	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58727	61-24322	2.5–3.5	Soil	—	—	—	0.12(J)	—	—	—	—	—
RE61-05-58640	61-24323	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58641	61-24323	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58642	61-24324	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	0.00081(J)	—	—	—	—	—	—	0.00047(J)
RE61-05-58644	61-24325	0.0–0.5	Soil	—	0.0047(J)	—	—	—	—	—	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	0.0017(J)	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,4-]	Dichloroethene[cis/trans 1,2-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno[1,2,3-cd]pyrene	Isopropylbenzene	Isopropyltoluene[4-]
Industrial Soil Screening Level[a]				**103**	**300[h]**	**128[e]**	**24400**	**26500**	**48700[e,i]**	**23.4**	**389[e]**	**389[e,j]**
Construction Worker Soil Screening Level[a]				**1960**	**254[h]**	**128[e]**	**8730**	**10200**	**48700[e,i]**	**212**	**389[e]**	**389[e,j]**
Residential Soil Screening Level[a]				**39.5**	**76.5[h]**	**128[e]**	**2290**	**2660**	**31800[i]**	**6.21**	**271**	**271[j]**
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58648	61-24327	0.0–0.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58649	61-24327	1.0–1.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58730	61-24327	1.5–2.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58650	61-24328	0.0–0.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58656	61-24331	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58657	61-24331	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58660	61-24333	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58661	61-24333	1.5–2.0	Soil	—	—	—	—	—	—	—	—	0.019

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,4-]	Dichloroethene[cis/trans 1,2-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno[1,2,3-cd]pyrene	Isopropylbenzene	Isopropyltoluene[4-]
Industrial Soil Screening Level[a]				**103**	**300[h]**	**128[e]**	**24400**	**26500**	**48700[e,i]**	**23.4**	**389[e]**	**389[e,j]**
Construction Worker Soil Screening Level[a]				**1960**	**254[h]**	**128[e]**	**8730**	**10200**	**48700[e,i]**	**212**	**389[e]**	**389[e,j]**
Residential Soil Screening Level[a]				**39.5**	**76.5[h]**	**128[e]**	**2290**	**2660**	**31800[i]**	**6.21**	**271**	**271[j]**
RE61-05-58665	61-24333	2.5–3.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58662	61-24334	0.0–0.5	Soil	—	—	—	0.099(J-)	—	—	—	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	1.3(J)	—	—	—	—	0.23(J)	—
RE61-05-58733	61-24346	5.5–6.0	Soil	—	—	3	—	—	—	—	0.72	1.1
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58736	61-24347	5.5–6.0	Soil	—	—	—	—	—	—	—	—	1.5
RE61-05-58743	61-24351	12–12.5	Soil	—	—	—	—	—	0.024	—	—	—
RE61-05-58744	61-24351	19–19.5	Qbt 4	—	—	—	—	—	0.047	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	230	—	—	—	—	9.5	—
RE61-05-58746	61-24352	17–17.5	Soil	—	—	6.9	—	—	—	—	1	3.9
RE61-05-58748	61-24353	17.6–18.1	Soil	—	—	—	—	—	0.047	—	—	—
RE61-05-58750	61-24354	17.2–17.7	Qbt 4	—	—	—	—	—	0.015(J)	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59119	61-24513	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59122	61-24514	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59123	61-24514	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dichlorobenzene[1,4-]	Dichloroethene[cis/trans 1,2-]	Ethylbenzene	Fluoranthene	Fluorene	Hexanone[2-]	Indeno[1,2,3-cd]pyrene	Isopropylbenzene	Isopropyltoluene[4-]
Industrial Soil Screening Level[a]				**103**	**300[h]**	**128[e]**	**24400**	**26500**	**48700[e,i]**	**23.4**	**389[e]**	**389[e,j]**
Construction Worker Soil Screening Level[a]				**1960**	**254[h]**	**128[e]**	**8730**	**10200**	**48700[e,i]**	**212**	**389[e]**	**389[e,j]**
Residential Soil Screening Level[a]				**39.5**	**76.5[h]**	**128[e]**	**2290**	**2660**	**31800[i]**	**6.21**	**271**	**271[j]**
RE61-05-59126	61-24515	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59127	61-24515	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	—	—	—	—
RE61-06-71531	61-26620	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	—	—	—	—	0.0371(J)	—	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	51.5	—	—	—	—	—	—
RE61-06-71536	61-26622	23–25	Qbt 4	—	—	47.8	—	—	—	—	10.9	—
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73168	61-26987	13–15	Qbt 4	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methyl-2-pentanone[4-]	Methylene chloride	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Propylbenzene[1-]	Pyrene	Styrene	Tetrachloroethene
Industrial Soil Screening Level[a]				**7010[e]**	**490**	**300[k]**	**300**	**20500**	**62.1[e]**	**30900**	**100[e]**	**31.6**
Construction Worker Soil Screening Level[a]				**7010[e]**	**2630[e]**	**262[k]**	**262**	**6990**	**62.1[e]**	**9010**	**100[e]**	**134[e]**
Residential Soil Screening Level[a]				**5510**	**182**	**79.2[k]**	**79.2**	**1830**	**62.1[e]**	**2290**	**100[e]**	**12.5**
RE61-05-58614	61-24310	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58615	61-24310	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58616	61-24311	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58618	61-24312	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58717	61-24312	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58718	61-24312	5.0–5.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58711	61-24313	4.0–4.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58623	61-24314	3.0–3.5	Soil	—	—	—	—	—	—	—	—	0.001(J)
RE61-05-58624	61-24315	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58626	61-24316	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58714	61-24316	5.0–5.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	—	—	—	—	0.36(J-)	—	0.39(J-)	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58632	61-24319	0.0–0.5	Soil	—	—	—	—	0.15(J-)	—	0.21(J-)	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methyl-2-pentanone[4-]	Methylene chloride	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Propylbenzene[1-]	Pyrene	Styrene	Tetrachloroethene
Industrial Soil Screening Level[a]				**7010[e]**	**490**	**300[k]**	**300**	**20500**	**62.1[e]**	**30900**	**100[e]**	**31.6**
Construction Worker Soil Screening Level[a]				**7010[e]**	**2630[e]**	**262[k]**	**262**	**6990**	**62.1[e]**	**9010**	**100[e]**	**134[e]**
Residential Soil Screening Level[a]				**5510**	**182**	**79.2[k]**	**79.2**	**1830**	**62.1[e]**	**2290**	**100[e]**	**12.5**
RE61-05-58633	61-24319	1.5–2.0	Soil	—	—	—	—	0.13(J-)	—	0.16(J-)	—	—
RE61-05-58634	61-24320	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58635	61-24320	1.5–2.0	Soil	—	—	—	—	—	—	0.092(J-)	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	—	—	—	—	1.4	—	1.3	—	—
RE61-05-58722	61-24320	5.5–6.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58636	61-24321	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58637	61-24321	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58725	61-24321	2.5–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58638	61-24322	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58639	61-24322	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58727	61-24322	2.5–3.5	Soil	—	—	—	—	—	—	0.092(J)	—	—
RE61-05-58640	61-24323	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58641	61-24323	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58642	61-24324	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	—	—	—	—	—	—	—	—	0.00082(J)
RE61-05-58644	61-24325	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methyl-2-pentanone[4-]	Methylene chloride	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Propylbenzene[1-]	Pyrene	Styrene	Tetrachloroethene
Industrial Soil Screening Level[a]				**7010[e]**	**490**	**300[k]**	**300**	**20500**	**62.1[e]**	**30900**	**100[e]**	**31.6**
Construction Worker Soil Screening Level[a]				**7010[e]**	**2630[e]**	**262[k]**	**262**	**6990**	**62.1[e]**	**9010**	**100[e]**	**134[e]**
Residential Soil Screening Level[a]				**5510**	**182**	**79.2[k]**	**79.2**	**1830**	**62.1[e]**	**2290**	**100[e]**	**12.5**
RE61-05-58648	61-24327	0.0–0.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58649	61-24327	1.0–1.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58730	61-24327	1.5–2.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58650	61-24328	0.0–0.5	Fill	—	—	—	—	—	—	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58656	61-24331	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58657	61-24331	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58660	61-24333	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58661	61-24333	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58665	61-24333	2.5–3.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58662	61-24334	0.0–0.5	Soil	—	—	—	—	—	—	0.12(J-)	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methyl-2-pentanone[4-]	Methylene chloride	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Propylbenzene[1-]	Pyrene	Styrene	Tetrachloroethene
Industrial Soil Screening Level[a]				**7010[e]**	**490**	**300[k]**	**300**	**20500**	**62.1[e]**	**30900**	**100[e]**	**31.6**
Construction Worker Soil Screening Level[a]				**7010[e]**	**2630[e]**	**262[k]**	**262**	**6990**	**62.1[e]**	**9010**	**100[e]**	**134[e]**
Residential Soil Screening Level[a]				**5510**	**182**	**79.2[k]**	**79.2**	**1830**	**62.1[e]**	**2290**	**100[e]**	**12.5**
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58734	61-24346	4.5–5.0	Soil	—	—	2	1.5	—	0.85(J)	—	0.13(J)	—
RE61-05-58733	61-24346	5.5–6.0	Soil	—	—	3.8	2.8	—	3.5	—		—
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	—	—	—	—	—	0.11(J)	—
RE61-05-58736	61-24347	5.5–6.0	Soil	—	—	10	5.8	—	—	—	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	—	—	—	—	—	—	—	0.0029(J)
RE61-05-58744	61-24351	19–19.5	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	—	—	230	1300	—	53	—	—	—
RE61-05-58746	61-24352	17–17.5	Soil	—	3.6	5.9	4.8	—	4.2	—	—	—
RE61-05-58748	61-24353	17.6–18.1	Soil	—	—	—	—	—	—	—	—	—
RE61-05-58750	61-24354	17.2–17.7	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59119	61-24513	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59122	61-24514	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59123	61-24514	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59126	61-24515	0.0–0.5	Soil	—	—	—	—	—	—	—	—	—
RE61-05-59127	61-24515	1.5–2.0	Soil	—	—	—	—	—	—	—	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Methyl-2-pentanone[4-]	Methylene chloride	Methylnaphthalene[2-]	Naphthalene	Phenanthrene	Propylbenzene[1-]	Pyrene	Styrene	Tetrachloroethene
Industrial Soil Screening Level[a]				**7010[e]**	**490**	**300[k]**	**300**	**20500**	**62.1[e]**	**30900**	**100[e]**	**31.6**
Construction Worker Soil Screening Level[a]				**7010[e]**	**2630[e]**	**262[k]**	**262**	**6990**	**62.1[e]**	**9010**	**100[e]**	**134[e]**
Residential Soil Screening Level[a]				**5510**	**182**	**79.2[k]**	**79.2**	**1830**	**62.1[e]**	**2290**	**100[e]**	**12.5**
RE61-06-71531	61-26620	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	0.0108	—	—	—	—	—	—	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	0.00229(J)	—	—	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	—	—	82.1	66.4	—	58.4	—	—	—
RE61-06-71536	61-26622	23–25	Qbt 4	—	—	78.9	71.2	—	52.9	—	—	—
RE61-06-71537	61-26623	38–40	Qbt 4	—	—	0.0184(J)	0.0179(J)	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	—	0.00751(J)	—	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	—	—	—	—	—	0.000274(J)	—	—	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	—	—	—	—	—	—	—
RE61-06-73168	61-26987	13–15	Qbt 4	—	0.0067	—	—	—	—	0.0129	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Toluene	Total Petroleum Hydrocarbons Diesel Range Organics	Total Petroleum Hydrocarbons Gasoline Range Organics	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (Total)	Xylene[1,2-]	Xylene[1,3+1,4]
Industrial Soil Screening Level[a]				**252[e]**	**200[l]**	**na[m]**	**213**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Construction Worker Soil Screening Level[a]				**252[e]**	**na**	**na**	**190**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Residential Soil Screening Level[a]				**252[e]**	**200[l]**	**na**	**58**	**24.8**	**82[e]**	**99.5[e]**	**82[n]**
RE61-05-58614	61-24310	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58615	61-24310	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58616	61-24311	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58618	61-24312	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58717	61-24312	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58718	61-24312	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58711	61-24313	4.0–4.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58622	61-24314	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58623	61-24314	3.0–3.5	Soil	0.0012(J)	—	—	—	—	—	—	—
RE61-05-58624	61-24315	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58715	61-24315	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58716	61-24315	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58626	61-24316	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58713	61-24316	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58714	61-24316	5.0–5.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58712	61-24317	4.0–4.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58630	61-24318	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58631	61-24318	1.5–2.0	Soil	0.00088(J)	—	—	—	—	—	—	—
RE61-05-58632	61-24319	0.0–0.5	Soil	0.0014(J)	—	—	—	—	—	—	—
RE61-05-58633	61-24319	1.5–2.0	Soil	—	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Toluene	Total Petroleum Hydrocarbons Diesel Range Organics	Total Petroleum Hydrocarbons Gasoline Range Organics	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (Total)	Xylene[1,2-]	Xylene[1,3+1,4]
Industrial Soil Screening Level[a]				**252[e]**	**200[l]**	**na[m]**	**213**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Construction Worker Soil Screening Level[a]				**252[e]**	**na**	**na**	**190**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Residential Soil Screening Level[a]				**252[e]**	**200[l]**	**na**	**58**	**24.8**	**82[e]**	**99.5[e]**	**82[n]**
RE61-05-58634	61-24320	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58635	61-24320	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58724	61-24320	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58722	61-24320	5.5–6.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58636	61-24321	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58637	61-24321	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58725	61-24321	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58638	61-24322	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58639	61-24322	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58727	61-24322	2.5–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58640	61-24323	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58641	61-24323	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58642	61-24324	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58643	61-24324	1.5–2.0	Soil	0.00074(J)	—	—	—	—	—	—	—
RE61-05-58644	61-24325	0.0–0.5	Soil	0.0014(J)	—	—	—	—	—	—	—
RE61-05-58645	61-24325	1.5–2.0	Qbt 4	0.00069(J)	—	—	—	—	—	—	—
RE61-05-58646	61-24326	0.0–0.5	Qbt 4	0.00075(J)	—	—	—	—	—	—	—
RE61-05-58647	61-24326	1.0–1.5	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58648	61-24327	0.0–0.5	Fill	0.00093(J)	—	—	—	—	—	—	—
RE61-05-58649	61-24327	1.0–1.5	Fill	0.00069(J)	—	—	—	—	—	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Toluene	Total Petroleum Hydrocarbons Diesel Range Organics	Total Petroleum Hydrocarbons Gasoline Range Organics	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (Total)	Xylene[1,2-]	Xylene[1,3+1,4]
Industrial Soil Screening Level[a]				**252[e]**	**200[l]**	**na[m]**	**213**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Construction Worker Soil Screening Level[a]				**252[e]**	**na**	**na**	**190**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Residential Soil Screening Level[a]				**252[e]**	**200[l]**	**na**	**58**	**24.8**	**82[e]**	**99.5[e]**	**82[n]**
RE61-05-58730	61-24327	1.5–2.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58650	61-24328	0.0–0.5	Fill	0.001(J)	—	—	—	—	—	—	—
RE61-05-58651	61-24328	1.5–2.0	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58652	61-24329	0.0–0.5	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-58653	61-24329	1.5–2.0	Qbt 4	0.00072(J)	—	—	—	—	—	—	—
RE61-05-58654	61-24330	0.0–0.5	Qbt 4	0.00098(J)	—	—	—	—	—	—	—
RE61-05-58655	61-24330	1.5–2.0	Qbt 4	0.001(J)	—	—	—	—	—	—	—
RE61-05-58656	61-24331	0.0–0.5	Soil	0.00073(J)	—	—	—	—	—	—	—
RE61-05-58657	61-24331	1.5–2.0	Soil	0.00073(J)	—	—	—	—	—	—	—
RE61-05-58658	61-24332	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58659	61-24332	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58664	61-24332	2.5–3.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58660	61-24333	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58661	61-24333	1.5–2.0	Soil	0.0051(J)	—	—	—	—	—	—	—
RE61-05-58665	61-24333	2.5–3.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58662	61-24334	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58663	61-24334	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-58666	61-24334	3.0–3.5	Soil	—	—	—	—	—	—	—	—
RE61-05-58734	61-24346	4.5–5.0	Soil	1.7(J)	67	1400(J+)	9.5	3.1	11	—	—
RE61-05-58733	61-24346	5.5–6.0	Soil	0.56	130	1400(J+)	42	8.9	22	—	—

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Toluene	Total Petroleum Hydrocarbons Diesel Range Organics	Total Petroleum Hydrocarbons Gasoline Range Organics	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (Total)	Xylene[1,2-]	Xylene[1,3+1,4]
Industrial Soil Screening Level[a]				**252[e]**	**200[l]**	**na[m]**	**213**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Construction Worker Soil Screening Level[a]				**252[e]**	**na**	**na**	**190**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Residential Soil Screening Level[a]				**252[e]**	**200[l]**	**na**	**58**	**24.8**	**82[e]**	**99.5[e]**	**82[n]**
RE61-05-58735	61-24347	4.5–5.0	Soil	—	—	120	3.2	1.3(J)	0.39(J)	—	—
RE61-05-58736	61-24347	5.5–6.0	Soil	2.5	220	1100(J+)	33	11	29	—	—
RE61-05-58743	61-24351	12–12.5	Soil	—	—	0.46	0.0019(J)	—	—	—	—
RE61-05-58744	61-24351	19–19.5	Qbt 4	—	—	1.4	—	—	—	—	—
RE61-05-58745	61-24352	10–10.5	Soil	380	8500	16000	610	210	870	—	—
RE61-05-58746	61-24352	17–17.5	Soil	4	1100	2400	54	29	68	—	—
RE61-05-58748	61-24353	17.6–18.1	Soil	—	—	0.36	—	—	—	—	—
RE61-05-58750	61-24354	17.2–17.7	Qbt 4	—	—	—	—	—	—	—	—
RE61-05-59118	61-24513	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-59119	61-24513	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-59122	61-24514	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-59123	61-24514	1.5–2.0	Soil	—	—	—	—	—	—	—	—
RE61-05-59126	61-24515	0.0–0.5	Soil	—	—	—	—	—	—	—	—
RE61-05-59127	61-24515	1.5–2.0	Soil	—	—	—	0.0003(J)	—	—	—	—
RE61-06-71529	61-26619	23–25	Qbt 4	—	4.24	0.133	—	—	—	—	—
RE61-06-71532	61-26620	5.0–7.0	Soil	—	3.43	—	—	—	—	—	—
RE61-06-71531	61-26620	23–25	Qbt 4	—	7.5	0.035(J)	—	—	—	—	—
RE61-06-71534	61-26621	28–30	Qbt 4	—	79.8	0.221	—	—	—	—	—
RE61-06-71533	61-26621	93–95	Qbt 4	—	—	0.0901(J)	—	—	—	—	—
RE61-06-71535	61-26622	15–17	Qbt 4	21.7	2990	6560	559	212	—	133	276

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Toluene	Total Petroleum Hydrocarbons Diesel Range Organics	Total Petroleum Hydrocarbons Gasoline Range Organics	Trimethylbenzene[1,2,4-]	Trimethylbenzene[1,3,5-]	Xylene (Total)	Xylene[1,2-]	Xylene[1,3+1,4]
Industrial Soil Screening Level[a]				**252[e]**	**200[l]**	**na[m]**	**213**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Construction Worker Soil Screening Level[a]				**252[e]**	**na**	**na**	**190**	**69.2[e]**	**82[e]**	**99.5[e]**	**82[n]**
Residential Soil Screening Level[a]				**252[e]**	**200[l]**	**na**	**58**	**24.8**	**82[e]**	**99.5[e]**	**82[n]**
RE61-06-71536	61-26622	23–25	Qbt 4	21.8	3730	6210	518	191	—	116	251
RE61-06-71537	61-26623	38–40	Qbt 4	—	3.45	0.129	—	—	—	—	—
RE61-06-71538	61-26623	53–55	Qbt 4	—	1.97	0.0715(J)	—	—	—	—	—
RE61-06-73161	61-26985	15–17	Qbt 4	—	—	0.0474(J)	—	0.000749(J)	—	0.00242	—
RE61-06-73162	61-26985	23–25	Qbt 4	—	—	0.0558(J)	—	—	—	—	—
RE61-06-73164	61-26986	23–25	Qbt 4	—	—	0.117(J)	—	—	—	—	—
RE61-06-73168	61-26987	13–15	Qbt 4	—	1.07(J)	—	—	—	—	—	—

Note: All units are mg/kg.

[a] SSLs obtained from NMED (2006, 092513), unless noted otherwise.

[b] — = Not detected or not analyzed for.

[c] Pyrene used as a surrogate based on structural similarity.

[d] Screening values from EPA Region 6 (2006, 094321).

[e] SSLs are soil saturation concentrations from NMED (2006, 092513).

[f] SSLs obtained from EPA Region 9 at http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf.

[g] Construction worker SSL calculated using EPA Region 9 RfD_o and RfD_i of 0.04 mg/kg-d (http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf).

[h] SSL is for dichloroethene[cis 1,2-] from NMED (2006, 092513), which is the lower of the two SSLs for cis and trans.

[i] Butanone[2-] used as a surrogate based on structural similarity.

[j] Isopropylbenzene used as a surrogate based on structural similarity.

[k] Naphthalene used as a surrogate based on structural similarity.

[l] Screening guideline is for TPH for unknown oil from NMED (2006, 094614).

[m] na = Not available.

[n] SSL for 1,3+1,4-xylene is the soil saturation concentration for xylenes from NMED (2006, 092513).

Table 4.1-3
Summary of COPCs at SWMU 61-002

COPCs	Scenario	Rationale
Inorganic Chemicals		
Aluminum	Construction worker and residential	Detected above background in subsurface samples.
Antimony	Industrial, construction worker, residential	Detection limits above Qbt 4 BV in surface and subsurface samples.
Arsenic	Construction worker	Detected above background in subsurface samples below 12 ft.
Barium	Construction worker and residential	Detected above background in subsurface samples.
Cadmium	na[a]	Above background below depths for the exposure scenarios
Cobalt	Construction worker and residential	Detected above background in subsurface samples.
Copper	Industrial, construction worker, residential	Detected above background in surface and subsurface samples.
Lead	Industrial, construction worker, residential	Detected above background in surface and subsurface samples.
Mercury	Industrial, construction worker, residential	Detected above background in a surface sample and subsurface samples.
Nickel	na	Above background below depths for the exposure scenarios
Selenium	Industrial, construction worker, residential	Detected above background in subsurface samples and detection limits above background in surface samples.
Zinc	Industrial, construction worker, residential	Detected above background in surface and subsurface samples.
Organic Chemicals		
Acenaphthene	Construction worker and residential	Detected in a subsurface sample.
Acetone	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Anthracene	Construction worker and residential	Detected in a subsurface sample.
Aroclor-1254	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Aroclor-1260	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Benzene	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Benzo(a)anthracene	Industrial, construction worker, residential	Detected in surface samples and a subsurface sample.
Benzo(a)pyrene	Industrial, construction worker, residential	Detected in surface samples and a subsurface sample.
Benzo(b)fluoranthene	Industrial, construction worker, residential	Detected in surface samples and a subsurface sample.
Benzo(g,h,i)perylene	Construction worker and residential	Detected in a subsurface sample.
Benzo(k)fluoranthene	Industrial, construction worker, residential	Detected in surface samples and a subsurface sample.

Table 4.1-3 (continued)

COPCs	Scenario	Rationale
Benzoic acid	Industrial, construction worker, residential	Detected in surface samples and a subsurface sample.
Bis(2-ethylhexyl)phthalate	Industrial, construction worker, residential	Detected in a surface sample and a subsurface sample.
Butanone[2-]	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Butylbenzene[n-]	Construction worker and residential	Detected in a subsurface sample.
Butylbenzene[sec-]	Construction worker	Detected in subsurface samples below 12 ft.
Butylbenzylphthalate	Industrial, construction worker, residential	Detected in surface samples.
Chlorobenzene	Industrial, construction worker, residential	Detected in a surface sample and subsurface samples.
Chloroethane	Construction worker and residential	Detected in a subsurface sample.
Chloromethane	Construction worker and residential	Detected in subsurface samples.
Chrysene	Industrial, construction worker, residential	Detected in surface samples and a subsurface sample.
Dibromo-3-chloropropane[1,2-]	Construction worker and residential	Detected in a subsurface sample.
Dibromoethane[1,2-]	Construction worker	Detected in a subsurface sample below 12 ft.
Dichlorobenzene[1,2-]	Industrial, construction worker, residential	Detected in a surface sample and subsurface samples.
Dichlorobenzene[1,4-]	Construction worker and residential	Detected in a subsurface sample.
Dichloroethene[cis/trans 1,2-]	Industrial, construction worker, residential	Detected in a surface sample and subsurface samples.
Di-n-octyl phthalate	Industrial, construction worker, residential	Detected in a surface sample.
Ethylbenzene	Construction worker and residential	Detected in subsurface samples.
Fluoranthene	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Fluorene	Construction worker and residential	Detected in a subsurface sample.
Hexanone[2-]	Construction worker	Detected in subsurface samples below 12 ft.
Indeno(1,2,3-cd)pyrene	Industrial, construction worker, residential	Detected in a surface and a subsurface sample.
Isopropylbenzene	Construction worker and residential	Detected in subsurface samples.
Isopropyltoluene[4-]	Construction worker and residential	Detected in subsurface samples.
Methyl-2-pentanone[4-]	na	Detected in a subsurface sample below exposure depths.
Methylene chloride	Construction worker	Detected in subsurface samples below 12 ft.
Methylnaphthalene[2-]	Construction worker and residential	Detected in subsurface samples.
Naphthalene	Construction worker and residential	Detected in subsurface samples.

Table 4.1-3 (continued)

COPCs	Scenario	Rationale
Phenanthrene	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Propylbenzene[1-]	Construction worker and residential	Detected in subsurface samples.
Pyrene	Industrial, construction worker, residential	Detected in surface and subsurface samples.
Styrene	Construction worker and residential	Detected in subsurface samples.
Tetrachloroethene	Construction worker and residential	Detected in subsurface samples.
Toluene	Industrial, construction worker, residential	Detected in surface and subsurface samples.
TPH-DRO	Industrial and residential	Detected in subsurface samples.
TPH-GRO	Industrial and residential	Detected in subsurface samples.
Trimethylbenzene[1,2,4-]	Construction worker and residential	Detected in subsurface samples.
Trimethylbenzene[1,3,5-]	Construction worker and residential	Detected in subsurface samples.
Xylene[1,2-][b]	Construction worker and residential	Detected in subsurface samples.
Xylenes[1,3+1,4-][b]	Construction worker and residential	Detected in subsurface samples.
Xylene(Total)[b]	Construction worker and residential	Detected in subsurface samples.

[a] na = Not applicable.

[b] Xylenes exposure point concentration includes concentrations for xylenes (total), xylene(1,2-) and xylene(1,3- and 1,4-) from 0.0–12.0 ft bgs.

Appendix A

Acronyms and Abbreviations, Glossary,
and Metric Conversion and Data Qualifier Definition Tables

A-1.0 ACRONYMS AND ABBREVIATIONS

ACA	accelerated corrective action
AOC	area of concern
ATSDR	Agency for Toxic Substances and Disease Registry
AUF	area use factor
bgs	below ground surface
BMP	best management practice
BTEX	benzene, toluene, ethylbenzene, and xylenes
BV	background value
CD	compact disc
CFR	Code of Federal Regulations (U.S.)
CME	Central Mine Equipment
COC	chain of custody
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
COPEC	chemicals of potential ecological concern
C_{sat}	soil saturation limit
CSF_i	cancer slope factor-inhalation
CSF_o	cancer slope factor-oral
CWDR	chemical waste disposal request
DAF_{sat}	saturated zone dilution attenuation factor
DAF_{unsat}	unsaturated zone dilution attenuation factor
DOE	Department of Energy (U.S.)
DOT	Department of Transportation (U.S.)
DRO	diesel range organic
EDB	dibromoethane[1,2-]
EDC	dichloroethane[1,2-]
Eh	oxidation-reduction potential
EP	Environmental Programs (a LANL directorate)
EPA	Environmental Protection Agency (U.S.)
EPC	exposure point concentration
EQL	estimated quantitation limit
ER	environmental restoration

ERDB	Environmental Restoration Database
ER ID	environmental restoration identifier
ERSS	Environment and Remediation Support Services (an EP Directorate division)
ESL	ecological screening level
EX-ID	excavation permit
FME	Facility Management and Engineering
GRO	gasoline range organic
ha	hectare
HE	high explosive(s)
HI	hazard index
HQ	hazard quotient
HR	home range
HSR-1	Health, Safety, and Radiation Protection (a LANL group)
ID	identification
IDL	instrument detection limit
IDW	investigation derived waste
IFCS	Institutional Facilities and Central Services
K_d	soil-water partition coefficient
K_{oc}	octanol-carbon adsorption coefficient
K_{ow}	octanol-water partition coefficient
LAL	lower acceptance limit
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC (current LANL manager)
LASO	Los Alamos Site Office (DOE)
LCS	laboratory control sample
MDL	method detection limit
mm Hg	millimeter of mercury
MRF	Materials Recycling Facility
MTBE	methyl tertiary butyl ether
NAPL	nonaqueous phase liquid
NDA	no detectable activity
NFA	no further action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department

NOAEL	no-observed-adverse-effect level
NOD	notice of deficiency
%D	percent difference
%R	percent recovery
%RSD	percent relative standard deviation
PAH	polycyclic aromatic hydrocarbon
PAH	polynuclear aromatic hydrocarbon
PAUF	population area use factor
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment
PR-ID	permits and requirements identification
PVC	polyvinyl chloride
QA	quality assurance
Qbt	Quaternary Tshirege Member of Bandelier Tuff
QC	quality control
QMP	quality management plan
QP	quality procedure
PSTB	Petroleum Storage Tank Bureau
RBDM	risk-based decision making
RBSL	risk-based screening level
RCRA	Resource Conservation and Recovery Act
RDX	hexahydro-1,3,5-trinitro-1,3,5 triazine
RfD	reference dose
RfDi	inhalation reference dose
RfDo	oral reference dose
RFI	RCRA facility investigation
RP-1	Health, Safety, and Radiation Protection (a LANL group)
RPD	relative percent difference
RPF	Records Processing Facility (an EP Directorate archive)
RSD	risk-specific dose
SCL	sample collection log
SF	slope factor
SMO	Sample Management Office

SOP	standard operating procedure
SSL	soil screening level
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
T&E	threatened and endangered
TAL	Target Analyte List
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
UAL	upper acceptance limit
UCL	upper confidence limit
UTL	upper tolerance limit
VCP	vitrified clay pipe
VOC	volatile organic compound
WQCC	Water Quality Control Commission

A-2.0 GLOSSARY

accelerated corrective action—A cleanup process used to implement presumptive remedies at small-scale and relatively simple sites where groundwater contamination is not a component of the accelerated cleanup, where the remedy is considered to be the final remedy for the site, and where the fieldwork will be accomplished within 180 days of the start of field activities. Accelerated corrective actions may be implemented before the approval of the accelerated corrective action work plan by the New Mexico Environment Department.

administrative authority—For Los Alamos National Laboratory, one or more regulatory agencies, such as the New Mexico Environment Department, the U.S. Environmental Protection Agency, or the U.S. Department of Energy, as appropriate.

aggregate—At the Los Alamos National Laboratory, an area within a *watershed* containing solid waste management units (SWMUs) and/or areas of concern (AOCs), and the media affected or potentially affected by releases from those SWMUs and/or AOCs. Aggregates are designated to promote efficient and effective corrective action activities.

analysis—A critical evaluation, usually made by breaking a subject (either material or intellectual) down into its constituent parts, then describing the parts and their relationship to the whole. Analyses may include physical analysis, chemical analysis, toxicological analysis, and knowledge-of-process determinations.

analyte—The element, nuclide, or ion a chemical analysis seeks to identify and/or quantify; the chemical constituent of interest.

area of concern—(1) A release that may warrant investigation or remediation and is not a solid waste management unit (SWMU). (2) An area at Los Alamos National Laboratory that may have had a release of a hazardous waste or a hazardous constituent but is not a SWMU.

area use factor—The ratio of an organism's home range, breeding range, or feeding/foraging range to the area of the site under investigation.

artificial fill—A material that has been imported and typically consists of disturbed *soils* mixed with crushed Bandelier Tuff or other rock types.

assessment—(1) The act of reviewing, inspecting, testing, checking, conducting surveillance, auditing, or otherwise determining and documenting whether items, processes, or services meet specified requirements. (2) An evaluation process used to measure the performance or effectiveness of a system and its elements. In this glossary, assessment is an all-inclusive term used to denote any one of the following: audit, performance evaluation, management system review, peer review, inspection, or surveillance.

assessment endpoint—In an ecological risk assessment, the expression of an environmental value to be protected (e.g., fish biomass or reproduction of avian populations).

background concentration—Naturally occurring concentrations of an inorganic chemical or radionuclide in soil, sediment, or tuff.

background data—Data that represent naturally occurring concentrations of inorganic and radionuclide constituents in a geologic medium. Los Alamos National Laboratory's (the Laboratory's) background data are derived from samples collected at locations that are either within, or adjacent to, the Laboratory. These locations (1) are representative of geological media found within Laboratory boundaries, and (2) have not been affected by Laboratory operations.

background level—(1) The concentration of a substance in an environmental medium (air, water, or soil) that occurs naturally or is not the result of human activities. (2) In exposure assessment, the concentration of a substance in a defined control area over a fixed period of time before, during, or after a data-gathering operation.

background radiation—The amount of radioactivity naturally present in the environment, including cosmic rays from space and natural radiation from soils and rock.

background value (BV)—A statistically derived concentration (i.e., the upper tolerance limit [UTL]) of a chemical used to represent the background data set. If a UTL cannot be derived, either the detection limit or maximum reported value in the background data set is used.

best management practices—Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

bias—The systematic deviation from a true value that remains constant over replicated measurements within the statistical precision of the measurement process.

blank—A sample that is expected to have a negligible or unmeasurable amount of an analyte. Results of blank sample analyses indicate whether field samples might have been contaminated during the sample collection, transport, storage, preparation, or analysis processes.

certificate of completion—A document to be issued by the New Mexico Environment Department (NMED) under the March 1, 2005, Compliance Order on Consent (Consent Order) once NMED determines that the requirements of the Consent Order have been satisfied for a particular solid waste management unit or area of concern.

certification—A signed statement required by permits, or certain enforcement documents (e.g., a compliance order), that is submitted with reports and other information requested by the administrative authority. Certification ensures that a document and all of its attachments were prepared under the direction or supervision of an authorized person in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Known violations of certification carry significant penalties.

chain of custody—An unbroken, documented trail of accountability that is designed to ensure the uncompromised physical integrity of samples, data, and records.

chemical—Any naturally occurring or human-made substance characterized by a definite molecular composition.

chemical analysis—A process used to measure one or more attributes of a sample in a clearly defined, controlled, and systematic manner. Chemical analysis often requires treating a sample chemically or physically before measurement.

chemical of potential concern (COPC)—A detected chemical compound or element that has the potential to adversely affect human receptors as a result of its concentration, distribution, and toxicity.

chemical of potential ecological concern—A detected chemical compound or element that has the potential to adversely affect ecological receptors as a result of its concentration, distribution, and toxicity.

cleanup—A series of actions taken to deal with the release, or threat of a release, of a hazardous substance that could affect humans and/or the environment. The term cleanup is sometimes used interchangeably with the terms remedial action, removal action, or corrective action.

cleanup levels—Media-specific contaminant concentration levels that must be met by a selected corrective action. Cleanup levels are established by using criteria such as the protection of human health and the environment; compliance with regulatory requirements; reduction of toxicity, mobility, or volume through treatment; long- and short-term effectiveness; implementability; and cost.

Compliance Order on Consent (Consent Order)—For the Environmental Remediation and Surveillance Program, an enforcement document signed by the New Mexico Environment Department, the U.S. Department of Energy, and the Regents of the University of California on March 1, 2005, which prescribes the requirements for corrective action at Los Alamos National Laboratory. The purposes of the Consent Order are (1) to define the nature and extent of releases of contaminants at, or from, the facility; (2) to identify and evaluate, where needed, alternatives for corrective measures to clean up contaminants in the environment and prevent or mitigate the migration of contaminants at, or from, the facility; and (3) to implement such corrective measures. The Consent Order supersedes the corrective action requirements previously specified in Module VIII of the Laboratory's Hazardous Waste Facility Permit.

Consent Order—See Compliance Order on Consent.

construction worker scenario—A land-use condition that evaluates exposures to a human receptor throughout a construction project. The activities typically involve substantial short-term on-site exposures.

contaminant—(1) Chemicals and radionuclides present in environmental media or on debris above background levels. (2) According to the March 1, 2005, Compliance Order on Consent (Consent Order), any hazardous waste listed or identified as characteristic in 40 Code of Federal Regulations (CFR) 261 (incorporated by 20.4.1.200 New Mexico Administrative Code [NMAC]); any hazardous constituent listed in 40 CFR 261 Appendix VIII (incorporated by 20.4.1.200 NMAC) or 40 CFR 264 Appendix IX (incorporated by 20.4.1.500 NMAC); any groundwater contaminant listed in the Water Quality Control Commission (WQCC) Regulations at 20.6.3.3103 NMAC; any toxic pollutant listed in the WQCC Regulations at 20.6.2.7 NMAC; explosive compounds; nitrate; and perchlorate. (Note: Under the Consent Order, the term "contaminant" does not include radionuclides or the radioactive portion of mixed waste.)

continuing calibration—A combination of calibration blank and check standards used to determine if an instrument's response to an analyte concentration is within acceptable bounds relative to its initial calibration. A continuing calibration is performed every 12 h of operation or every 10 injections, depending on the analytical test method, thus verifying the satisfactory performance of an instrument on a day-to-day basis. The continuing-calibration 12-h period assumes that the instrument has not been shut down since the initial calibration.

contract analytical laboratory—An analytical laboratory under contract to the University of California to analyze samples from work performed at Los Alamos National Laboratory.

corrective action—(1) In the Resource Conservation and Recovery Act, an action taken to rectify conditions potentially adverse to human health or the environment. (2) In the quality assurance field, the process of rectifying and preventing nonconformances.

data package—The hard copy deliverable for each sample delivery group produced by a contract analytical laboratory in accordance with the statement of work for analytical services.

data-quality assessment—The statistical and/or scientific evaluation of a data set that establishes whether the data set is adequate for its intended use.

data validation—A systematic process that applies a defined set of performance-based criteria to a body of data and that may result in the qualification of the data. The data-validation process is performed independently of the analytical laboratory that generates the data set and occurs before conclusions are drawn from the data. The process may include a standardized data review (routine data validation) and/or a problem-specific data review (focused data validation).

data verification—The process of evaluating the completeness, correctness, consistency, and compliance of a laboratory data package against a specified standard or contract.

- Completeness: All required information is present—in both hard copy and electronic forms.
- Correctness: The reported results are based on properly documented and correctly applied algorithms.
- Consistency: The values are the same when they appear in different reports or are transcribed from one report to another.
- Compliance: The data pass numerical quality-control tests based on parameters or limits specified in a contract or in an auxiliary document.

detect (detection)—An analytical result, as reported by an analytical laboratory, that denotes a chemical or radionuclide to be present in a sample at a given concentration.

detection limit—The minimum concentration that can be determined by a single measurement of an instrument. A detection limit implies a specified statistical confidence that the analytical concentration is greater than zero.

discharge—The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into, or on, any land or water.

disposal—The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into, or on, any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters.

duplicate analysis—An analysis performed on one member of a pair of identically prepared subsamples taken from the same sample.

ecological screening levels—Soil, sediment, or water concentrations that are used to screen for potential ecological effects. The concentrations are based on a chemical's no-observed-adverse-effect level for a receptor, below which no risk is indicated.

Environmental Restoration (ER) Project—A Los Alamos National Laboratory project established in 1989 as part of a U.S. Department of Energy nationwide program, and precursor of today's Environmental Remediation and Surveillance (ERS) Program. This program is designed (1) to investigate hazardous and/or radioactive materials that may be present in the environment as a result of past Laboratory operations, (2) to determine if the materials currently pose an unacceptable risk to human health or the environment, and (3) to remediate (clean up, stabilize, or restore) those sites where unacceptable risk is still present.

environmental samples—Air, soil, water, or other media samples that have been collected from streams, wells, and soils, or other locations, and that are not expected to exhibit properties classified as hazardous by the U.S. Department of Transportation.

equipment blank (rinsate blank)—A sample used to rinse sample-collection equipment and expected to have negligible or unmeasurable amounts of analytes. The equipment blank is collected after the equipment decontamination is completed but before the collection of another field sample.

ER data—Data derived from samples that have been collected and paid for through Environmental Remediation and Surveillance Program funding.

ER database (ERDB)—A database housing analytical and other programmatic information for the Environmental Remediation and Surveillance Program. The ERDB currently contains about 3 million analyses in 300 tables.

estimated detection limit—A reporting limit required by a Los Alamos National Laboratory statement of work for analytical services.

estimated quantitation limit (EQL)—The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine analytical-laboratory operating conditions. The low point on a calibration curve should reflect this quantitation limit. The EQL is not used to establish detection status. Sample EQLs are highly matrix dependent, and the specified EQLs might not always be achievable.

exposure pathway—Any path from the sources of contaminants to humans and other species or settings through air, soil, water, or food.

facility—All contiguous land (and structures, other appurtenances, and improvements on the land) used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units. For the purpose of implementing a corrective action, a facility is all the contiguous property that is under the control of the owner or operator seeking a permit under Subtitle C of the Resource Conservation and Recovery Act.

field blank (field reagent blank)—A blank sample prepared in the field or carried to the sampling site, exposed to sampling conditions (e.g., by removing bottle caps), and returned to a laboratory to be analyzed in the same manner in which environmental samples are being analyzed. Field blanks are used to identify the presence of any contamination that may have been added during the sampling and analysis process.

field duplicate (replicate) samples—Two separate, independent samples taken from the same source, which are collected as collocated samples (i.e., equally representative of a sample matrix at a given location and time).

field matrix spike—A known amount of a field sample to which a known amount of a target analyte has been added and used to compute the proportion of the added analyte that is recovered upon analysis.

field reagent blank—See field blank.

field sample—See sample.

grab sample—A specimen collected by a single application of a field sampling procedure to a target population (e.g., the surface soil from a single hole collected after the spade-and-scoop sampling procedure, or a single air filter left in the field for three months).

hazard index—The sum of hazard quotients for multiple contaminants to which a receptor may have been exposed.

hazardous constituent (hazardous waste constituent)—According to the March 1, 2005, Compliance Order of Consent (Consent Order), any constituent identified in Appendix VIII of Part 261, Title 40 Code of Federal Regulations (CFR) (incorporated by 20.4.1.200 New Mexico Administrative Code [NMAC]) or any constituent identified in 40 CFR 264, Appendix IX (incorporated by 20.4.1.500 NMAC).

hazardous waste—(1) Solid waste that is listed as a hazardous waste, or exhibits any of the characteristics of hazardous waste (i.e., ignitability, corrosivity, reactivity, or toxicity, as provided in 40 CFR, Subpart C). (2) According to the March 1, 2005, Compliance Order of Consent (Consent Order), any solid waste or combination of solid wastes that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, meets the description set forth in New Mexico Statutes Annotated 1978, § 74-4-3(K) and is listed as a hazardous waste or exhibits a hazardous waste characteristic under 40 CFR 261 (incorporated by 20.4.1.200 New Mexico Administrative Code).

Hazardous Waste Bureau—The New Mexico Environment Department bureau charged with providing regulatory oversight and technical guidance to New Mexico hazardous waste generators and to treatment, storage, and disposal facilities, as required by the New Mexico Hazardous Waste Act.

hazard quotient (HQ)—The ratio of the estimated site-specific exposure concentration of a single chemical from a site to the estimated daily exposure level at which no adverse health effects are likely to occur.

holding time—The maximum elapsed time a sample can be stored without unacceptable changes in analyte concentrations. Holding times apply under prescribed conditions, and deviations from these conditions may affect the holding times. Extraction holding time refers to the time lapsed between sample collection and sample preparation. Analytical holding time refers to the time lapsed between sample preparation and analysis.

industrial scenario—A land-use condition in which current Los Alamos National Laboratory operations or industrial/commercial operations within Los Alamos County are continued or planned. Any necessary remediation involves cleanup to standards designed to ensure a safe and healthy work environment for workers.

initial calibration—The process used to establish the relationship between instrument response and analyte concentration at several analyte concentration values in order to demonstrate that an instrument is capable of acceptable analytical performance.

institutional controls—Controls that prohibit or limit access to contaminated media. Institutional controls may include use restrictions, permitting requirements, standard operating procedures, laboratory implementation requirements, laboratory implementation guidance, and laboratory performance requirements.

instrument detection limit (IDL)—A measure of instrument sensitivity without any consideration for contributions to the signal from reagents. The IDL is calculated as follows: Three times the average of the standard deviations obtained on three nonconsecutive days from the analysis of a standard solution, with seven consecutive measurements of that solution per day. The standard solution must be prepared at a concentration of three to five times the instrument manufacturer's estimated IDL.

internal standards—Compounds added to a sample after the sample has been prepared for qualitative and quantitative instrument analysis. The compounds serve as a standard of retention time and response that is invariant from run to run.

investigation-derived waste—Solid waste or hazardous waste that was generated as a result of corrective action investigation or remediation field activities. Investigation-derived waste may include drilling muds, cuttings, and purge water from the installation of test pits or wells; purge water, soil, and other materials from the collection of samples; residues from the testing of treatment technologies and pump-and-treat systems; contaminated personal protective equipment; and solutions (aqueous or otherwise) used to decontaminate nondisposable protective clothing and equipment.

laboratory control sample (LCS)—A known matrix that has been spiked with compound(s) representative of target analytes. LCSs are used to document laboratory performance, and the acceptance criteria for LCSs are method-specific.

laboratory qualifier (laboratory flag)—Codes applied to data by a contract analytical laboratory to indicate, on a gross scale, a verifiable or potential data deficiency. These flags are applied according to the U.S. Environmental Protection Agency contract-laboratory program guidelines.

LANL (Los Alamos National Laboratory) data validation qualifiers—The Los Alamos National Laboratory data qualifiers which are defined by, and used, in the Environmental Remediation and Surveillance (ERS) Program validation process. The qualifiers describe the general usability (or quality) of data. For a complete list of data qualifiers applicable to any particular analytical suite, consult the appropriate ERS standard operating procedure.

LANL (Los Alamos National Laboratory) data validation reason codes—The Los Alamos National Laboratory designations applied to sample data by data validators who are independent of the contract laboratory that performed a given sample analysis. Reason codes provide an analysis-specific explanation for applying a qualifier, with some description of the qualifier's potential impact on data use. For a complete list of data qualifiers applicable to any particular analytical suite, consult the appropriate Environmental Remediation and Surveillance Program standard operating procedure.

log book—A notebook used to record tabulated data (e.g., the history of calibrations, sample tracking, numerical data, or other technical data).

Los Alamos unlimited release (LA-UR) number—A unique identification number required for all documents or presentations prepared for distribution outside Los Alamos National Laboratory (the Laboratory). LA-UR numbers are obtained by filling out a technical information release form (http://enterprise.lanl.gov/alpha.htm) and submitting the form together with 2 copies of the document to the Laboratory's Classification Group (S-7) for review.

lower acceptance limit (LAL)—The lowest limit that is acceptable according to quality control (QC) criteria for a specific QC sample and for a specific method. Any results lower than the LAL are qualified following the routine validation procedure.

matrix—Relatively fine material in which coarser fragments or crystals are embedded; also called "ground mass" in the case of igneous rocks.

matrix spike—An aliquot of a sample to which a known concentration of target analyte has been added. Matrix spike samples are used to measure the ability to recover prescribed analytes from a native sample matrix. The spiking typically occurs before sample preparation and analysis.

matrix spike duplicate—An intralaboratory duplicate sample to which a known amount of target analyte has been added. Spiking typically occurs before sample preparation and analysis.

medium (environmental)—Any material capable of absorbing or transporting constituents. Examples of media include tuffs, soils and sediments derived from these tuffs, surface water, soil water, groundwater, air, structural surfaces, and debris.

method blank—An analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing, and which is prepared and analyzed in the same manner as the corresponding environmental samples. The method blank is used to assess the potential for sample contamination during preparation and analysis.

method detection limit (MDL)—The minimum concentration of a substance that can be measured and reported with a known statistical confidence that the analyte concentration is greater than zero. After subjecting samples to the usual preparation, the MDL is determined by analyzing those samples of a given matrix type that contain the analyte. The MDL is used to establish detection status.

no further action—Under the Resource Conservation and Recovery Act, a corrective-action determination whereby, based on evidence or risk, no further investigation or remediation is warranted.

nondetect—A result that is less than the method detection limit.

notices of approval, of approval with modification, or of disapproval—Notices issued by the New Mexico Environment Department (NMED). Upon receipt of a work plan, schedule, report, or other deliverable document, NMED reviews the document and approves the document as submitted, modifies the document and approves it as modified, or disapproves the document. A notice of approval means that the document is approved as submitted. A notice of approval with modifications means that the document is approved but with modifications specified by NMED. A notice of disapproval means that the document is disapproved and it states the deficiencies and other reasons for disapproval.

outfall—A place where effluent is discharged into receiving waters.

percent recovery (%R)—The amount of material detected in a sample (less any amount already in the sample) divided by the amount added to the sample, expressed as a percentage.

population—(1) A group of interbreeding organisms occupying a particular space. (2) The number of humans or other living creatures in a designated area.

precision—The degree of mutual agreement among a series of individual measurements, values, or results.

quality assurance/quality control—A system of procedures, checks, audits, and corrective actions set up to ensure that all U.S. Environmental Protection Agency research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.

quality control—See quality assurance/quality control.

quality management plan (QMP)—A document providing a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance/quality control. A QMP is part of an organization's structured and documented management system that describes the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan for ensuring quality in work processes, products, and services.

quality procedure—A document that describes the process, method, and responsibilities for performing, controlling, and documenting any quality-affecting activity governed by a quality management plan.

radiation—A stream of particles or electromagnetic waves emitted by atoms and molecules of a radioactive substance as a result of nuclear decay. The particles or waves emitted can consist of neutrons, positrons, alpha particles, beta particles, or gamma radiation.

radionuclide—Radioactive particle (human-made or natural) with a distinct atomic weight number.

receptor—A person, other animal, plant, or geographical location that is exposed to a chemical or physical agent released to the environment by human activities**.**

record—Any book, paper, map, photograph, machine-readable material, or other documentary material, regardless of physical form or characteristics.

relative percent difference (RPD)—The measure used to assess the precision between parent results and their associated duplicate results. The RPD is calculated as follows:

$$|RPD| = \frac{S - R}{\left(\frac{S + R}{2}\right)100} \quad ,$$

where RPD = relative percent difference,
S = parent sample result, and
R = duplicate sample result.

The Environmental Remediation and Surveillance Program criteria for the RPD are less than 20% for aqueous samples and less than 35% for soil samples when the sample concentrations are greater than, or equal to, five times the method detection limit (MDL). For samples with concentrations less than five times the MDL, but greater than the MDL, the control is +/-MDL. No precision criterion applies to samples with concentrations less than the MDL.

release—Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of hazardous waste or hazardous constituents into the environment.

remediation—(1) The process of reducing the concentration of a contaminant (or contaminants) in air, water, or soil media to a level that poses an acceptable risk to human health and the environment. (2) The act of restoring a contaminated area to a usable condition based on specified standards.

request number—An identifying number assigned by the Environmental Remediation and Surveillance Program to a group of samples submitted for analysis.

residential scenario—The land use condition under which individuals may be exposed to contaminants as a result of living on or near contaminated sites.

Resource Conservation and Recovery Act—The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976 (Public Law [PL] 94-580, as amended by PL 95-609 and PL 96-482, United States Code 6901 et seq.).

rinsate blank—See equipment blank.

risk—A measure of the probability that damage to life, health, property, and/or the environment will occur as a result of a given hazard.

routine analysis—The analysis categories of inorganic compounds, organic compounds, metals, radiochemistry, and high explosives, as defined in a contract laboratory's statement of work.

routine data—Data generated using analytical methods that are identified as routine methods in the current Environmental Remediation and Surveillance Program statement of work for analytical services.

routine data validation—The process of reviewing analytical data relative to quantitative routine acceptance criteria. The objective of routine data validation is two-fold— to estimate the technical quality of the data relative to minimum national standards adopted by the Environmental Remediation and Surveillance Program, and to indicate to data users the technical data quality at a gross level by assigning laboratory qualifiers to environmental data whose quality indicators do not meet acceptance criteria.

sample—A portion of a material (e.g., rock, soil, water, or air), which, alone or in combination with other portions, is expected to be representative of the material or area from which it is taken. Samples are typically either sent to a laboratory for analysis or inspection or are analyzed in the field. When referring to samples of environmental media, the term field sample may be used.

sample matrix—In chemical analysis, that portion of a sample that is exclusive of the analytes of interest. Together, the matrix and the analytes of interest form the sample.

screening risk assessment—A risk assessment that is performed with few data and many assumptions in order to identify exposures that should be evaluated more carefully for potential risk.

serial dilution sample—A requirement of the U.S. Environmental Protection Agency (EPA) Method 6010B (Inductively Coupled Plasma-Atomic Emission Spectroscopy). Serial dilutions are made by performing a series of dilutions on an aliquot taken from a stock solution for a target analyte. The first dilution of the original stock solution serves as the stock solution for the second dilution, and the second dilution serves as the stock solution for the third dilution, and so on. To meet the requirement of EPA Method 6010B, one serial dilution analysis must be performed for each matrix in every sample batch, with a minimum of 1 serial dilution sample per 20 samples.

site characterization—Defining the pathways and methods of migration of hazardous waste or constituents, including the media affected; the extent, direction and speed of the contaminants; complicating factors influencing movement; or concentration profiles.

soil—(1) A material that overlies bedrock and has been subject to soil-forming processes. (2) A sample media group that includes naturally occurring and artificial fill materials.

soil screening level (SSL)—The concentration of a chemical (inorganic or organic) below which no potential for unacceptable risk to human health exists. The derivation of an SSL is based on conservative exposure and land-use assumptions, and on target levels of either a hazard quotient of 1.0 for a noncarcinogenic chemical or a cancer risk of 10^{-5} for a carcinogenic chemical.

solid waste—Any garbage, refuse, or sludge from a waste treatment plant, water-supply treatment plant, or air-pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. Solid waste does not include solid or dissolved materials in domestic sewage; solid or dissolved materials in irrigation return flows; industrial discharges that are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended; or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended.

solid waste management unit (SWMU)—(1) Any discernible site at which solid wastes have been placed at any time, whether or not the site use was intended to be the management of solid or hazardous waste. SWMUs include any site at a facility at which solid wastes have been routinely and systematically released. This definition includes regulated sites (i.e., landfills, surface impoundments, waste piles, and land treatment sites), but does not include passive leakage or one-time spills from production areas and sites in which wastes have not been managed (e.g., product storage areas). (2) According to the March 1, 2005, Compliance Order on Consent (Consent Order), any discernible site at which solid waste has been placed at any time, and from which the New Mexico Environment Department determines there may be a risk of a release of hazardous waste or hazardous waste constituents (hazardous constituents), whether or not the site use was intended to be the management of solid or hazardous waste. Such sites include any area in Los Alamos National Laboratory at which solid wastes have been routinely and systematically released; they do not include one-time spills.

standard operating procedure—A document that details the officially approved method(s) for an operation, analysis, or action, with thoroughly prescribed techniques and steps.

surface sample—A sample taken at a collection depth that is (or was) representative of the medium's surface during the period of investigative interest. A typical depth interval for a surface sample is 0 to 6 in. for mesa-top locations, but may be up to several feet in sediment-deposition areas within canyons.

surrogate (surrogate compound)—An organic compound used in the analyses of organic target analytes that is similar in composition and behavior to the target analytes but is not normally found in field samples. Surrogates are added to every blank and spike sample to evaluate the efficiency with which analytes are being recovered during extraction and analysis.

target analyte—A chemical or parameter, the concentration, mass, or magnitude of which is designed to be quantified by a particular test method.

technical area (TA)—At Los Alamos National Laboratory, an administrative unit of operational organization (e.g., TA-21).

technical notebook—A record of the methodology, observations, and results of technical activity investigations.

trip blank—A sample of analyte-free medium taken from a sampling site and returned to an analytical laboratory unopened, along with samples taken in the field; used to monitor cross contamination of samples during handling and storage both in the field and in the analytical laboratory.

tuff—Consolidated volcanic ash, composed largely of fragments produced by volcanic eruptions.

upper acceptance limit (UAL)—The highest limit that is acceptable, based on the quality control (QC) criteria for a specific QC sample for a specific method. Any results greater than the UAL are qualified.

upper confidence limit—The statistic that represents the upper bound of the arithmetic mean (usually 95%) of the measured data and that is used in a risk assessment as the reasonable maximum exposure point concentration.

upper tolerance limit—A statistical measure of the upper end of a distribution. The 95th percentile upper tolerance limit, which is the 95% upper percentile of the 95th percentile of the data distribution, is the background value used to represent the background data distribution for an inorganic chemical or naturally occurring radionuclide.

U.S. Department of Energy—The federal agency that sponsors energy research and regulates nuclear materials for weapons production.

U.S. Environmental Protection Agency (EPA)—The federal agency responsible for enforcing environmental laws. Although state regulatory agencies may be authorized to administer some of this responsibility, EPA retains oversight authority to ensure the protection of human health and the environment.

work plan—A document that specifies the activities to be performed when implementing an investigation or remedy. At a minimum, the work plan should identify the scope of the work to be performed, specify the procedures to be used to perform the work, and present a schedule for performing the work. The work plan may also present the technical basis for performing the work.

A-3.0 METRIC CONVERSION TABLE

Multiply SI (Metric) Unit	by	To Obtain US Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

A-4.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
R	The data are rejected as a result of major problems with quality assurance/quality control (QA/QC) parameters.
U	The analyte was analyzed for but not detected.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.

Appendix B

Site Photographs

2005 ACA PHOTOGRAPHS

Figure B-1 Preexisting site conditions at SWMU 61-002 (view looking east)

Figure B-2 Preexisting site conditions at SWMU 61-002 (view looking south along fenced property line with Los Alamos County Landfill). Former Building 61-23 was just to the right out of view.

Figure B-3 Sampling using hand auger at SWMU 61-002 (location 61-24310; view looking north and West Jemez Road)

Figure B-4 Sampling using hand auger at SWMU 61-002 location 61-24310 (view looking south toward Los Alamos County Landfill)

Figure B-5 Potholing before excavation at SWMU 61-002. Pothole dug for locating buried electrical cable near the northern fence line.

Figure B-6 Potholing before excavation at SWMU 61-002. Pothole dug to find water line shown on excavation permit map near northeast corner of property. No water line was found after hand digging to 6 ft bgs.

Figure B-7 Excavation activities at SMMU 61-002 started from northeastern corner of site, as shown in this photograph, and continued eastward in a 20-ft swath along the northern fence line.

Figure B-8 Excavated area at SWMU 61-002 near access gate (view looking south toward the Los Alamos County Landfill)

Figure B-9 **Hand excavating around electrical utility boxes at SWMU 61-002 (view looking north toward East Jemez Road)**

Figure B-10 **Backfilling excavation with clean fill using trackhoe at SWMU 61-002 near access gate area**

Figure B-11 Truck loading at SWMU 61-002 along West Jemez Road. Material was hauled to Waste Control Specialists in Andrews, Texas for disposal.

Figure B-12 Installation of plastic layer before backfilling with clean fill in northwestern corner of SWMU 61-002 where petroleum hydrocarbon contaminated soil was found (Building 61-23 in background)

Figure B-13 Backfilling area where petroleum hydrocarbon contamination was found in northwestern corner of SWMU 61-002 (Building 61-23 in background)

Figure B-14 Drilling at SWMU 61-002 (location 61-24352) near northern fence line to characterize petroleum hydrocarbon contamination

Figure B-15 **Excavated area was restored with base course after backfilling was completed. Note five roll-off waste bins with covers that contain petroleum-contaminated soil removed from northwestern corner of SWMU 61-002.**

Figure B-16 **Photoionization detector used for headspace readings. Note mason jar with aluminum foil.**

2006 ACA PHOTOGRAPHS

Figure B-17 Installation of borehole location 61-26621. Note exhaust fan to disperse VOC vapors away from borehole.

Figure B-18 Installation of borehole location 61-26621

Figure B-19 Core from borehole location 61-26621

Appendix C

Field Forms
(on CD included with this document)

This appendix presents the field activities and sampling paperwork associated with the 2005 and 2006 investigation and remediation of Solid Waste Management Unit 61-002.

Attachment C-1 Field-Screening Summary Table and Field-Screening Measurements Data Sheets

Attachment C-2 Borehole Lithologic Logs

Attachment C-3 Sample Collection Logs

Attachment C-4 Field Notes

Attachment C-5 Geophysical Survey Coordinates

Appendix D

Analytical Suites and Results
(on DVD included with this document)

Appendix E

Risk Assessment and Tier One Evaluation

Human health and ecological risk screening assessments for Solid Waste Management Unit (SWMU) 61-002 are presented in the following sections.

E-1.0 HUMAN HEALTH SCREENING ASSESSMENT

Los Alamos National Laboratory (LANL or the Laboratory) workers currently have access to and may be present in and around SWMU 61-002. Construction workers are potential receptors as well and are evaluated in this assessment. Because the site is accessible to the public, other exposure scenarios could be envisioned, including visitors and walkers along East Jemez Road. However, the duration and frequency of such exposures are less than those experienced by industrial and construction workers. Therefore, the assessment of risk to industrial workers is used to indicate whether there are potential present-day risks. Potential risks for residential exposures are also provided as required by the March 1, 2005, Compliance Order on Consent.

Samples were collected at SWMU 61-002 from the surface (0–0.5 ft below ground surface [bgs]) as well as deeper in order to assess the potential risk to receptors. Sampling results from 0 to 0.5 ft bgs are used to evaluate industrial worker exposure, results from 0 to 20 ft bgs are used in the construction worker evaluation, and results from 0 to 12 ft bgs are used in the residential evaluation. Potential exposure pathways for industrial and construction worker exposures as well as a resident include the incidental ingestion of soil, the inhalation of fugitive dust or vapors, and dermal contact with soil. Potential pathways from subsurface releases are complete only if soil was excavated and brought to the surface. In such a case, the potential exposure pathways are the same as those of a surface soil release.

Analytical results from 0 to 5 ft bgs are used in the ecological risk screening evaluation (LANL 2004, 087630). The primary ecological exposure pathways for wildlife receptors include the ingestion of contaminated soil and food web transport. The primary exposure pathway to plants is root uptake.

E-1.1 Screening Evaluation

Exposure point concentrations (EPCs) for chemicals of potential concern (COPCs) were compared with industrial worker, construction worker, and residential soil screening levels (SSLs) and ecological screening levels (ESLs). The EPCs for SWMU 61-002 are the 95% upper confidence limit (UCL) of the arithmetic mean in the depth interval of interest. Potential risks are evaluated for a site using a concentration for each contaminant that represents the maximum exposure that is reasonably expected to occur to a receptor across the site; it is not the worst-case exposure. The U.S. Environmental Protection Agency (EPA) has indicated in its risk assessment guidance for superfund (EPA 1989, 008021), that the 95% UCL of the mean is used to represent this reasonable maximum exposure.

The 95% UCLs were calculated as described in EPA guidance (EPA 2002, 073593). Tests for distributions were performed using ProUCL software (EPA 2004, 090033) to determine the appropriate method for UCL calculations. The following methods were used to calculate 95% UCL concentrations (depending on the type of distribution found for the data set):

- Student’s t-statistic procedure – normal distributions
- Land method H-statistic – lognormal distributions
- Chebyshev or Modified-t test procedure – nonparametric distributions
- Approximate Gamma procedure – gamma distributions

The results of the distribution testing and the EPCs used for the industrial, construction worker, residential, and ecological assessments are presented in Tables E-1.1-1 through E-1.1-4. One-half of the detection limit was used to represent the concentration for all undetected results in the UCL calculations.

The chemical SSLs used in the evaluations were obtained from New Mexico Environment Department (NMED) guidance (NMED 2006, 092513). If NMED does not have a SSL for a chemical, the EPA Region 6 screening levels were used (EPA 2006, 094321). The SSLs for carcinogens are equivalent to a 1 x 10^{-5} cancer risk (EPA Region 6 values for carcinogens are adjusted to a 1 x 10^{-5} cancer risk) and for noncarcinogens represent a hazard quotient (HQ) of 1.0. The comparisons with SSLs are conducted separately for carcinogens and noncarcinogens for each scenario evaluated (Tables E-1.1-5 through E-1.1-10).

Several organic COPCs (butanone[2-], butylbenzene[n-], butylbenzylphthalate, chlorobenzene, chloroethane, dichlorobenzene[1,2-], ethylbenzene, isopropylbenzene, methylene chloride, propylbenzene[1-], tetrachloroethene, toluene, trimethylbenzene[1,3,5-], and xylenes) have one or more SSLs based on soil saturation limits (C_{sat}) rather than chemical-specific toxicological effects (NMED 2006, 092513; EPA 2006, 094321). To evaluate the potential risk from these COPCs, risk-based SSLs were either obtained from the EPA Region 6 screening values Excel spreadsheet (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screenexpanded.xls) for the residential and/or outdoor worker scenario or calculated using the reference doses (RfDs), slope factors (SFs), equations, and parameters from NMED guidance (NMED 2006, 092513). These risk-based SSLs are substituted for the C_{sat} SSLs in the screening assessments to provide a meaningful assessment of risk. The use of risk-based SSLs for these COPCs is appropriate because (1) although maximum detected concentrations of individual COPCs exceeded C_{sat} SSLs, the concentration to be compared to the SSLs is the 95% UCL, not the maximum detected concentration; and (2) 95% UCLs do not exceed C_{sat} SSLs; therefore, the 95% UCLs are within the range of concentrations where the assumptions and models used to develop risk-based SSLs are valid and the comparison with risk-based SSLs is appropriate.

Total petroleum hydrocarbon (TPH)-diesel range organic (DRO) and TPH-gasoline range organic (GRO) data were evaluated using NMED's screening guidelines (NMED 2006, 094614) (Table E-1.1-11). The industrial and residential screening guidelines for unknown oil were used because the type of release from the SWMU is unknown. Neither TPH-GRO nor the construction worker has TPH screening guidelines (NMED 2006, 094614). However, the components of the TPH were screened using NMED SSLs as described above. Although SWMU 61-002 is not regulated as a petroleum storage tank site, a release of petroleum product apparently occurred. A Tier One evaluation was performed for informational purposes based on the New Mexico Petroleum Storage Tank Bureau corrective action guidelines (Title 20 of the New Mexico Administrative Code, Chapter 5, Part 12, Section 1213) and is presented in section E-4.0 of this appendix.

The EPCs for noncarcinogenic COPCs at SWMU 61-002 were less than their respective industrial SSLs. The industrial hazard index (HI) is approximately 0.04 (Table E-1.1-5), which is less than the NMED target HI of 1.0 (NMED 2006, 092513). The EPCs for carcinogenic COPCs at SWMU 61-002 were less than their respective industrial SSLs. The total excess cancer risk is approximately 6 x 10^{-6} (Table E-1.1-6), which is less than the NMED target level for carcinogenic risk of 1 x 10^{-5} (NMED 2006, 092513).

The EPCs for noncarcinogenic COPCs at SWMU 61-002 were less than their respective construction worker SSLs. The construction worker HI is approximately 2.0 (Table E-1.1-7), which is above the NMED target HI. The EPCs for carcinogenic COPCs at SWMU 61-002 were less than their respective construction worker SSLs. The total excess cancer risk is approximately 1 x 10^{-6} (Table E-1.1-8), which is less than the NMED target level.

The EPCs for noncarcinogenic COPCs at SWMU 61-002 were less than their respective residential SSLs, except for naphthalene (Table E-1.1-9). The residential HI is approximately 4.0, which is above the NMED target level (Table E-1.1-9). The EPCs for carcinogenic COPCs at SWMU 61-002 were less than their respective residential SSLs. The total excess cancer risk is approximately 2 x 10^{-5}, which is slightly above the NMED target level (Table E-1.1-10).

The TPH-DRO concentrations were above NMED's industrial and residential screening guidelines for unknown oil (NMED 2006, 094614) (Table E-1.1-11). Although there are no NMED screening guidelines for TPH-GRO, the detected concentrations are often higher than the TPH-DRO concentrations.

E-1.2 Uncertainty Analysis

The analysis for human health is subject to uncertainties associated with the data evaluation, exposure assessment, and toxicity values. Each or all of these uncertainties may affect the assessment results.

Data Evaluation

Data evaluation uncertainties may include errors in sampling, laboratory analysis, and data analysis. Although concentrations used in this risk assessment were less than estimated quantitation limits for some COPCs, the data evaluation uncertainties are expected to have little effect on the assessment results. The J (estimated) qualification of detected concentrations of some organic COPCs does not affect the assessment.

Another data evaluation uncertainty relates to the use of the 95% UCL as the EPC. Use of the 95% UCL may result in an overestimation of risk for COPCs with elevated detection limits. The receptors would not be exposed to the concentrations represented by the 95% UCLs across the site.

Exposure Assessment

The receptors used in the assessment are subject to exposures in a different manner than the exposure assumptions used to derive the SSLs. The assumptions for the industrial SSLs are that the potentially exposed individual is a Laboratory worker who is outside for 225 d/yr for 25 yr (NMED 2006, 092513) and spends the entire time on-site within the contaminated area. The construction worker is assumed to be exposed for 1 yr and 250 d/yr (NMED 2006, 092513) and also spends the entire time on-site within the contaminated area. Because the site is not used in the fashion evaluated, it is unlikely that either a Laboratory worker or a construction worker is present within the contaminated area for the entire work day and for the specified exposure frequencies and durations. Therefore, the risk screening assessments overestimate the exposures as well as the risks and hazards to these receptors.

The construction worker EPCs for the inorganic COPCs (aluminum, antimony, arsenic, barium, beryllium, cobalt, copper, lead, mercury, selenium, and zinc) are similar to the background concentrations. In addition, lead can be separated out as a COPC because the toxic effect is related to blood lead levels. The lead EPC of 15.5 mg/kg for the construction worker results in blood lead levels well below the threshold of 10 µg/dL. Therefore, inorganic chemicals should be eliminated as COPCs. As a result, the construction worker HI is reduced to approximately 1.2, which is equivalent to NMED's target level.

Assumptions underlying the exposure parameters, routes of exposure, amount of contaminated media available for exposure, and intake rates for routes of exposure are consistent with EPA-approved parameters and default values (NMED 2006, 092513; EPA 2006, 094321). In the absence of site-specific data, several upper-bound values for the assumptions may be combined to estimate exposure for any one pathway, and the resulting risk estimate can exceed the 99th percentile. Therefore, uncertainties in the assumptions underlying the exposure pathways may contribute to risk assessments that exceed the reasonably expected range.

Toxicity Values

The primary uncertainty associated with the screening values relates to the derivation of screening values from EPA toxicity values (RfDs and SFs) (EPA 1997, 058968; EPA 2002, 076870). Uncertainties were identified in the following three areas with respect to the toxicity values: (1) extrapolation from animals to humans, (2) extrapolation from one route of exposure to another route of exposure, and (3) interindividual variability in the human population.

The SFs and RfDs are often determined by extrapolation from animal data to humans, which may result in uncertainties in toxicity values because differences exist in chemical absorption, metabolism, excretion, and toxic response between animals and humans. EPA takes into account differences in body weight, surface area, and pharmacokinetic relationships between animals and humans to minimize the potential to underestimate the dose-response relationship. However, more conservatism is usually incorporated in these steps.

The SFs and RfDs often contain extrapolations from one route of exposure to another. The extrapolation from the oral route to the inhalation and/or the dermal route is used in the derivation of some screening values. Differences in chemical absorption and/or toxicity between the two exposure routes could result in an over- or underestimation of the risk or hazard.

For noncarcinogenic effects, the amount of human variability in physical characteristics is important in determining the risks that can be expected at low exposures and in determining the no-observed-adverse-effect level (NOAEL). The NOAEL/uncertainty factor approach incorporates a factor of 10 to reflect the possible interindividual variability in the human population; it is generally considered a conservative estimate.

Another uncertainty related to toxicity assessment is the assumption of additivity, which may result in an overestimate or underestimate of risk. For noncarcinogens, the effects of a mixture of chemicals generally are unknown and possible interactions could be synergistic or antagonistic. Additionally, the RfDs for different chemicals are not based on the same severity, effect, or target organ. Therefore, the potential for occurrence of noncarcinogenic effects may be overestimated for chemicals that are addressed additively but that act by different mechanisms and on different target organs.

As noted in NMED's SSL technical background document (NMED 2006, 092513), C_{sat} concentrations serve to identify an upper limit to the applicability of generic risk-based soil criteria because certain default assumptions and models used in the generic algorithms are not applicable when free-phase contamination is present in soil. A C_{sat} SSL describes a chemical-physical soil condition that integrates certain chemical-specific properties with physical attributes of the soil to estimate the contaminant concentration at which soil pore water, pore air, and surface sorption sites are saturated with contaminants. Above this concentration, the contaminants *may* be present in free phase within the soil matrix—as nonaqueous phase liquids (NAPLs) for substances that are liquid at ambient soil temperatures and as pure solid phases for compounds that are solids at ambient soil temperatures. Generic saturation limit concentrations should not be interpreted as confirmation of a saturated soil condition but rather as estimates of when this condition *may* occur and correspond to a theoretical threshold above which free-phase contaminant may exist. The C_{sat} SSL is based only on the physical properties of soil and the physical-chemical properties of chemical and does not depend on the toxicity of the chemical. Therefore, concentrations above C_{sat} SSLs are not an indication of risk.

The use of surrogates for some chemicals that do not have EPA-approved or provisional toxicity values also contributes to uncertainty in risk assessment. In this assessment, a surrogate was used to establish toxicity values for the following COPCs based on structural similarity (NMED 2003, 081172):

- benzo(g,h,i)perylene
- hexanone[2-]
- isopropyltoluene[4-]
- 2-methylnaphthalene

None of these COPCs contributed substantially to the HIs of the scenarios assessed.

E-1.3 Interpretation

Potential risks for a site are assessed using a concentration for each contaminant that represents the reasonable maximum exposure to a receptor across the site. Although some COPC concentrations exceed the C_{sat} SSLs, it does not mean further remediation of the site is required. The cleanup or risk goals specified in the Consent Order of a total excess cancer risk of 1×10^{-5} and an HI of 1.0 (NMED 2006, 092513) are for the site, not location by location or sample by sample. At SWMU 61-002, the 95% UCL for each COPC was used in the screening assessments to evaluate potential risk and resulted in total excess cancer risks and hazard indices equivalent to or below NMED's target levels for the industrial and construction worker scenarios. The results of the risk screening assessment under a residential scenario resulted in a total excess cancer risk and HI above NMED's target levels. However, because the industrial scenario is the current and reasonably foreseeable future land use for this site no further remediation of the site is warranted.

Based on an industrial scenario, the HI (approximately 0.04) is less than NMED's target level of 1.0 and the cancer risk (approximately 6×10^{-6}) is less than the NMED target level of 1×10^{-5}. For a construction worker, the HI (approximately 2.0) is above the NMED's target level of 1.0 and the cancer risk (approximately 1×10^{-6}) is less than the NMED target level of 1×10^{-5}. However, based on the uncertainty analysis the construction worker HI is reduced to approximately 1.0 and is equivalent to NMED's target level. The HI (approximately 4.0) for the residential scenario is above NMED's target level of 1.0 and the cancer risk (approximately 2×10^{-5}) is slightly above the NMED target level of 1×10^{-5}. The screening assessments indicate no potential unacceptable risk to human health under the industrial and construction worker scenarios at SWMU 61-002. There is potential unacceptable risk at this SWMU under the residential scenario.

E-2.0 ECOLOGICAL SCREENING ASSESSMENT

The scoping evaluation establishes the breadth and focus of the ecological screening assessment. The ecological scoping checklist, Attachment E-1 to this appendix, was used to determine whether ecological receptors might be affected, identify the types of receptors that might be present, and develop the ecological site conceptual model for the site.

The site is located in an industrially developed area adjacent to the security perimeter road complex, and the surface has been disturbed as a result of accelerated corrective action (ACA) activities. The surrounding area is made up of asphalt pavement, gravel surfacing, and fill, with sparse vegetation. The small amount of open area within the developed area contains native and nonnative grasses and invasive weeds and provides limited and fragmented habitat. The potential pathways to ecological receptors are by root uptake, soil ingestion, and food web transport.

E-2.1 Assessment Endpoints

An assessment endpoint is an explicit expression of the environmental value to be protected. These endpoints are ecologically relevant and help sustain the natural structure, function, and biodiversity of an ecosystem or its components (EPA 1998, 062809). In a screening-level assessment, assessment endpoints are any adverse effects on ecological receptors, where receptors are populations and communities (EPA 1997, 059370).

The ecological screening assessment is designed to protect populations and communities of biota rather than individual organisms, except for listed or candidate threatened and endangered (T&E) species or treaty-protected species (EPA 1999, 070086). The protection of individuals within these designated protected species may also be protected at the population level; the populations of these species tend to be small, and the loss of an individual adversely affects the species.

In accordance with this guidance, the Laboratory developed generic assessment endpoints (LANL 1999, 064137) to ensure that values at all levels of ecological organization are considered in the ecological screening process. These general assessment endpoints may be measured using impacts on reproduction, growth, and survival to represent categories of effects that may adversely impact populations. In addition, specific receptor species were chosen to represent each functional group. The receptor species were chosen because of their presence at the site, their sensitivity to the COPCs, and their potential for exposure to those COPCs. These categories of effects and the chosen receptor species were used to select the types of effects seen in toxicity studies considered in the development of the toxicity reference values (TRVs). Toxicity studies used in the development of TRVs included only studies in which the adverse effect evaluated affected reproduction, survival, and/or growth.

The selection of receptors and assessment endpoints is designed to be protective of both the representative species used as screening receptors and the other species within their feeding guilds and the overall food web for the terrestrial and aquatic ecosystems. Focusing the assessment endpoints on these general characteristics of species that affect populations (rather than the biochemical and behavioral changes that may affect only the studied species) also ensures the applicability to the ecosystem of concern.

E-2.2 Screening Evaluation

Analytical results from 0–5 ft bgs are used in ecological screening assessment using the 95% UCL as the EPC. The numerical screening evaluation compared media-specific ESLs for each receptor with the EPC. The ESLs are derived for each of the receptors where information is available. The ESLs are based on similar species and derived from experimentally determined as having NOAELs, lowest-observed-adverse-effect levels, or doses lethal to 50% of the population. The derivation of ESLs is based on the approach presented in “Screening Level Ecological Risk Assessment Methods, Revision 2” (LANL 2004, 087630). Relevant information necessary to calculate ESLs, including concentration equations, dose equations, bioconcentration factors, transfer factors, and toxicity reference values, are presented in the ECORISK Database, Version 2.2 (LANL 2005, 090032). The ESLs were developed to reflect an adverse effect on an average, nongravid, adult individual of a particular species (EPA 1993, 059384); are designed to be protective of specific organisms; and may only be used to infer a potential risk to receptors. The ESLs used in this screening evaluation (Table E-2.2-1) were obtained from the ECORISK Database, Version 2.2 (LANL 2005, 090032).

The receptors, which represent several trophic levels (LANL 2004, 087630), include the following:

- a plant
- a soil-dwelling invertebrate (represented by the earthworm)
- the American robin (avian insectivore, avian omnivore, and avian herbivore)
- the American kestrel (avian insectivore and carnivore)
- the deer mouse (mammalian omnivore)
- the montane shrew (mammalian insectivore)
- the desert cottontail (mammalian herbivore)
- the red fox (mammalian carnivore)

The COPCs evaluated against the ESLs included eight inorganic chemicals and 30 organic chemicals. The minimum ESL for each COPC was compared with the respective EPC; the HQ was calculated by dividing the EPC by the ESL (Table E-2.2-2). An HQ greater than 0.3 was used to identify chemicals of potential ecological concern (COPECs) and determine which chemicals were evaluated further (LANL 2004, 087630). Based on this comparison, 17 COPCs (seven inorganic chemicals and 10 organic chemicals) were retained as COPECs (Table E-2.2-2). Butylbenzene[n-], chloromethane, dibromo-3-chloropropane[1,2-], dichlorobenzene[1,2-], ethylbenzene, isopropylbenzene, isopropyltoluene[4-], propylbenzene[1-], styrene, trimethylbenzene[1,2,4-], and trimethylbenzene[1,3,5-] do not have ESLs for terrestrial receptors and were retained as COPECs. These COPECs are discussed in the uncertainty analysis.

The COPECs were evaluated further in Table E-2.2-3. The HQs for each COPEC/receptor combination as well as the HIs for each receptor were calculated. 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 that nonradionuclides have common toxicological effects. The HI analysis provides an indication of potential adverse impacts by determining how many receptors may be affected and provides information on T&E species. The HI for each receptor was greater than 1.0, ranging from approximately 3 (earthworm and desert cottontail) to 59 (robin-insectivore) (Table E-2.2-3).

E-2.3 Uncertainty Analysis

The uncertainty analysis describes the key sources of uncertainty related to the screening assessment. This analysis can result in either adding or removing chemicals from the list of COPECs for the sites.

The assumptions used in the ESL derivations were conservative and not necessarily representative of actual conditions. These assumptions included maximum chemical bioavailability, maximum receptor ingestion rates, minimum bodyweight, and additive effects of multiple COPECs. Most of these factors tend to result in conservative estimates of the ESLs, which may lead to an overestimation of the potential risk. The effects of a mixture of chemicals generally are unknown, and possible interactions could be synergistic or antagonistic. Therefore, the assumption of additive effects for multiple COPECs may result in an over- or underestimation of the potential risk to receptors.

The chemical form of the individual COPECs was not determined as part of the investigation. This is largely a limitation on the analytical quantitation of individual chemical species. Toxicological data are typically based on the most toxic and bioavailable chemical species, which are not likely found in the environment. The inorganic and organic COPECs are generally not 100% bioavailable to receptors in the natural environment because of the adsorption of chemical constituents to matrix surfaces (e.g., soils), or rapid oxidation or reduction changes that render harmful chemical forms unavailable to biotic processes. The ESLs were calculated to ensure a conservative indication of potential risk (LANL 2004, 087630), and the values were biased toward overestimating the potential risk to receptors.

The quality and availability of habitat is a factor in determining whether there are receptors present at the site. SWMU 61-002 is located in an industrially developed area adjacent to the security perimeter road complex and the surface has been disturbed as a result of ACA activities. The surrounding area is made up of asphalt pavement, gravel surfacing, and fill, with sparse vegetation. The small amount of open area within the developed area contains sparse native and nonnative grasses and invasive weeds, and provide limited and fragmented habitat.

The EPCs used in the calculation of HQs were the 95% UCLs. As a result, the exposure of individuals within a population was evaluated using this specific concentration, which was assumed constant throughout the exposure area. This approach results in an overestimation of the potential risk because concentrations varied across the site.

A comparison of the EPCs for the inorganic COPECs and their respective background concentrations (LANL 1998, 059730) indicates that the EPCs are similar to the background concentrations (Table E-2.3-1). Therefore, exposure to antimony, barium, copper, lead, mercury, selenium, and zinc across the site is similar to background and these inorganic chemicals are not retained as COPECs.

In addition to the direct comparison of the EPCs with the ESLs, area use factors (AUFs) are used to account for the amount of time that the receptor is likely to spend within the contaminated areas based on the size of the receptor's home range (HR). The AUFs for individuals were developed by dividing the size of the site (approximately 0.13 hectares [ha]) by the HR for that receptor. The HR for the Mexican spotted owl is 366 ha (EPA 1993, 059384), and the AUF is 0.0003. Based on the application of the AUF for the Mexican spotted owl to the HI (20) for the carnivorous kestrel, which is a surrogate for the owl, there is no potential for ecological risk to the Mexican spotted owl (HI = 0.007).

EPA guidance is to manage the ecological risk to populations rather than to individuals, except for T&E species (EPA 1999, 070086). One approach to address the potential effects on a population is to estimate the spatial extent of the area inhabited by the local population that overlaps with the contaminated area. The population area for a receptor is based on the individual receptor HR and its dispersal distance (Bowman et al. 2002, 073475). Bowman et al. (2002, 073475) estimate that the median dispersal distance for mammals is seven times the linear dimension of the HR (i.e., the square root of the HR area). If only the dispersal distances for the mammals with HRs within the range of the screening receptors are used (Bowman et al. 2002, 073475), the median dispersal distance becomes 3.6 times the square root of the HR (R^2=0.91). If it is assumed that the receptors can disperse the same distance in any direction, the population area is circular and the dispersal distance is the radius of the circle. Therefore, the population area can be derived by $\pi(3.6\sqrt{HR})^2$ or approximately 40HR.

The area of SWMU 61-002 is approximately 0.13 ha. The population area use factors (PAUFs) are estimated by dividing the area by the population area of each receptor population (Table E-2.3-2). The HIs were recalculated without the inorganic chemicals, which were eliminated as COPECs based on the similarity to background concentrations, and adjusted by the PAUFs (Table E-2.3-2).The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs. Based on the reassessment, the PAUF-adjusted HIs are 0.4 or less for the wildlife receptors (Table E-2.3-3). Therefore, these receptor populations are not adversely affected by the COPECs.

The HI for the plant is primarily driven by an elevated concentration of acenaphthene. Acenaphthene was detected in only one sample from 0–5 ft bgs at a concentration of 0.16 mg/kg. If the detected concentration is used as the EPC rather than the 95% UCL (0.49 mg/kg), the plant HI is reduced to 1.2. Naphthalene is the other primary COPEC for the plant and was detected from 0-5 ft bgs in only one sample. The results indicate that the elevated concentrations of the primary COPECs are isolated; the EPCs overestimate the potential exposure and risk and are not likely to adversely affect plant populations. Therefore, based on this assessment, the plants are not adversely affected by the COPECs.

Butylbenzene[n-], chloromethane, dibromo-3-chloropropane[1,2-], dichlorobenzene[1,2-], ethylbenzene, isopropylbenzene, isopropyltoluene[4-], propylbenzene[1-], styrene, trimethylbenzene[1,2,4-], and trimethylbenzene[1,3,5-] were also retained as COPECs but do not have ESLs. All of these organic chemicals were infrequently detected across the site; the number of detected concentrations ranged from one to six out of 65 samples from the 0–5-ft-bgs depth interval. In addition, COPEC concentrations are compared to residential SSLs if ESLs or surrogate chemicals with ESLs are not available. The comparison provides an estimate of the potential for effects when other information is not available, and it is used as a line of evidence to indicate the likelihood that ecological receptors are potentially impacted. The inference that humans and animals are similar, on average, in intrinsic susceptibility to chemicals and that in many cases data from animals may be used as surrogates for data from humans is the basic premise of modern toxicology (EPA 1989, 008021). The toxicity values derived for the calculation of human health SSLs are also often based on potential effects that are more sensitive than the ones used to derive ESLs (e.g., cellular effects for humans versus survival or reproductive effects for terrestrial animals). The EPA also applies uncertainty factors or modifying factors to ensure that the toxicity values are protective (i.e., they are adjusted by uncertainty factors to values much lower than the study results). COPEC concentrations compared to these values are an order of magnitude or more below the SSLs, which corresponds to uncertainty factors of 10 or more. Therefore, it is assumed that the differences in toxicity would not be more than an order of magnitude for a given chemical. The relative difference between values provides a weight of evidence that the potential toxicity of the COPC is likely to be low or very low to the receptor(s).

- Butylbenzene[n-], dibromo-3-chloropropane[1,2-], ethylbenzene, isopropylbenzene, and propylbenzene[1-] were each detected from 0-5 ft bgs in one of 65 samples. Detected concentrations were 0.00054 mg/kg, 0.0015 mg/kg, 1.3 mg/kg, 0.23 mg/kg, and 0.85 mg/kg, respectively. If benzene is used as a surrogate for butylbenzene[n-], ethylbenzene, isopropylbenzene, and propylbenzene[1-], the minimum soil ESL is 24 mg/kg for the deer mouse. The HQs for these organic chemicals are 0.00002, 0.05, 0.01, and 0.04, respectively. There is no surrogate with an ESL for dibromo-3-chloropropane[1,2-], but a comparison of either the EPC (0.21 mg/kg) or the detected concentration (0.0015 mg/kg) with the NMED residential SSL (1.84 mg/kg) indicates that the potential risk of dibromo-3-chloropropane[1,2-] to ecological receptors is low.
- Chloromethane was detected from 0-5 ft bgs in six of 65 samples at concentrations ranging from 0.0024 mg/kg to 0.021 mg/kg; the EPC is 0.21 mg/kg. There is no surrogate with an ESL for chloromethane but a comparison of either the EPC (0.21 mg/kg) or the maximum detected concentration (0.021 mg/kg) with the NMED residential SSL (21.8 mg/kg) indicates that the potential risk of chloromethane to ecological receptors is very low.
- Dichlorobenzene[1,2-] was detected from 0-5 ft bgs in six of 65 samples at concentrations ranging from 0.00074 mg/kg to 0.066 mg/kg. If dichlorobenzene[1,4-] is used as a surrogate based on structural similarity, the minimum ESL is 0.88 mg/kg for the montane shrew. The HQs for dichlorobenzene[1,2-] using the minimum dichlorobenzene[1,4-] ESL range from 0.0008 to 0.08 for the detected concentrations. The HQ is 0.01 using the EPC of 0.0087 mg/kg.

- Isopropyltoluene[4-] was detected from 0-5 ft bgs in two of 65 samples at concentrations of 0.00047 mg/kg and 0.019 mg/kg; the EPC is 0.11 mg/kg. There is no surrogate with an ESL for isopropyltoluene[4-], but a comparison of the maximum detected 4-isopropyltoluene concentration or the EPC with the NMED residential SSL for isopropylbenzene (271 mg/kg) indicates that the potential risk of isopropyltoluene[4-] to ecological receptors is very low.
- Styrene was detected from 0-5 ft bgs in two of 65 samples at concentrations of 0.11 mg/kg and 0.13 mg/kg; the EPC is 0.017 mg/kg. There is no surrogate with an ESL for styrene, but a comparison of the maximum detected styrene concentration or the EPC with the EPA Region 6 residential SSL for styrene (4600 mg/kg) indicates that the potential risk of styrene to ecological receptors is very low.
- Trimethylbenzene[1,2,4-] and trimethylbenzene[1,3,5-] were detected from 0-5 ft bgs in three and two of 65 samples, respectively. If trichlorobenzene[1,2,4-] is used as a surrogate, the minimum ESL is 0.27 mg/kg for the montane shrew. The HQs for trimethylbenzene[1,2,4-] and trimethylbenzene[1,3,5-] using the EPCs of 0.87 mg/kg and 0.29 mg/kg are approximately 3 and 1, respectively. If the PAUFs are applied to the HQs for trimethylbenzene[1,2,4-] and trimethylbenzene[1,3,5-], the adjusted HQs are 0.1 or less.

Based on this evaluation, the infrequency of detection, and the general lack of habitat in and around SWMI 61-002, butylbenzene[n-], chloromethane, dibromo-3-chloropropane[1,2-], dichlorobenzene[1,2-], ethylbenzene, isopropylbenzene, isopropyltoluene[4-], propylbenzene[1-], styrene, trimethylbenzene[1,2,4-], and trimethylbenzene[1,3,5-] do not pose potential ecological risks to receptors at SWMU 61-002 and are eliminated as COPECs.

E-2.4 Interpretation

Based on the ecological screening assessment for SWMU 61-002, several COPECs were identified. The inorganic chemicals and organic chemicals were eliminated as COPECs in the uncertainty analysis by considering a number of factors, including availability of habitat, background concentrations, the potential effects to populations (individuals for T&E species), the area of contamination, and the infrequency of detected concentrations. The ecological screening assessment indicates that contamination at SWMU 61-002 does not pose a potential ecological risk to receptors.

E-3.0 ENVIRONMENTAL FATE AND TRANSPORT

The evaluation of environmental fate addresses the chemical processes that affect the persistence of a chemical in the environment. The evaluation of transport addresses the physical processes affecting mobility. Migration into soil and tuff depends on properties such as rate of precipitation or snowmelt, soil moisture content, depth of soil, and soil hydraulic properties. Migration into and through tuff also depends on the unsaturated flow properties of the tuff and the presence of joints and fractures. Chemical and physical properties of COPCs are presented in Tables E-3.1-1 and E-3.2-1.

The SSL calculations consider equilibrium soil-liquid-air partitioning. Soil-liquid partitioning is defined by the distribution coefficient (K_d) and liquid-air partitioning by the Henry's Law constant (H). These partitioning constants are only valid up to the C_{sat} concentration. Once the soil concentration exceeds C_{sat}, free-phase chemical may be present, and the vapor concentration in the soil pore gas should be the saturated vapor pressure of the chemical. Further increases in the soil concentration will not increase this vapor concentration. The SSL calculations, however, assume that vapor concentrations will continue to increase linearly with soil concentrations. Use of the SSL model with soil concentrations above C_{sat}, therefore, will calculate vapor concentrations in excess of the vapor pressure of the chemical, which is not possible. In other words, if the calculated risk-based SSL is greater than C_{sat}, the vapor concentration used in the risk calculation will be higher than the actual vapor concentration in the soil pore gas. The soil concentration associated with allowable contaminant exposure would actually be higher than the calculated SSL (i.e., exposure is overestimated). Therefore, the approach used at SWMU 61-002 is conservative. In addition, the exceedance of the C_{sat} SSLs by a few COPCs in a few samples does not warrant soil removal, especially because the vertical extent of contamination is defined to a relatively shallow depth (approximately 50 ft bgs), and the relative depth between the detected contamination and groundwater is approximately 1000 ft bgs.

E-3.1 Inorganic Chemicals

Factors that help determine the distribution of inorganic COPCs within the soil and tuff are the soil-water partition coefficient (K_d) of the inorganic chemical, the pH of the soil, soil characteristic (such as sand or clay content), and oxidation-reduction potential (Eh). The interaction of these factors is complex, but the K_ds can provide a general assessment of the potential for migration through the subsurface. Chemicals with K_ds above 40 cm^3/g are considered immobile in the vadose zone and groundwater (Kincaid et al. 1998, 093270). Table E-3.1-1 presents the K_ds for the inorganic COPCs; these values match the EPA K_ds recommended for the default pH of 6.8 for the evaluation of Superfund sites (EPA 1996, 059902). These K_ds represent conservative values applicable to a wide range of sites. Based on this K_d criterion, aluminum, antimony, barium, beryllium, cadmium, cobalt, lead, mercury, nickel, and zinc have a very low potential for migration to groundwater.

The K_d values in Table E-3.1-1 for arsenic, copper, and selenium indicate that these inorganic chemicals may be relatively mobile in soil. Other factors besides the K_d values, such as speciation in soil and Eh, also play a role in the likelihood that inorganic chemicals will migrate. Information about the fate and transport properties of inorganic chemicals, some of which follows below, was obtained from individual chemical profiles published by the Agency for Toxic Substances and Disease Registry (ATSDR) and is available from the ATSDR website at http://www.atsdr.cdc.gov/toxprofiles.

- *Arsenic*. Many arsenic compounds tend to partition to soil or sediment under oxidizing conditions; therefore, leaching usually does not result in the transport of arsenic to any great depth. In addition, the K_d is 29 cm^3/g, indicating limited mobility, and the extent of arsenic is defined.
- *Copper*. Most copper deposited in soil is strongly adsorbed and remains in the upper few centimeters of soil. In general, the copper adsorbs to organic matter, carbonate minerals, clay minerals, or hydrous iron and manganese oxides. In addition, the K_d is 35 cm^3/g, indicating limited mobility, and the extent of copper is defined.
- *Selenium*. The determining factors for the transport and partitioning of selenium in soils are pH and Eh. In soils with pH above 7.5, selenates, which have high solubility and a low tendency to adsorb onto soil particles, are the major selenium species and are very mobile. The soil pH at SWMU 61-002 is more neutral than 7.5 and indicates that selenium is not likely to migrate in these soils. In addition, the extent of selenium is defined.

E-3.2 Organic Chemicals

Chemical and physical properties are indicators of fate and transport of organic chemicals. These properties include water solubility, vapor pressure, octanol-water partition coefficient (K_{ow}), and octanol-carbon adsorption coefficient (K_{oc}).

The higher the water solubility of a chemical, the more likely it is to be mobile and the less likely it is to accumulate, bioaccumulate, volatilize, or persist in the environment. A highly soluble chemical (water solubility greater than 1000 mg/L) is prone to biodegradation and metabolic breakdown that may detoxify the parent chemical. With lower water solubility (especially lower than 10 mg/L), the organic chemical is more likely to be immobilized by adsorption onto particles of organic or inorganic matter and more likely to accumulate or bioaccumulate and persist in the environment.

Vapor pressure indicates the tendency of an organic chemical to volatilize. Chemicals with vapor pressure greater than 0.01 millimeter of mercury (mm Hg) are more likely to volatilize and diffuse through the soil or tuff pores, potentially increasing release to the atmosphere. Chemicals with vapor pressures less than 0.000001 mm Hg are less likely to volatilize and, therefore, tend to be immobile.

The K_{ow} is an indicator of a chemical's potential to bioaccumulate or bioconcentrate in the fatty tissues of living organisms. The unitless K_{ow} value is an indicator of water solubility, mobility, sorption, and bioaccumulation. The higher the K_{ow} value above 1000 (equal to a log K_{ow} of 3), the greater the affinity of the chemical for bioaccumulation/bioconcentration in the food chain, the greater the potential for sorption in the soil, and the lower the mobility. Table E-3.2-1 shows the log K_{ow} for organic COPCs. Approximately two-thirds of the organic COPCs have a log K_{ow} above 3, indicating that the chemicals are likely to sorb to soil and that they are relatively immobile.

The K_{oc} measures the tendency of a chemical to adsorb to organic carbon in soil. K_{oc} values greater than 500 cm^3/g indicate a strong tendency to adsorb to soil (NMED 2006, 092513). Table E-3.2-1 provides the K_{oc} values for organic COPCs at SWMU 61-002. Approximately half of the organic COPCs have K_{oc} values greater than 500 cm^3/g. Because of the high K_{oc} values, these organic chemicals have a very low potential to migrate toward groundwater. The remaining organic COPCs have K_{oc} values less than 500 cm^3/g, indicating a tendency to not adsorb to soil and therefore to be potentially more mobile.

The numerical values for these parameters are provided in Table E-3.2-1 and the chemical-specific implications are discussed below.

The following chemicals have relatively high water solubility, high vapor pressure, low K_{ow}, and low K_{oc}: acetone, benzene, benzoic acid, butanone [2-], chloroethane, chloromethane, dibromo-3-chloropropane[1,2-], dibromoethane[1,2-], dichloroethene[cis/trans 1,2-], hexanone[2-], methyl-2-pentanone[4-], and methylene chloride. These chemicals will have a high tendency to biodegrade, a low tendency to bioconcentrate, a low tendency to bind to organic matter, and they volatilize readily.

Butylbenzene[n-], butylbenzene[sec-], chlorobenzene, dichlorobenzene[1,2-], dichlorobenzene[1,4-], ethylbenzene, isopropylbenzene, isopropyltoluene[4-], propylbenzene[1-], styrene, tetrachloroethene, toluene, trimethylbenzene[1,2,4-], trimethylbenzene[1,3,5-], and xylenes have moderate water solubility and a high vapor pressure. The K_{ow}s are moderate to high; their K_{oc}s, however, are low. Therefore, the tendency to bioaccumulate and bind to organic matter is low.

Acenaphthene, anthracene, Aroclor-1254, Aroclor-1260, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, chrysene, di-n-octyl phthalate, fluoranthene, fluorene, indeno[1,2,3-cd]pyrene, methylnaphthalene, naphthalene, phenanthrene, and pyrene have low water solubilities and vapor pressures, indicating they that will tend to bioaccumulate and persist in the environment. These chemicals have very low mobility. Log K_{ow}s and K_{oc}s are high (greater than 3 and 500 cm^3/g, respectively), indicating a high potential for bioaccumulation by binding to organic compounds.

Chemicals may occur as NAPLs in the soil if the concentration exceeds C_{sat}. At the concentrations observed at SWMU 61-002, however, the amount of NAPL present in the soil is insignificant and does not increase the likelihood of migration to groundwater. The amount of free-phase chemical present in the soil was calculated for the maximum detected concentrations given in the comment above, using the default soil parameters presented in the NMED SSL document (NMED 2006, 092513). These results show that the amount of NAPL occupies only 0.04% to 0.32% of the total soil pore volume. Migration of NAPL as a free phase under gravity drainage requires pore volumes to be at or near saturation with chemical. Complete saturation of the pore volume with NAPL results in soil concentrations on the order of 200,000 mg/kg. Therefore, although NAPL may be present, it is not present in amounts that would increase the likelihood of migration to groundwater.

The COPCs at SWMU 61-002 decreased with depth and were not detected in deeper samples (i.e., they are not migrating vertically to groundwater). None of these COPCs were detected in the deepest boreholes (locations 21-26623 and 21-26621) at 40 to 55 ft bgs and 30 to 95 ft bgs, respectively. (The borehole at location 21-26621 was drilled through the middle of the petroleum-contaminated area based on field-screening results.) Results from the deepest samples collected also showed either no detected concentrations or low- or trace-level concentrations of other COPCs in tuff. At other locations, the extent of COPCs is also defined because of decreasing concentrations with depth, no detected concentrations in the deepest sample, or trace-level concentrations that do not warrant further sampling. Also, no source(s) continues to release contamination into the subsurface beneath the site. Therefore, the analyses presented in the report support the conclusion that COPCs will not reach groundwater and the groundwater pathway is incomplete.

SWMU 61-002 lies on a dry mesa top approximately 1000 ft above the regional aquifer. Saturated conditions (i.e., the presence of high levels of moisture in the tuff) do not exist in the soil and tuff in the vicinity of SWMU 61-002. Downward migration of contaminants in the vadose zone is limited by a lack of hydraulic gradient. The lack of saturated conditions in the area restricts both horizontal and vertical migration. No perched aquifers have been identified in the area, nor are there springs or seeps nearby that would indicate the presence of perched aquifers. Without sufficient moisture, little or no potential migration occurs through the vadose zone to groundwater. In addition, the extent of the COPCs identified at SWMU 61-002 is defined and does not extend below approximately 50 ft bgs. As a result, the potential for COPC migration is very low and a complete pathway to the groundwater is unlikely.

E-4.0 TIER ONE EVALUATION

The NMED Petroleum Storage Tank Bureau (PSTB) has developed a risk-based decision making (RBDM) program for evaluating releases of petroleum products from storage tanks. The RBDM includes a methodology for evaluating the risk to on-site and off-site receptors at petroleum release sites. These receptors include residents, commercial (i.e., industrial) workers, and construction workers. Exposure pathways considered include the ingestion of soil, outdoor inhalation of vapors and particulates, dermal contact with soil, leaching and potential ingestion of contaminated groundwater, and indoor inhalation of vapors. The RBDM process includes several tiers of evaluation. The first level (Tier One) is performed using generic exposure and transport parameters. If a site fails the Tier One Evaluation, additional evaluations may be performed using more site-specific data.

The RBDM methodology is not strictly applicable to SWMU 61-002 because the release was not from regulated petroleum storage tanks. Also, the human health screening assessment presented in this appendix addressed most of the receptors and exposure routes considered by the RBDM. The RBDM is, however, specifically directed toward petroleum releases, which is one of the types of releases addressed by the ACA at SWMU 61-002. For this reason, a Tier One Evaluation based on the PSTB methodology was conducted for SWMU 61-002 for information purposes and to verify that the results of the Tier One Evaluation were consistent with the human health screening assessment.

E-4.1 Assessment Input Data

Much of the documentation required for the Tier One Evaluation report is already provided in the human health screening assessment. This section provides discussion of specific inputs to the Tier One Evaluation.

E-4.1.1 Nature and Extent of Release

The nature and extent of the petroleum release at SWMU 61-002 is described in section 4.1 of this report. The source of the petroleum release was in the northwestern corner of the site where elevated levels of organic chemicals were detected. The two phases of investigation at the site have defined the lateral and vertical extent of petroleum contamination along the northern side of the site. The lateral extent is bounded by the boreholes drilled in 2006. The area bounded by these boreholes is approximately 60 ft by 40 ft. The vertical extent of petroleum contamination was defined by boreholes 61-26621 and 61-26622. Borehole 61-26622 had concentrations of TPH-DRO of 3730 mg/kg and TPH-GRO of 6120 mg/kg at a depth of 23 ft bgs to 25 ft bgs, which was the deepest sample collected in the borehole. Borehole 61-26621 is located approximately 15 ft southwest of borehole 61-26622 and was installed to a depth of 95 ft. TPH-DRO and TPH-GRO were detected at concentrations of 79.8 mg/kg and 0.221 mg/kg, respectively, in borehole 61-26621 at a depth of 28–30 ft bgs. The deepest sample collected from this borehole at 93–95 ft bgs had no detectable TPH-DRO and 0.0901 mg/kg TPH-GRO.

The results of the investigation also show low detected concentrations (µg/kg range) of petroleum-related contaminants throughout the site. Toluene was detected over much of the site and polynuclear aromatic hydrocarbons (PAHs) were generally detected on the eastern side of the site, in addition to the northwestern corner. As a result of the nature of activities historically conducted at the site and the low concentrations detected, these contaminants originated from sources other than the petroleum release.

E-4.1.2 Contaminants of Concern

The contaminants of concern are those specified in the RBDM methodology. These contaminants are benzene, toluene, ethylbenzene, and xylenes (together referred to as BTEX), dibromoethane[1,2-] (EDB), dichloroethane[1,2-] (EDC), methyl tertiary butyl ether (MTBE), PAHs, and lead.

E-4.1-3 Representative Concentrations

Representative chemical concentrations were calculated as described in Section 4.8 of the NMED Guidelines for Corrective Action (http://www.nmenv.state.nm.us/ust/docs/gui-chap4.doc). In accordance with this guidance, results from soil borings peripheral to the source area should not be used. As described in section E-4.1.1 above, the extent of contamination from the petroleum hydrocarbon release is limited to the north side of the site. The sampling locations to be included in the determination of representative concentrations were bounded by the distribution of boreholes with samples having over 1.0 mg/kg of either TPH-DRO or TPH-GRO. These 11 sampling locations are 61-24432, 61-24346, 61-24347, 61-24351, 61-24352, 61-26619, 61-26620, 61-26621, 61-26622, 61-26623, and 61-26987. Data from these locations were used to calculate the average concentrations of each contaminant of concern for three cases: all data; data from 0 ft bgs to 1 ft bgs only; and data from 0 ft bgs to 15 ft bgs only. The frequency of detection of contaminants of concern in these boreholes is presented in Table E-4.1-1, and the average concentrations are presented in Table E-4.1-2. As specified in the guidance, the arithmetic average concentration was calculated in each case. Samples with nondetects were considered to be contaminated to half the applicable detection limit. The concentration of total naphthalenes was calculated as the sum of naphthalene and 2-methylnaphthalene, which were the only two naphthalene species reported.

E-4.1.4 Land Use

Current and future land uses are described in section 3.2.1 of this report. As noted in section 3.2.1, the current and future land use of the site is industrial. Land use controls are in place to prevent residential use of the site in the future. Because of the proximity of the site to the security perimeter road, construction of buildings on the site is unlikely. The site is currently either partially beneath or adjacent to the Laboratory security perimeter road, which is one of the main access roads to the Laboratory. This land use is expected to be unchanged for the foreseeable future. Placement of a building at this site is restricted by Laboratory traffic safety requirements. The northern wall of any new structure at that location would have to be a minimum of 50 ft south of the edge of the asphalt, approximately 40 ft south of the residual subsurface contamination. Additional grading of the site is not necessary, but if grading were required, it would not intrude deep enough (>4 ft bgs) to access the residual contamination present at this site. Therefore, workers at the site are expected to be limited to outdoor workers. Future construction activities on the site would likely involve excavation for utilities or additional construction associated with the security perimeter road.

The nearest residents are approximately 1600 ft from the site and are located to the north across Los Alamos Canyon. The nearest buildings occupied by LANL workers are approximately 400 ft to the south and southwest. Because the site is adjacent to the Los Alamos County Landfill, there are also Los Alamos County workers working within several hundred feet of the site. The county landfill is scheduled for closure in 2008, and the closed landfill site is expected to be undeveloped.

E-4.1.5 Potential Receptors

As discussed under land use, the site will be controlled to prevent residential use, so there are no residential receptors, either currently or in the future. Also, there are no off-site residential receptors within 1000 ft of the site. Commercial and construction workers within the limited extent of the contaminated area are outside workers. There are presently no buildings on the site of the release, and none are expected to be built in the future.

E-4.1.6 Complete Pathways of Exposure

Complete pathways and routes of exposure were identified using the RBDM computational software (http://www.nmenv.state.nm.us/ust/lustrem.html). See Attachment E-2, Form 2, for the site conceptual exposure model. Potential pathways are discussed below.

Indoor inhalation of air vapors is an incomplete pathway for child and adult residents. As described under land use, the site is not currently used for residential purposes and will not be used for residential purposes in the future. Current and future exposure of off-site residents is an incomplete pathway based on the distance from the site to off-site residents (i.e., greater than 1000 ft). Indoor vapor exposure is an incomplete pathway for current and future on-site commercial workers. Workers at the site are currently limited to outdoor workers. This condition is expected to remain for the foreseeable future based on expected land use. Indoor vapor exposure for off-site commercial workers is incomplete because of the current distance to off-site structures and the expected future land use of adjacent commercial property (i.e., undeveloped use of the Los Alamos County Landfill after closure). Indoor air exposure for construction workers is not considered in the RBDM methodology.

The vapor intrusion pathway was not evaluated for several reasons. The exposure pathway for indoor vapor is incomplete for any receptor because no buildings are present either at the site or in the area around the site. In addition, EPA's draft guidance for evaluating subsurface vapor intrusion (EPA 2002, 094114, p. 2) specifically states that the approaches are primarily designed to ensure protection in residential settings. The possible adjustment for other exposure scenarios, in this case for industrial and construction worker, is discussed in EPA's draft guidance (EPA 2002, 094114, p. 3) and indicates that the Occupational Safety and Health Administration generally takes the lead in addressing occupational exposures. The document further states that workers generally understand the workplace regulations (and monitoring, as needed) that already apply and are provided for their protection. In general, therefore, EPA does not expect this guidance to be used for settings that are primarily occupational. In addition, all proposed construction sites at the Laboratory must be evaluated to determine whether residual contamination is present. If so, a site-specific health and safety plan must be written, approved, and followed, which would include the potential hazards and exposures that may be encountered if intrusion into the subsurface occurs. Because of these controls, the actual construction worker exposure conditions would be protective.

Exposure to surficial soils is an incomplete pathway for child and adult residents. As described under land use, the site is not currently used for residential purposes and will not be used for residential purposes in the future. Current and future exposure of off-site residents is an incomplete pathway based on the distance from the site to off-site residents. On-site commercial and construction workers may currently be exposed to surficial soils and this is expected to be the case in the future. Exposure to on-site commercial and construction workers, therefore, is a complete pathway for current and future conditions. Exposure of off-site commercial and construction workers is not a complete pathway, both currently and in the future, since contaminants have not migrated off-site.

Indoor inhalation of vapors from subsurface soils is an incomplete pathway for residential and commercial workers for the reasons given above for the indoor inhalation of air vapors pathway. This pathway is not considered by the RBDM methodology for construction workers.

Outdoor inhalation of vapors volatilized from subsurface soils is a complete pathway for on-site construction workers, under both current and future conditions. This pathway is also complete for off-site construction workers given the potential for vapors to migrate to the adjacent Los Alamos County Landfill property. This pathway is not considered by the RBDM methodology for residents or commercial workers.

Dermal contact and ingestion of subsurface soils is a complete pathway for construction workers under both current and future conditions given the residual contamination present in on-site soils at depths up to 15 ft bgs. This pathway is incomplete for off-site construction workers, both now and in the future, because the lateral extent of subsurface contamination has been determined and does not extend off-site. This pathway is not considered by the RBDM methodology for residents or commercial workers.

Indoor inhalation of vapors from groundwater is an incomplete pathway for residents and commercial workers because of the depth to groundwater (i.e., greater than 15 ft). This pathway is not considered by the RBDM methodology for construction workers.

Outdoor inhalation of vapors from groundwater is an incomplete pathway for construction workers because of the depth to groundwater (i.e., greater than 15 ft). This pathway is not considered by the RBDM methodology for residents and commercial workers.

Ingestion of groundwater by on-site residents and commercial workers is an incomplete pathway because there are no on-site supply wells, nor are any expected to be installed in the future. Ingestion of groundwater by off-site residents and commercial workers is a potentially complete pathway because there are off-site supply wells. The nearest supply well is well Otowi-4, which is located approximately three miles east of the site in Los Alamos Canyon. Monitoring results have shown no site-related contaminants in this well, and the migration of contaminants from the site to this well is unlikely because of the distance to the well and the depth to groundwater. This pathway is included for completeness and to be protective. Ingestion of groundwater by construction workers is not considered by the RBDM methodology.

E-4.2 Comparison of Soil Concentrations with Risk-Based Screening Levels

The Tier One report forms from the RBDM Computational Software (http://www.nmenv.state.nm.us/ust/lustrem.html) were used to compare representative soil concentrations with appropriate risk-based screening levels (RBSLs) for the complete pathways identified above. For the ingestion, inhalation, and dermal contact of surficial soil by on-site commercial workers, all representative soil concentrations were below RBSLs (Attachment E-2, Form No. 4, p. 3 of 6). For the ingestion, inhalation, and dermal contact of subsurface soils by on-site construction workers, all representative soil concentrations were below RBSLs (Attachment E-2, Form No. 4, p. 5 of 6).

The direct comparison of groundwater concentrations with RBSLs was impossible because there are no applicable groundwater monitoring data. As a result, soil concentrations that are protective of groundwater were calculated for comparison with representative soil concentrations using the methodology in Section 4.5 of the NMED Guidelines for Corrective Action (http://www.nmenv.state.nm.us/ust/docs/gui-chap4.doc).

The unsaturated zone configuration for the site was based on a default overburden thickness of 5 ft, a contaminated zone thickness of 40 ft (based on the vertical extent of contamination), a transport zone greater than 200 ft, and a default transition zone of 0.033 ft. From Table 4-12 of the guidance, the appropriate configuration identification is 40. Values of unsaturated zone dilution attenuation factor (DAF_{unsat}) were obtained from Table 4-13 in the guidance. Based on a configuration identification of 40, the appropriate DAF_{unsat} values are 2.9 for EDB, 3.2 for EDC, and 4.0 for MTBE. Other contaminants do not impact groundwater given this configuration.

A value for saturated zone dilution attenuation factor (DAF_{sat}) was obtained from Table 4-14 of the guidance. Based on a distance from the edge of the mixing zone of greater than 1000 ft, the maximum DAF_{sat} of 163 was selected.

Tier 1 soil concentrations protective of groundwater were obtained from Table 4.15 of the guidance. For an unsaturated zone configuration identification of 40, the resulting soil concentrations were 0.0002 mg/kg for EDB, 0.03 mg/kg for EDC, and 0.17 mg/kg for MTBE. These values were adjusted to account for dilution and attenuation in the saturated zone by multiplying by DAF_{sat}. The resulting values are 0.03 mg/kg for EDB, 4.9 mg/kg for EDC, and 27.7 mg/kg for MTBE. The representative soil concentrations for EDC and MTBE did not exceed the RBSL, but the representative concentration for EDB was higher than the RBSL (Attachment E-2, Form No. 5, p. 1 of 2). The representative concentration of EDB was 0.41 mg/kg compared with the RBSL of 0.003 mg/kg.

EDB was not detected within the source area and the representative concentration is based solely on detection limits. Detection limits for EDB ranged from 0.00103 mg/kg to 5.82 mg/kg. In accordance with the methodology for calculating representative concentrations, one-half the detection limit was used for nondetected results. The representative concentration of EDB is biased high as a result of using only the detection limits for EDB (five of 22 detection limits were elevated above 1 mg/kg). In addition, the maximum available value for DAF_{sat} was used, which is based on a distance to point of exposure of 1000 ft. The actual distance from the site to the nearest supply well is over 17,000 ft, so the actual DAF_{sat} should be much higher. Since the DAF is essentially a dilution factor, a higher DAF would result in a higher RBSL.

E-4.3 Summary

The results of the Tier One Evaluation for surface and subsurface soil exposure pathways for commercial and construction workers are consistent with the results of the human health screening assessment and show no potential current or future risk by these pathways. As a result, no additional cleanup activities are recommended. The exposure to groundwater pathways was not evaluated in the human health screening assessment. The results of the Tier One Evaluation indicate that the representative concentration for EDB exceed the RBSL. However, EDB was not detected in any of the samples and the representative concentration was calculated solely from detection limits. The Tier One groundwater screening assessment is very conservative and underestimates the RBSL. As a result, the site is not a potential source of groundwater contamination and no additional cleanup activities are recommended.

E-5.0 CONCLUSIONS AND RECOMMENDATIONS

The human health risk screening results for SWMU 61-002 demonstrate that the potential hazard and risk under the industrial and construction worker scenarios do not exceed NMED's target levels (NMED 2006, 092513) under current conditions. The human health risk screening results under the residential scenario exceeded NMED's target levels for noncarcinogenic hazard and carcinogenic risk. If SWMU 61-002 remains in its current state, no additional corrective action is warranted based on potential risk to human health.

Detected concentrations in soil exceeding C_{sat} SSLs indicate that further evaluation is appropriate. In the case of SWMU 61-002, the evaluations included an analysis to determine if nature and extent are defined and the risk screening assessments. The evaluation of the data determined that nature and extent, especially vertical extent, are defined by the sampling conducted (COPCs were detected at trace levels or not detected below 50 ft bgs). The site was assessed for potential risk using NMED and EPA guidance. The 95% UCLs for the COPCs were calculated to represent the reasonable maximum exposure across the site for the industrial, construction worker, and residential scenarios, not the worst-case conditions. In doing so, none of the 95% UCLs exceeded the C_{sat} SSLs provided by NMED and EPA Region 6 (EPA 2006, 094321; NMED 2006, 092513). Therefore, calculating risk-based SSLs for the site was appropriate and based on the results of the assessments no further soil removal is necessary.

Potential ecological risk was assessed for SWMU 61-002 and the results indicated that contamination does not pose potential ecological risk to receptor populations. No additional corrective action is warranted at SWMU 61-002 based on a potential ecological risk.

The results of the Tier One Evaluation indicate that the residual subsurface petroleum hydrocarbon concentrations do not exceed New Mexico Petroleum Storage Tank Bureau risk-based screening levels for any current or reasonably foreseeable future exposure pathway.

E-6.0 REFERENCES

The following list includes all documents cited in this appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; the EPA, Region 6; and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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Table E-1.1-1
EPCs for the Industrial Scenario at SWMU 61-002

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Antimony	20	Nonparametric	0.16	0.6(UJ)	0.29	0.08	0.32	Modified-t UCL
Copper	20	Gamma	1.9	21.5	5.55	4.72	7.34	Approximate Gamma
Lead	20	Gamma	3.8	42.6	12.84	10.42	17	Approximate Gamma
Mercury	20	Nonparametric	0.016	0.11	0.0285	0.025	0.053	Chebyshev(Mean, Std)
Selenium	20	Normal	0.11	0.89	0.43	0.23	0.52	Student's-t UCL
Zinc	20	Nonparametric	14	555	61.8	118	176.9	Chebyshev(Mean, Std)
Acetone	20	Lognormal	0.0057	4.5	0.33	0.996	0.53	Chebyshev(MVUE*)
Aroclor-1254	20	Nonparametric	0.035(U)	0.47	0.054	0.11	0.16	Chebyshev(Mean, Std)
Aroclor-1260	20	Nonparametric	0.029	0.27	0.057	0.062	0.12	Chebyshev(Mean, Std)
Benzene	20	Nonparametric	0.00028	0.0064(U)	0.0024	0.0028	0.0012	Chebyshev(Mean, Std)
Benzo(a)anthracene	20	Nonparametric	0.1	3.5(U)	0.52	0.52	1.03	Chebyshev(Mean, Std)
Benzo(a)pyrene	20	Nonparametric	0.096	3.5(U)	0.52	0.52	1.03	Chebyshev(Mean, Std)
Benzo(b)fluoranthene	20	Nonparametric	0.082	3.5(U)	0.51	0.53	1.03	Chebyshev(Mean, Std)
Benzo(k)fluoranthene	20	Nonparametric	0.11	3.5(U)	0.52	0.52	1.03	Chebyshev(Mean, Std)
Benzoic acid	20	Nonparametric	0.15	17(U)	2.47	2.59	4.99	Chebyshev(Mean, Std)
Bis(2-ethylhexyl)phthalate	20	Nonparametric	0.34	3.5(U)	0.53	0.51	1.03	Chebyshev(Mean, Std)
Butanone[2-]	20	Nonparametric	0.0015	0.17	0.019	0.0115	0.053	Chebyshev(Mean, Std)
Butylbenzylphthalate	20	Nonparametric	0.17	3.5(U)	0.49	0.52	0.99	Chebyshev(Mean, Std)
Chlorobenzene	20	Nonparametric	0.0051(U)	0.01	0.0033	0.0016	0.0039	Modified-t UCL
Chrysene	20	Nonparametric	0.11	3.5(U)	0.52	0.52	1.03	Chebyshev(Mean, Std)
Dichlorobenzene[1,2-]	20	Nonparametric	0.00042(U)	0.007(U)	0.0029	0.0009	0.0038	Chebyshev(Mean, Std)
Dichloroethene[cis/trans 1,2-]	20	Nonparametric	0.0047	0.0064(U)	0.0029	0.00048	0.0031	Modified-t UCL

Table E-1.1-1 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Di-n-octyl phthalate	20	Nonparametric	0.075	3.5(U)	0.52	0.52	1.03	Chebyshev(Mean, Std)
Fluoranthene	20	Nonparametric	0.099	3.5(U)	0.53	0.52	1.03	Chebyshev(Mean, Std)
Indeno(1,2,3-cd)pyrene	20	Nonparametric	0.11	3.5(U)	0.52	0.52	1.03	Chebyshev(Mean, Std)
Phenanthrene	20	Nonparametric	0.15	3.5(U)	0.53	0.52	1.03	Chebyshev(Mean, Std)
Pyrene	20	Nonparametric	0.12	3.5(U)	0.53	0.52	1.03	Chebyshev(Mean, Std)
Toluene	20	Nonparametric	0.00064	0.0064(U)	0.0019	0.0011	0.003	Chebyshev(Mean, Std)

Note: See Appendix A for data qualifier definitions.

*MVUE = Minimum variance unbiased estimate.

Table E-1.1-2
EPCs for the Construction Worker Scenario at SWMU 61-002

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Aluminum	90	Gamma	30.4(U)	20700	6294	5242	7375	Approximate Gamma
Antimony	90	Nonparametric	0.16	0.69(U)	0.24	0.09	0.25	Modified-t UCL
Arsenic	90	Lognormal	0.2	5.9	1.8	1.28	2.13	H-UCL
Barium	84	Nonparametric	18	676	107	99	154	Chebyshev(Mean,Std)
Cobalt	90	Nonparametric	0.59(U)	14.1	2.67	2.26	3.71	Chebyshev(Mean,Std)
Copper	90	Gamma	0.59(U)	21.5	5.49	3.56	6.15	Approximate Gamma
Lead	90	Lognormal	0.35(U)	52.5	12.7	10.4	15.5	H-UCL
Mercury	90	Nonparametric	0.011	2.2	0.054	0.23	0.16	Chebyshev(Mean,Std)
Selenium	90	Nonparametric	0.11	9.41	0.71	1.59	1.44	Chebyshev(Mean,Std)
Zinc	90	Nonparametric	2.4(U)	555	37.4	59.5	64.8	Chebyshev(Mean,Std)
Acenaphthene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Acetone	90	Nonparametric	0.0048	29.1(U)	0.51	1.78	1.33	Chebyshev(Mean,Std)
Anthracene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Aroclor-1254	90	Nonparametric	0.0036(U)	11	0.49	1.18	0.74	Chebyshev(Mean,Std)
Aroclor-1260	90	Nonparametric	0.0036(U)	1.3	0.06	0.16	0.13	Chebyshev(Mean,Std)
Benzene	90	Nonparametric	0.00028	27	0.37	2.86	1.68	Chebyshev(Mean,Std)
Benzo(a)anthracene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.49	Chebyshev(Mean,Std)
Benzo(a)pyrene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Benzo(b)fluoranthene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Benzo(g,h,i)perylene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Benzo(k)fluoranthene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)

Table E-1.1-2 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Benzoic acid	90	Nonparametric	0.15	77.6(U)	1.74	4.22	3.68	Chebyshev(Mean,Std)
Bis(2-ethylhexyl)phthalate	90	Nonparametric	0.18(U)	19.4(U)	0.41	1.05	0.89	Chebyshev(Mean,Std)
Butanone[2-]	90	Nonparametric	0.0012	29.1(U)	0.36	1.70	1.14	Chebyshev(Mean,Std)
Butylbenzene[n-]	90	Nonparametric	0.00054	50.5(U)	0.33	2.66	1.56	Chebyshev(Mean,Std)
Butylbenzene[sec-]	90	Nonparametric	0.00108(U)	9.4	0.16	1.01	0.62	Chebyshev(Mean,Std)
Butylbenzylphthalate	90	Nonparametric	0.17	38.8(U)	0.50	2.04	1.44	Chebyshev(Mean,Std)
Chlorobenzene	90	Nonparametric	0.00108(U)	5.82(U)	0.085	0.37	0.25	Chebyshev(Mean,Std)
Chloroethane	90	Nonparametric	0.00108(U)	5.82(U)	0.11	0.43	0.31	Chebyshev(Mean,Std)
Chloromethane	90	Nonparametric	0.00108(U)	5.82(U)	0.12	0.45	0.32	Chebyshev(Mean,Std)
Chrysene	90	Nonparametric	0.036(U)	3.88(U)	0.32	0.38	0.49	Chebyshev(Mean,Std)
Dibromo-3-chloropropane[1,2-]	90	Nonparametric	0.000108(U)	5.82(U)	0.11	0.43	0.31	Chebyshev(Mean,Std)
Dibromoethane[1,2-]	90	Nonparametric	0.000509	5.82(U)	0.083	0.37	0.25	Chebyshev(Mean,Std)
Dichlorobenzene[1,2-]	90	Nonparametric	0.00033(U)	5.82(U)	0.063	0.34	0.22	Chebyshev(Mean,Std)
Dichlorobenzene[1,4-]	89	Nonparametric	0.00058(U)	5.82(U)	0.063	0.34	0.29	Chebyshev(Mean,Std)
Dichloroethene[cis/trans 1,2-]	90	Nonparametric	0.00081	5.82(U)	0.083	0.37	0.25	Chebyshev(Mean,Std)
Di-n-octyl phthalate	90	Nonparametric	0.075	38.8(U)	0.51	2.04	1.45	Chebyshev(Mean,Std)
Ethylbenzene	90	Nonparametric	0.00101(U)	230	3.27	24.8	14.7	Chebyshev(Mean,Std)
Fluoranthene	90	Nonparametric	0.036(U)	3.88(U)	0.32	0.40	0.51	Chebyshev(Mean,Std)
Fluorene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Indeno(1,2,3-cd)pyrene	90	Nonparametric	0.036(U)	3.88(U)	0.31	0.38	0.48	Chebyshev(Mean,Std)
Isopropylbenzene	90	Nonparametric	0.00108(U)	9.5	0.17	1.05	0.66	Chebyshev(Mean,Std)
Isopropyltoluene[4-]	90	Nonparametric	0.00047	5.82(UJ)	0.14	0.57	0.40	Chebyshev(Mean,Std)
Methylnaphthalene[2-]	90	Nonparametric	0.01815(U)	230	3.98	25.6	15.8	Chebyshev(Mean,Std)
Naphthalene	90	Nonparametric	0.036(U)	1300	15.6	137.6	78.6	Chebyshev(Mean,Std)

Table E-1.1-2 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Phenanthrene	90	Nonparametric	0.036(U)	3.88(U)	0.32	0.39	0.50	Chebyshev(Mean,Std)
Propylbenzene[1-]	90	Nonparametric	0.000274	58.4	1.35	8.27	5.15	Chebyshev(Mean,Std)
Pyrene	80	Nonparametric	0.0129	3.88(U)	0.32	0.39	0.50	Chebyshev(Mean,Std)
Styrene	90	Nonparametric	0.00041(U)	3.88(U)	0.067	0.35	0.30	Chebyshev(Mean,Std)
Tetrachloroethene	90	Nonparametric	0.00082(U)	5.82(U)	0.082	0.37	0.25	Chebyshev(Mean,Std)
Toluene	90	Nonparametric	0.00064(U)	380	4.57	40.1	23	Chebyshev(Mean,Std)
Trimethylbenzene[1,2,4-]	90	Nonparametric	0.00026(U)	610	14.6	86.9	54.5	Chebyshev(Mean,Std)
Trimethylbenzene[1,3,5-]	90	Nonparametric	0.00075	212	5.28	31.4	19.7	Chebyshev(Mean,Std)
Xylenes	94	Nonparametric	0.000543(U)	870	15	94.8	57.6*	Chebyshev(Mean,Std)

Note: See Appendix A for data qualifier definitions.

*EPC for xylenes includes concentrations for xylene(total), xylene[1,2-], and xylene[1,3+1,4-] from 0–20 ft bgs.

Table E-1.1-3
EPCs for the Residential Scenario at SWMU 61-002

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Aluminum	82	Gamma	30.4(U)	20700	6111	5068	7212	Approximate Gamma
Antimony	82	Nonparametric	0.16	0.69(U)	0.24	0.09	0.29	Chebyshev(Mean,Std)
Barium	79	Nonparametric	18	676	105.6	97.8	153.6	Chebyshev(Mean,Std)
Cobalt	82	Nonparametric	0.67	14.1	2.8	2.31	3.91	Chebyshev(Mean,Std)
Copper	82	Gamma	1.9	21.5	5.69	3.55	6.33	Approximate Gamma
Lead	82	Gamma	3.4	51.9	12.37	9.45	13.9	Approximate Gamma
Mercury	82	Nonparametric	0.0063	2.2	0.06	0.24	0.18	Chebyshev(Mean,Std)
Selenium	82	Lognormal	0.11	9.41	0.58	1.28	0.58	H-UCL
Zinc	82	Nonparametric	2.4(U)	555	38.1	62.3	68.1	Chebyshev(Mean,Std)
Acenaphthene	82	Nonparametric	0.036(U)	3.7(U)	0.3	0.34	0.47	Chebyshev(Mean,Std)
Acetone	82	Nonparametric	0.00541(U)	11(U)	0.34	0.99	0.81	Chebyshev(Mean,Std)
Anthracene	82	Nonparametric	0.036(U)	3.7(U)	0.3	0.35	0.47	Chebyshev(Mean,Std)
Aroclor-1254	82	Nonparametric	0.0036(U)	11	0.21	1.24	0.81	Chebyshev(Mean,Std)
Aroclor-1260	82	Nonparametric	0.0036(U)	1.3	0.065	0.16	0.14	Chebyshev(Mean,Std)
Benzene	82	Nonparametric	0.00028	27	0.36	2.98	1.8	Chebyshev(Mean,Std)
Benzo(a)anthracene	82	Nonparametric	0.036(U)	3.7(U)	0.31	0.35	0.47	Chebyshev(Mean,Std)
Benzo(a)pyrene	82	Nonparametric	0.036(U)	3.7(U)	0.31	0.35	0.47	Chebyshev(Mean,Std)
Benzo(b)fluoranthene	82	Nonparametric	0.036(U)	3.7(U)	0.31	0.35	0.47	Chebyshev(Mean,Std)
Benzo(g,h,i)perylene	82	Nonparametric	0.036(U)	3.7(U)	0.31	0.35	0.47	Chebyshev(Mean,Std)
Benzo(k)fluoranthene	82	Nonparametric	0.036(U)	3.7(U)	0.31	0.35	0.48	Chebyshev(Mean,Std)
Benzoic acid	82	Nonparametric	0.15	18(U)	1.46	1.6	2.28	Chebyshev(Mean,Std)
Bis(2-ethylhexyl)phthalate	82	Nonparametric	0.18(U)	3.7(U)	0.31	0.36	0.48	Chebyshev(Mean,Std)

Table E-1.1-3 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Butanone[2-]	82	Nonparametric	0.0012	11.0(U)	0.15	0.61	0.44	Chebyshev(Mean,Std)
Butylbenzene[n-]	82	Nonparametric	0.00054	2.8(U)	0.052	0.22	0.16	Chebyshev(Mean,Std)
Butylbenzylphthalate	82	Nonparametric	0.17	3.7(U)	0.3	0.34	0.46	Chebyshev(Mean,Std)
Chlorobenzene	82	Nonparametric	0.00108(U)	2.8(U)	0.051	0.21	0.15	Chebyshev(Mean,Std)
Chloroethane	82	Nonparametric	0.00108(U)	3.5(U)	0.077	0.31	0.23	Chebyshev(Mean,Std)
Chloromethane	82	Nonparametric	0.00108(U)	3.5(U)	0.074	0.31	0.22	Chebyshev(Mean,Std)
Chrysene	82	Nonparametric	0.036(U)	3.7(U)	0.31	0.35	0.48	Chebyshev(Mean,Std)
Dibromo-3-chloropropane[1,2-]	82	Nonparametric	0.00108(U)	5.6(U)	0.077	0.31	0.23	Chebyshev(Mean,Std)
Dichlorobenzene[1,2-]	82	Nonparametric	0.00033(U)	2.8(U)	0.031	0.16	0.11	Chebyshev(Mean,Std)
Dichlorobenzene[1,4-]	81	Nonparametric	0.00058(U)	0.069	0.0037	0.0074	0.0073	Chebyshev(Mean,Std)
Dichloroethene[cis/trans 1,2-]	82	Nonparametric	0.00108(U)	2.8(U)	0.061	0.047	0.17	Chebyshev(Mean,Std)
Di-n-octyl phthalate	82	Nonparametric	0.075	3.7(U)	0.31	0.34	0.47	Chebyshev(Mean,Std)
Ethylbenzene	82	Nonparametric	0.00108(U)	230	2.88	25.4	15.1	Chebyshev(Mean,Std)
Fluoranthene	82	Nonparametric	0.036(U)	3.7(U)	0.32	0.38	0.50	Chebyshev(Mean,Std)
Fluorene	82	Nonparametric	0.036(U)	3.7(U)	0.30	0.35	0.47	Chebyshev(Mean,Std)
Hexanone[2-]	82	Nonparametric	0.00541(U)	11(U)	0.23	0.9	0.66	Chebyshev(Mean,Std)
Indeno(1,2,3-cd)pyrene	82	Nonparametric	0.036(U)	3.7(U)	0.3	0.35	0.47	Chebyshev(Mean,Std)
Isopropylbenzene	82	Nonparametric	0.00108(U)	9.5	0.14	1.05	0.65	Chebyshev(Mean,Std)
Isopropyltoluene[4-]	82	Nonparametric	0.00047	2.8(U)	0.072	0.28	0.21	Chebyshev(Mean,Std)
Methylene chloride	82	Nonparametric	0.0033(U)	7.4(U)	0.09	0.43	0.30	Chebyshev(Mean,Std)
Methylnaphthalene[2-]	82	Nonparametric	0.036(U)	230	3.27	25.4	15.5	Chebyshev(Mean,Std)
Naphthalene	82	Nonparametric	0.036(U)	1300	16.2	143.5	85.3	Chebyshev(Mean,Std)
Phenanthrene	82	Nonparametric	0.036(U)	3.7(U)	0.32	0.37	0.50	Chebyshev(Mean,Std)
Propylbenzene[1-]	82	Nonparametric	0.00108(U)	53	0.72	5.85	3.54	Chebyshev(Mean,Std)

Table E-1.1-3 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Pyrene	82	Nonparametric	0.036(U)	3.7(U)	0.32	0.36	0.49	Chebyshev(Mean,Std)
Styrene	82	Nonparametric	0.00041(U)	2.8(U)	0.036	0.032	0.12	Chebyshev(Mean,Std)
Tetrachloroethene	82	Nonparametric	0.00082	2.8(U)	0.051	0.22	0.15	Chebyshev(Mean,Std)
Toluene	82	Nonparametric	0.00064(U)	380	4.7	42	24.9	Chebyshev(Mean,Std)
Trimethylbenzene[1,2,4-]	82	Nonparametric	0.0026(U)	610	8.51	67.5	41	Chebyshev(Mean,Std)
Trimethylbenzene[1,3,5-]	82	Nonparametric	0.00026(U)	210	2.86	23.2	14	Chebyshev(Mean,Std)
Xylenes	84	Nonparametric	0.000543(U)	870	11.1	94.9	56.2*	Chebyshev(Mean,Std)

Note: See Appendix A for data qualifier definitions.
*EPC for xylenes includes concentrations for xylene(total), xylene[1,2-], and xylene[1,3+1,4-] from 0–12 ft bgs.

Table E-1.1-4
EPCs for the Ecological Screening Assessment at SWMU 61-002

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Antimony	65	Nonparametric	0.16	0.69(U)	0.27	0.08	0.29	Modified-t UCL
Barium	65	Nonparametric	18	676	106	105	163	Chebyshev(Mean,Std)
Cobalt	65	Nonparametric	0.67	10.2	2.8	4.38	3.93	Chebyshev(Mean,Std)
Copper	65	Gamma	1.9	21.5	5.98	3.86	6.79	Approximate Gamma
Lead	65	Gamma	3.4	51.9	12.9	9.72	14.7	Approximate Gamma
Mercury	65	Nonparametric	0.011	0.15	0.033	0.028	0.048	Chebyshev(Mean,Std)
Selenium	65	Gamma	0.11	1.7	0.41	0.28	0.47	Approximate Gamma
Zinc	65	Nonparametric	2.4(U)	555	41.5	69.6	79.2	Chebyshev(Mean,Std)
Acenaphthene	65	Nonparametric	0.16	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Acetone	65	Nonparametric	0.0039	7.0(U)	0.24	0.79	0.67	Chebyshev(Mean,Std)
Anthracene	65	Nonparametric	0.3	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Aroclor-1254	65	Nonparametric	0.035(U)	11	0.26	1.39	1.01	Chebyshev(Mean,Std)
Aroclor-1260	65	Nonparametric	0.029	1.3	0.076	0.18	0.17	Chebyshev(Mean,Std)
Benzene	65	Nonparametric	0.00028	1.8(U)	0.029	0.15	0.11	Chebyshev(Mean,Std)
Benzo(a)anthracene	65	Nonparametric	0.1	3.5(U)	0.32	0.33	0.50	Chebyshev(Mean,Std)
Benzo(a)pyrene	65	Nonparametric	0.096	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Benzo(b)fluoranthene	65	Nonparametric	0.082	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Benzo(g,h,i)perylene	65	Nonparametric	0.34	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Benzo(k)fluoranthene	65	Nonparametric	0.11	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Benzoic acid	65	Nonparametric	0.15	17(U)	1.49	1.62	2.37	Chebyshev(Mean,Std)
Bis(2-ethylhexyl)phthalate	65	Nonparametric	0.34	3.5(U)	0.32	0.34	0.50	Chebyshev(Mean,Std)
Butanone[2-]	65	Nonparametric	0.0012	7(U)	0.12	0.58	0.43	Chebyshev(Mean,Std)

Table E-1.1-4 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Butylbenzene[n-]	65	Nonparametric	0.00054	1.8(U)	0.029	0.15	0.11	Chebyshev(Mean,Std)
Butylbenzylphthalate	65	Nonparametric	0.17	3.5(U)	0.30	0.32	0.47	Chebyshev(Mean,Std)
Chlorobenzene	65	Nonparametric	0.0013	1.8(U)	0.032	0.15	0.11	Chebyshev(Mean,Std)
Chloromethane	65	Nonparametric	0.0024	3.5(U)	0.057	0.29	0.21	Chebyshev(Mean,Std)
Chrysene	65	Nonparametric	0.11	3.5(U)	0.32	0.33	0.50	Chebyshev(Mean,Std)
Dibromo-3-chloropropane[1,2-]	65	Nonparametric	0.0015	3.5(U)	0.057	0.29	0.21	Chebyshev(Mean,Std)
Dichlorobenzene[1,2-]	65	Nonparametric	0.00033(U)	0.066	0.0043	0.0081	0.0087	Chebyshev(Mean,Std)
Dichlorobenzene[1,4-]	63	Nonparametric	0.00058(U)	3.5(U)	0.004	0.0084	0.0086	Chebyshev(Mean,Std)
Dichloroethene[cis/trans 1,2-]	65	Nonparametric	0.00081	1.8(U)	0.029	0.15	0.11	Chebyshev(Mean,Std)
Di-n-octyl phthalate	65	Nonparametric	0.075	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Ethylbenzene	65	Nonparametric	0.0051(U)	1.6(U)	0.035	0.19	0.14	Chebyshev(Mean,Std)
Fluoranthene	65	Nonparametric	0.083	3.5(U)	0.33	0.37	0.54	Chebyshev(Mean,Std)
Fluorene	65	Nonparametric	0.16	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Indeno(1,2,3-cd)pyrene	65	Nonparametric	0.11	3.5(U)	0.31	0.33	0.49	Chebyshev(Mean,Std)
Isopropylbenzene	65	Nonparametric	0.0051(U)	1.6(U)	0.019	0.1	0.074	Chebyshev(Mean,Std)
Isopropyltoluene[4-]	65	Nonparametric	0.00047	1.8(U)	0.029	0.15	0.11	Chebyshev(Mean,Std)
Methylnaphthalene[2-]	65	Nonparametric	0.34(U)	3.5(U)	0.34	0.39	0.55	Chebyshev(Mean,Std)
Naphthalene	65	Nonparametric	0.34(U)	3.5(U)	0.33	0.36	0.53	Chebyshev(Mean,Std)
Phenanthrene	65	Nonparametric	0.15	3.5(U)	0.33	0.36	0.52	Chebyshev(Mean,Std)
Propylbenzene[1-]	65	Nonparametric	0.0051(U)	1.6(U)	0.028	0.14	0.11	Chebyshev(Mean,Std)
Pyrene	65	Nonparametric	0.092	3.5(U)	0.33	0.35	0.52	Chebyshev(Mean,Std)
Styrene	65	Nonparametric	0.00041(U)	0.13	0.0064	0.02	0.017	Chebyshev(Mean,Std)
Tetrachloroethene	65	Nonparametric	0.00082	1.8(U)	0.029	0.15	0.11	Chebyshev(Mean,Std)
Toluene	65	Nonparametric	0.00064(U)	1.7	0.04	0.23	0.17	Chebyshev(Mean,Std)

Table E-1.1-4 (continued)

COPC	Number of Analyses	Distribution	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	EPC (mg/kg)	UCL Method
Trimethylbenzene[1,2,4-]	65	Nonparametric	0.00026(U)	9.5	0.2	1.24	0.87	Chebyshev(Mean,Std)
Trimethylbenzene[1,3,5-]	65	Nonparametric	0.0051(U)	3.1	0.071	0.41	0.29	Chebyshev(Mean,Std)
Xylenes	65	Nonparametric	0.0051(U)	11	0.18	1.36	0.92	Chebyshev(Mean,Std)

Note: See Appendix A for data qualifier definitions.

Table E-1.1-5
Noncarcinogenic Screening Evaluation for the Industrial Scenario at SWMU 61-002

COPC	EPC[a] (mg/kg)	Industrial SSL[b] (mg/kg)	Industrial HQs
Antimony	0.32	454	0.0007
Copper	7.34	45400	0.0002
Lead	17	800	0.02
Mercury	0.053	340[c]	0.0002
Selenium	0.52	5680	0.00009
Zinc	176.9	100000[d]	0.002
Acetone	0.53	100000	0.000005
Aroclor-1254	0.16	12[e]	0.01
Aroclor-1260	0.12	12[e]	0.01
Benzoic acid	4.99	100000[c]	0.00005
Butanone[2-]	0.053	100000[e]	0.0000005
Butylbenzylphthalate	0.99	100000[e]	0.00001
Chlorobenzene	0.0039	500	0.000008
Dichlorobenzene[1,2-]	0.0038	450	0.000008
Dichloroethene[cis/trans 1,2-]	0.0031	300[f]	0.00001
Di-n-octyl phthalate	1.03	25000[g]	0.00004
Fluoranthene	1.03	24400	0.00004
Phenanthrene	1.03	20500	0.00005
Pyrene	1.03	30900	0.00003
Toluene	0.003	22000[e]	0.0000001
		HI	**0.04**

[a] 95% UCL used as EPC.

[b] SSLs from NMED (2006, 092513), unless otherwise noted.

[c] SSL from EPA Region 6 (EPA 2006, 094321).

[d] Maximum allowable concentration in accordance with NMED (2006, 092513) and EPA (2006, 094321).

[e] SSL from EPA Region 6 Excel spreadsheet (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screenexpanded.xls).

[f] SSL is for dichloroethene[cis 1,2-] from NMED (2006, 092513), which is the lower of the two SSLs for cis and trans.

[g] SSL obtained from EPA Region 9 (http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf).

Table E-1.1-6
Carcinogenic Screening Evaluation for the Industrial Scenario at SMWU 61-002

COPC	EPC[a] (mg/kg)	Industrial SSL[b] (mg/kg)	Industrial Cancer Risk
Aroclor-1254	0.16	8.26	$2 x10^{-7}$
Aroclor-1260	0.12	8.26	1×10^{-7}
Benzene	0.0012	25.8	5×10^{-10}
Benzo(a)anthracene	1.03	23.4	4×10^{-7}
Benzo(a)pyrene	1.03	2.34	4×10^{-6}
Benzo(b)fluoranthene	1.03	23.4	4×10^{-7}
Benzo(k)fluoranthene	1.03	234	4×10^{-8}
Bis(2-ethylhexyl)phthalate	1.03	1370	8×10^{-9}
Chrysene	1.03	2310	5×10^{-9}
Indeno(1,2,3-cd)pyrene	1.03	23.4	4×10^{-7}
		Total Excess Cancer Risk	**6×10^{-6}**

[a] 95% UCL used as the EPC.

[b] SSLs from NMED (2006, 092513).

Table E-1.1-7
Noncarcinogenic Screening Evaluation for the
Construction Worker Scenario at SWMU 61-002

COPC	EPC[a] (mg/kg)	Construction Worker SSL[b] (mg/kg)	Construction Worker HQs
Aluminum	7375	14400	0.5
Antimony	0.25	124	0.002
Arsenic	2.13	85.2	0.03
Barium	154	60200	0.003
Cobalt	3.71	61	0.06
Copper	6.15	12400	0.0005
Lead	15.5	800	0.02
Mercury	0.16	927[c]	0.0002
Selenium	1.44	1550	0.0009
Zinc	64.8	92900	0.0007
Acenaphthene	0.48	14100	0.00003
Acetone	1.33	96500	0.00001
Anthracene	0.48	86000	0.000006
Aroclor-1254	0.74	4.28	0.2
Aroclor-1260	0.13	4.28	0.03
Benzo(g,h,i)perylene	0.48	9010[d]	0.00005
Benzoic acid	3.68	100000[e,f]	0.00004

Table E-1.1-7 (continued)

COPC	EPC[a] (mg/kg)	Construction Worker SSL[b] (mg/kg)	Construction Worker HQs
Butanone[2-]	1.14	98300[g]	0.00001
Butylbenzene[n-]	1.56	510[g]	0.003
Butylbenzene[sec-]	0.62	404[g]	0.002
Butylbenzylphthalate	1.44	46500[h]	0.00003
Chlorobenzene	0.25	629[g]	0.0004
Chloromethane	0.32	284	0.001
Dibromo-3-chloropropane[1,2-]	0.31	6.48	0.05
Dichlorobenzene[1,2-]	0.22	281[g]	0.0008
Dichloroethene[cis/trans 1,2-]	0.25	254[i]	0.001
Di-n-octyl phthalate	1.45	11600[j]	0.0001
Ethylbenzene	14.7	7060[g]	0.002
Fluoranthene	0.51	8730	0.00006
Fluorene	0.48	10200	0.00005
Hexanone[2-]	1.15	100000	0.00001
Isopropylbenzene	0.66	878[g]	0.0008
Isopropyltoluene[4-]	0.40	878[k]	0.0005
Methylnaphthalene[2-]	15.8	262[l]	0.06
Naphthalene	78.6	262	0.3
Phenanthrene	0.50	6990	0.00007
Propylbenzene[1-]	5.15	504[g]	0.01
Pyrene	0.50	9010	0.00006
Styrene	0.30	9130[g]	0.00003
Toluene	23	12800[g]	0.002
Trimethylbenzene[1,2,4-]	54.5	190	0.3
Trimethylbenzene[1,3,5-]	19.7	81.1[g]	0.2
Xylenes	57.6	855[g]	0.07
		HI	**1.8**

[a] 95% UCL used as EPC.

[b] SSLs from NMED (2006, 092513), unless otherwise noted.

[c] Construction worker SSL is for elemental mercury obtained from NMED (2006, 092513).

[d] Pyrene is used as surrogate based on structural similarity.

[e] Maximum allowable concentration in accordance with NMED (2006, 092513) and EPA (2006, 094321).

[f] Construction worker SSL calculated using EPA Region 6 RfDo and RfDi of 4.0 mg/kg-d (EPA 2006, 094321).

[g] Construction worker SSL calculated using NMED RfDo and RfDi (NMED 2006, 092513).

[h] Construction worker SSL calculated using EPA Region 6 RfDo and RfDi of 0.2 mg/kg-d (EPA 2006, 094321).

[i] SSL is for dichloroethene[cis 1,2-] from NMED (2006, 092513), which is the lower of the two SSLs for cis and trans.

[j] Construction worker SSL calculated using EPA Region 9 RfDo and RfDi of 0.04 mg/kg-d (http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf).

[k] Isopropylbenzene is used as surrogate based on structural similarity.

[l] Naphthalene is used as surrogate based on structural similarity.

Table E-1.1-8
Carcinogenic Screening Evaluation for the Construction Worker Scenario at SWMU 61-002

COPC	EPC[a] (mg/kg)	Construction Worker SSL[b] (mg/kg	Construction Worker Cancer Risk
Arsenic	2.13	105[c]	2×10^{-7}
Aroclor-1254	0.74	27[c]	3×10^{-7}
Aroclor-1260	0.13	27[c]	5×10^{-8}
Benzene	1.68	174	1×10^{-7}
Benzo(a)anthracene	0.49	212	2×10^{-8}
Benzo(a)pyrene	0.48	21.2	2×10^{-7}
Benzo(b)fluoranthene	0.48	212	2×10^{-8}
Benzo(k)fluoranthene	0.48	2120	2×10^{-9}
Bis(2-ethylhexyl)phthalate	0.89	4660	2×10^{-9}
Chloroethane	0.31	2980[c]	1×10^{-9}
Chloromethane	0.32	942[c]	3×10^{-9}
Chrysene	0.49	21200	2×10^{-10}
Dibromoethane[1,2-]	0.25	24.8	1×10^{-7}
Dichlorobenzene[1,4-]	0.29	1960	1×10^{-9}
Indeno(1,2,3-cd)pyrene	0.48	212	2×10^{-8}
Methylene chloride	1.02	4480[c]	2×10^{-9}
Tetrachloroethene	0.25	526[c]	5×10^{-9}
		Total Excess Cancer Risk	**1×10^{-6}**

[a] 95% UCL used as EPC.

[b] SSLs from NMED (2006, 092513), unless otherwise noted.

[c] Construction worker SSL calculated using NMED cancer slope factor-oral (CSF_o) and cancer slope factor-inhalation (CSF_i) (NMED 2006, 092513).

Table E-1.1-9
Noncarcinogenic Screening Evaluation for the Residential Scenario at SWMU 61-002

COPC	EPC[a] (mg/kg)	Residential SSL[b] (mg/kg)	Residential HQs
Aluminum	7212	77800	0.09
Antimony	0.29	31.3	0.009
Barium	154	15600	0.01
Cobalt	3.91	1520	0.003
Copper	6.33	3130	0.002
Lead	13.9	400	0.03
Mercury	0.18	23[c]	0.008
Selenium	0.58	391	0.001
Zinc	68.1	23500	0.003
Acenaphthene	0.47	3730	0.0001
Acetone	0.81	28100	0.00003
Anthracene	0.47	22000	0.00002
Aroclor-1254	0.81	1.12	0.7
Aroclor-1260	0.14	1.12	0.1
Benzo(g,h,i)perylene	0.47	2290[d]	0.0002
Benzoic acid	2.28	100000[c,e]	0.00002
Butanone[2-]	0.44	31800	0.00001
Butylbenzene[n-]	0.16	140	0.001
Butylbenzylphthalate	0.46	12000[f]	0.00004
Chlorobenzene	0.15	194	0.0008
Dibromo-3-chloropropane[1,2-]	0.23	1.84	0.1
Dichlorobenzene[1,2-]	0.11	120[f]	0.0009
Dichloroethene[cis/trans 1,2-]	0.17	76.5[g]	0.002
Di-n-octyl phthalate	0.47	2400[h]	0.0002
Ethylbenzene	15.1	1500[f]	0.01
Fluoranthene	0.50	2290	0.0002
Fluorene	0.47	2660	0.0002
Isopropylbenzene	0.65	271	0.002
Isopropyltoluene[4-]	0.21	271[i]	0.0008
Methylnaphthalene[2-]	15.5	79.5[j]	0.2
Naphthalene	85.3	79.5	1.1
Phenanthrene	0.50	1830	0.0003
Propylbenzene[1-]	3.54	140	0.03
Pyrene	0.49	2290	0.0002
Styrene	0.12	4600[f]	0.00003
Toluene	24.9	3500[f]	0.007

Table E-1.1-9 (continued)

COPC	EPC[a] (mg/kg)	Residential SSL[b] (mg/kg)	Residential HQs
Trimethylbenzene[1,2,4-]	41	58	0.7
Trimethylbenzene[1,3,5-]	14	24.8	0.6
Xylenes	56.2[k]	190[f]	0.3
		HI	**4.0**

[a] 95% UCL used as the EPC.

[b] SSLs from NMED (2006, 092513), unless otherwise noted.

[c] SSL from EPA Region 6 (EPA 2006, 094321).

[d] Pyrene is used as surrogate based on structural similarity.

[e] Maximum allowable concentration in accordance with NMED (2006, 092513) and EPA (2006, 094321).

[f] SSL from EPA Region 6 Excel spreadsheet (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screenexpanded.xls)

[g] SSL is for dichloroethene[cis 1,2-] from NMED (2006, 092513), which is the lower of the two SSLs for cis and trans.

[h] SSL obtained from EPA Region 9 (http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf)

[i] Isopropylbenzene used as a surrogate based on structural similarity.

[j] Naphthalene is used as surrogate based on structural similarity.

[k] Xylenes EPC includes concentrations for xylenes (total), xylene(1,2-) and xylene(1,3- and 1,4-) from 0.0-12.0 ft bgs.

Table E-1.1-10
Carcinogenic Screening Evaluations for the Residential Scenario at SWMU 61-002

COPC	EPC[a] (mg/kg)	Residential SSL[b] (mg/kg)	Residential Cancer Risk
Aroclor-1254	0.81	2.2[c]	4×10^{-6}
Aroclor-1260	0.14	2.2[c]	6×10^{-7}
Benzene	1.8	10.3	2×10^{-6}
Benzo(a)anthracene	0.47	6.21	8×10^{-7}
Benzo(a)pyrene	0.47	0.621	8×10^{-6}
Benzo(b)fluoranthene	0.47	6.21	8×10^{-7}
Benzo(k)fluoranthene	0.48	62.1	8×10^{-8}
Bis(2-ethylhexyl)phthalate	0.48	347	1×10^{-8}
Chloroethane	0.23	63.3	4×10^{-8}
Chloromethane	0.22	21.8	1×10^{-7}
Chrysene	0.48	615	8×10^{-9}
Dichlorobenzene[1,4-]	0.0073	39.5	2×10^{-9}
Indeno(1,2,3-cd)pyrene	0.47	6.21	8×10^{-7}
Tetrachloroethene	0.15	12.5	1×10^{-7}
		Total Excess Cancer Risk	**2.0×10^{-5}**

[a] 95% UCL concentration used as the EPC.

[b] SSLs from NMED (2006, 092513), unless otherwise noted.

[c] SSL from EPA Region 6 (EPA 2006, 094321).

Table E-1.1-11
Comparison of TPH-DRO Sampling Results with NMED Screening Guidelines

Sample ID	Location ID	Depth (ft)	TPH-DRO Concentrations (mg/kg)	TPH-GRO Concentrations (mg/kg)
Industrial Screening Guideline[a]			**200**	**na**[b]
Residential Screening Guideline[a]			**200**	**na**
RE61-05-58735	61-24347	4.5–5	32(U)	120
RE61-05-58736	61-24347	5.5–6	220	1100
RE61-05-58734	61-24346	4.5–5	67	1400
RE61-05-58733	61-24346	5.5–6	130	1400
RE61-05-58743	61-24351	12–12.5	30(U)	0.46
RE61-05-58744	61-24351	19–19.5	29(U)	1.4
RE61-05-58745	61-24352	10–10.5	8500	16000
RE61-05-58746	61-24352	17–17.5	1100	2400
RE61-05-58747	61-24353	10–10.5	27(U)	0.11(U)
RE61-05-58748	61-24353	17.6–18.1	29(U)	0.36
RE61-05-58749	61-24354	10–10.5	27(U)	0.11(U)
RE61-05-58750	61-24354	17.2–17.7	29(U)	0.12(U)
RE61-06-71529	61-26619	23–25	4.24	0.133
RE61-06-71532	61-26620	5–7	3.43	0.547(U)
RE61-06-71531	61-26620	23–25	7.5	0.035
RE61-06-71534	61-26621	28–30	79.8	0.221
RE61-06-71533	61-26621	93–95	1.71(U)	0.0901
RE61-06-71535	61-26622	15–17	2990	6560
RE61-06-71536	61-26622	23–25	3730	6210
RE61-06-71537	61-26623	38–40	3.45	0.129
RE61-06-71538	61-26623	53–55	1.97	0.0715
RE61-06-73161	61-26985	15–17	2(U)	0.0474
RE61-06-73162	61-26985	23–25	2(U)	0.0558
RE61-06-73166	61-26986	10–12	2.03(U)	0.122(U)
RE61-06-73164	61-26986	23–25	1.97(U)	0.117
RE61-06-73168	61-26987	13–15	1.07	0.109(U)
RE61-06-73167	61-26987	23–25	1.9(U)	0.114(U)

Note: See Appendix A for data qualifier definitions.

[a] Screening guidelines obtained from NMED (2006, 094614).

[b] na = Not available.

Table E-2.2-1
Ecological Screening Levels for Terrestrial Receptors

Chemical	Kestrel (Intermediate carnivore)	Kestrel (top carnivore)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Desert Cottontail	Earthworm	Plant	Montane Shrew	Red Fox
Antimony	na*	na	na	na	na	0.48	2.9	78	0.05	0.26	45
Barium	11000	37000	820	1000	930	1800	3300	330	110	1300	41000
Cobalt	930	3500	170	96	120	400	1800	na	13	160	5400
Copper	88	1200	28	11	16	59	250	13	10	34	3500
Lead	120	810	21	14	16	120	370	1700	120	72	3700
Mercury	0.082	0.28	0.07	0.013	0.022	3	22	0.05	34	1.7	46
Selenium	8.5	140	1.5	1.1	1.3	1.1	3	7.7	0.1	0.92	110
Zinc	180	1400	200	27	48	290	3000	190	10	160	10000
Acenaphthene	na	na	na	na	na	160	490	na	0.25	120	6200
Acetone	120	30000	7.5	170	14	1.2	1.4	na	na	15	2900
Anthracene	na	na	na	na	na	310	1100	na	na	210	5800
Aroclor-1254	0.17	0.22	1.3	0.041	0.08	0.88	52	na	160	0.44	0.15
Aroclor-1260	3.7	4.6	46	0.88	1.7	20	3000	na	na	10	0.14
Benzene	na	na	na	na	na	24	35	na	na	47	7600
Benzo(a)anthracene	na	na	na	na	na	3.4	6.2	na	18	3	45
Benzo(a)pyrene	na	na	na	na	na	15	50	na	na	9.6	68
Benzo(b)fluoranthene	na	na	na	na	na	52	130	na	18	38	250
Benzo(g,h,i)perylene	na	na	na	na	na	47	540	na	na	24	94
Benzo(k)fluoranthene	na	na	na	na	na	100	350	na	na	62	400
Benzoic acid	na	na	na	na	na	1.3	4.2	na	na	1	350
Bis(2-ethylhexyl)phthalate	0.045	0.033	20	0.02	0.04	1.1	2700	na	na	0.59	1.2
Butanone[2-]	na	na	na	na	na	360	420	na	na	2600	420000

Table E-2.2-1 (continued)

Chemical	Kestrel (Intermediate carnivore)	Kestrel (top carnivore)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Desert Cottontail	Earthworm	Plant	Montane Shrew	Red Fox
Butylbenzylphthalate	na	na	na	na	na	160	2300	na	na	90	1900
Chlorobenzene	na	na	na	na	na	54	150	2.4	na	43	5500
Chrysene	na	na	na	na	na	3.1	6.5	na	na	2.4	46
Dichlorobenzene[1,4-]	na	na	na	na	na	1.5	11	1.2	na	0.88	72
Dichloroethene[cis/trans 1,2-]	na	na	na	na	na	25	58	na	na	23	7100
Di-n-octyl phthalate	na	na	na	na	na	2.2	16000	na	na	1.1	16
Fluoranthene	na	na	na	na	na	38	260	38	na	22	360
Fluorene	na	na	na	na	na	340	1100	4.1	na	250	9300
Indeno(1,2,3-cd)pyrene	na	na	na	na	na	110	590	na	na	62	270
Methylnaphthalene[2-]	na	na	na	na	na	3.8	16	na	na	2.5	130
Naphthalene	1100	6300	37	170	61	0.34	0.45	na	1	0.96	42
Phenanthrene	na	na	na	na	na	15	59	34	na	10	290
Pyrene	na	na	na	na	na	32	110	18	na	22	360
Tetrachloroethene	na	na	na	na	na	0.36	8.8	na	10	0.18	31
Toluene	na	na	na	na	na	25	61	na	200	23	3100
Xylenes	280	3200	90	41	56	2	7	na	100	1.4	130

Note: ESLs from ECORISK Database, Version 2.2 (LANL 2005, 090032).
*na = Not available.

Table E-2.2-2
Comparison of COPCs with the Minimum ESLs

COPC	EPC[a] (mg/kg)	Minimum ESL[b] (mg/kg)	Receptor	Hazard Quotient
Antimony	0.29	0.05	Plant	**5.8**
Barium	163	110	Plant	**1.5**
Cobalt	3.93	13	Plant	0.3
Copper	6.79	10	Plant	**0.7**
Lead	14.7	14	Robin(insectivore)	**1.1**
Mercury	0.048	0.013	Robin(insectivore)	**3.7**
Selenium	0.47	0.1	Plant	**4.7**
Zinc	79.2	10	Plant	**7.9**
Acenaphthene	0.49	0.25	Plant	**2**
Acetone	0.67	1.2	Deer mouse	**0.6**
Anthracene	0.49	210	Montane shrew	0.002
Aroclor-1254	1.01	0.041	Robin(insectivore)	**24.6**
Aroclor-1260	0.17	0.14	Red fox	**1.2**
Benzene	0.11	24	Deer mouse	0.005
Benzo(a)anthracene	0.50	3	Montane shrew	0.2
Benzo(a)pyrene	0.49	9.6	Montane shrew	0.05
Benzo(b)fluoranthene	0.49	18	Plant	0.03
Benzo(g,h,i)perylene	0.49	24	Montane shrew	0.02
Benzo(k)fluoranthene	0.49	62	Montane shrew	0.008
Benzoic acid	2.37	1.0	Montane shrew	**2.4**
Bis(2-ethylhexyl)phthalate	0.50	0.02	Robin(insectivore)	**25.5**
Butanone[2-]	0.43	360	Deer mouse	0.001
Butylbenzylphthalate	0.47	90	Montane shrew	0.005
Chlorobenzene	0.11	2.4	Earthworm	0.05
Chrysene	0.50	2.4	Montane shrew	0.2
Dichlorobenzene[1,4-]	0.0086	0.88	Montane shrew	0.01
Dichloroethene[cis/trans 1,2-]	0.11	23	Montane shrew	0.005
Di-n-octyl phthalate	0.49	1.1	Montane shrew	**0.4**
Fluoranthene	0.54	22	Montane shrew	0.03
Fluorene	0.49	4.1	Earthworm	0.1
Indeno(1,2,3-cd)pyrene	0.49	62	Montane shrew	0.008
Methylnaphthalene[2-]	0.55	2.5	Montane shrew	0.2
Naphthalene	0.53	0.34	Deer mouse	**1.6**
Phenanthrene	0.52	10	Montane shrew	0.05
Pyrene	0.52	18	Earthworm	0.03
Tetrachloroethene	0.11	0.18	Montane shrew	**0.6**

Table E-2.2-2 (continued)

COPC	EPC[a] (mg/kg)	Minimum ESL[b] (mg/kg)	Receptor	Hazard Quotient
Toluene	0.17	23	Montane shrew	0.007
Xylenes	0.92	1.4	Montane shrew	**0.7**

Note: Bolded HQ indicates COPC retained as a COPEC.

[a] The EPC is the 95% UCL.

[b] ESLs from ECORISK Database, Version 2.2 (LANL 2005, 090032).

Table E-2.2-3
HI Analysis of COPECs at SWMU 61-002

COPEC	EPC (mg/kg)	Plant	Earthworm	Kestrel (Intermediate carnivore)	Kestrel (top carnivore)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Desert Cottontail	Red Fox
Antimony	0.29	5.8	0.0037	na*	na	na	na	na	0.6	1.12	0.1	0.0064
Barium	163	1.5	0.49	0.015	0.0044	0.2	0.16	0.18	0.091	0.12	0.049	0.004
Copper	6.79	0.68	0.52	0.077	0.0057	0.24	0.62	0.42	0.12	0.2	0.027	0.0019
Lead	14.7	0.12	0.0086	0.12	0.018	0.7	1.1	0.92	0.12	0.2	0.04	0.004
Mercury	0.048	0.0014	0.96	0.58	0.17	0.69	3.69	2.18	0.016	0.028	0.0022	0.001
Selenium	0.47	4.7	0.061	0.055	0.0036	0.31	0.43	0.36	0.43	0.51	0.16	0.0043
Zinc	79.2	7.9	0.42	0.44	0.057	0.4	2.93	1.65	0.27	0.5	0.026	0.0079
Acenaphthene	0.49	1.96	na	na	na	na	na	na	0.0031	0.0041	0.001	0.000079
Acetone	0.67	na	na	0.0056	0.000022	0.089	0.0039	0.048	0.56	0.045	0.48	0.00023
Aroclor-1254	1.01	0.0063	na	5.94	4.59	0.78	24.6	12.6	1.15	2.3	0.019	6.73
Aroclor-1260	0.17	na	na	0.046	0.037	0.0036	0.19	0.1	0.0085	0.017	0.000057	1.21
Benzoic acid	2.37	na	na	na	na	na	na	na	1.84	2.39	0.57	0.0068
Bis(2-ethylhexyl)phthalate	0.50	na	na	11.3	15.5	0.026	25.5	12.8	0.46	0.0002	0.00019	0.43
Di-n-octyl phthalate	0.49	na	na	na	na	na	na	na	0.22	0.021	0.000031	0.031
Naphthalene	0.53	0.53	na	0.00048	0.000084	0.014	0.0031	0.0087	1.56	0.55	1.18	0.013
Tetrachloroethene	0.11	0.011	na	na	na	na	na	na	0.31	0.61	0.013	0.0035
Xylenes	0.92	0.0092	na	0.0033	0.00029	0.01	0.022	0.016	0.46	0.66	0.13	0.0071
	HIs	**23**	**2.5**	**18.6**	**20.4**	**3.5**	**59.2**	**31.5**	**8.2**	**9.3**	**2.8**	**8.5**

*na = Not available.

Table E-2.3-1
Comparison of 95% UCLs with Background Concentrations

COPEC	95% UCL (mg/kg)	Soil Background Concentrations [a] (mg/kg)	Tuff Background Concentrations [a] (mg/kg)
Antimony	0.29	0.1–1	0.05–0.4
Barium	163	21–410	1.4–51.6
Copper	6.79	0.25–16	0.25–6.2
Lead	14.7	2–28	1.6–15.5
Mercury	0.048	0.05–0.1	0.1[b]
Selenium	0.47	0.1–1.7	0.1–0.105
Zinc	79.2	14–75.5	5.5–65.6

[a] From (LANL 1998, 059730).

[b] No background data set; value is the detection limit.

Table E-2.3-2
PAUFs for Receptors at SWMU 61-002

Receptor	Home Range[a] (ha)	Population Area (ha)	PAUF[b]
American robin	0.42	16.8	0.008
American kestrel	106	4,240	0.00003
Deer mouse	0.077	3.0	0.04
Desert cottontail	3.1	124	0.001
Montane shrew	0.39	15.6	0.008
Red fox	1038	41,520	0.000003

[a] Home ranges from EPA (1993, 059384)

[b] PAUF = Population area use factor calculated as the area of the SWMU (0.13 ha) divided by the population area.

Table E-2.3-3
Adjusted HI Analysis of COPECs at SWMU 61-002

COPEC	EPC (mg/kg)[a]	Plant	Earthworm	Kestrel (Intermediate carnivore)	Kestrel (top carnivore)	Robin (herbivore)	Robin (insectivore)	Robin (omnivore)	Deer Mouse	Montane Shrew	Desert Cottontail	Red Fox
Acenaphthene	0.49	1.96	na[b]	na	na	na	na	na	0.0031	0.0041	0.001	0.000079
Acetone	0.67	na	na	0.0056	0.000022	0.089	0.0039	0.048	0.56	0.045	0.48	0.00023
Aroclor-1254	1.01	0.0063	na	5.94	4.59	0.78	24.6	12.6	1.15	2.3	0.019	6.73
Aroclor-1260	0.17	na	na	0.046	0.037	0.0036	0.19	0.1	0.0085	0.017	0.000057	1.21
Benzoic acid	2.37	na	na	na	na	na	na	na	1.84	2.39	0.57	0.0068
Bis(2-ethylhexyl)phthalate	0.50	na	na	11.3	15.5	0.026	25.5	12.8	0.46	0.0002	0.00019	0.43
Di-n-octyl phthalate	0.49	na	na	na	na	na	na	na	0.22	0.021	0.000031	0.031
Naphthalene	0.53	0.53	na	0.00048	0.000084	0.014	0.0031	0.0087	1.56	0.55	1.18	0.013
Tetrachloroethene	0.11	0.011	na	na	na	na	na	na	0.31	0.61	0.013	0.0035
Xylenes	0.92	0.0092	na	0.0033	0.00029	0.01	0.022	0.016	0.46	0.66	0.13	0.0071
HIs		**3**	**na**	**17**	**20**	**0.9**	**50**	**26**	**7**	**7**	**2**	**8**
PAUF-adjusted HIs		**3**	**na**	**0.0005**	**0.0006**	**0.007**	**0.4**	**0.2**	**0.3**	**0.06**	**0.002**	**0.00002**

[a] The EPC is the 95% UCL.

[b] na = Not available.

Table E-3.1-1
K_d Values for Inorganic COPCs at SWMU 61-002

COPCs	K_d* (cm^3/g)
Aluminum	1.50E+03
Antimony	4.50E+01
Arsenic	2.90E+01
Barium	4.10E+01
Beryllium	7.90E+02
Cadmium	7.50E+01
Cobalt	4.50E+01
Copper	3.50E+01
Lead	9.00E+02
Mercury	5.20E+01
Nickel	6.50E+01
Selenium	5.00E+00
Zinc	6.20E+01

*K_d values from NMED (2006, 092513).

Table E-3.2-1
Physical and Chemical Properties of Organic COPCs at SWMU 61-002

Analyte	Organic Carbon Partition Coefficient, K_{oc} [a] (L/kg)	Log Octanol-Water Partition Coefficient, K_{ow} [b]	Water Solubility (mg/L)[a]	Vapor Pressure[b] (mm Hg at 25°C)
Acenaphthene	4.90E+03	3.92E+00	4.24E+00	2.50E-03
Acetone	5.80E-01	-2.40E-01	1.00E+06	2.31E+02
Anthracene	2.95E+04	4.45E+00	4.34E-02	2.67E-06
Aroclor-1254	5.30E+05	6.79E+00	2.77E-01	6.53E-06
Aroclor-1260	5.30E+05	8.27E+00	2.77E-01	4.05E-05
Benzene	5.89E+01	2.13E+00	1.75E+03	9.48E+01
Benzo(a)anthracene	3.98E+05	5.76E+00	9.40E-03	1.90E-06
Benzo(a)pyrene	1.02E+06	6.13E+00	1.62E-03	5.49E-09
Benzo(b)fluoranthene	1.23E+06	5.78E+00	1.50E-03	5.00E-07
Benzo(g,h,i)perylene	2.68E+06	6.63E+00	2.60E-04	1.00E-10
Benzo(k)fluoranthene	1.23E+06	6.11E+00	8.00E-04	9.65E-10
Benzoic acid	1.45E+01[b]	1.87E+00	3.40E+03	7.00E-04
Bis(2-ethylhexyl)phthalate	1.51E+05	7.60E+00	3.40E-01	1.42E-07
Butanone[2-]	4.50E+00	2.90E-01	2.70E+05	9.06E+01
Butylbenzene[n-]	2.80E+03	4.38E+00[c]	1.40E+01	1.06E+00[c]
Butylbenzene[sec-]	2.20E+03	4.57E+00[c]	1.70E+01	1.75E+00[c]
Butylbenzylphthalate	9.36E+03	4.73E+00	2.69E+00	8.25E-06
Chlorobenzene	2.19E+02	2.84E+00	4.72E+02	1.20E+01[d]
Chloroethane	1.50E+01	1.43E+00	5.70E+03	1.01E+00
Chloromethane	3.50E+01	9.10E-01	8.20E+03	4.30E+03
Chrysene	3.98E+05	5.81E+00	1.60E-03	6.23E-09
Dibromo-3-chloropropane[1,2-]	1.70E+02	2.96E+00	1.20E+03	5.80E-01[d]
Dibromoethane[1,2-]	2.80E+01	1.96E+00	3.40E+03	1.12E+01
Dichlorobenzene[1,2-]	3.80E+01	3.43E+00	1.56E+02	1.47E+00
Dichlorobenzene[1,4-]	6.16E+02	3.44E+00	7.38E+01	1.74E+00
Dichloroethene[cis/trans 1,2-]	4.38E+01[b]	2.09E+00	3.50E+03[b]	2.01E+02
Di-n-octyl phthalate	1.30E+07[d]	8.10E+00[d]	2.00E-02[d]	2.60E-06[d]
Ethylbenzene	3.63E+02	3.15E+00	1.69E+02	9.60E+00
Fluoranthene	1.07E+05	5.16E+00	2.06E-01	9.22E-06
Fluorene	7.90E+03	4.18E+00	1.90E+00	8.42E-03
Hexanone[2-]	1.30E+01[b]	1.38E+00	1.75E+04[b]	1.16E+01
Indeno(1,2,3-cd)pyrene	3.47E+06	6.70E+00	2.20E-05	1.25E-10
Isopropylbenzene	2.20E+02	3.66E+00	6.10E+01	4.50E+00
Isopropyltoluene[4-]	na[e]	4.10E+00	2.34E+01	1.64E+00
Methyl-2-pentanone[4-]	1.30E+02	1.31E+00	1.90E+04	1.99E+01

Table E-3.2-1 (continued)

Analyte	Organic Carbon Partition Coefficient, K_{oc} [a] (L/kg)	Log Octanol-Water Partition Coefficient, K_{ow} [b]	Water Solubility (mg/L)[a]	Vapor Pressure[b] (mm Hg at 25°C)
Methylene chloride	1.20E+01	1.25E+00	1.30E+04	4.35E+02
Methylnaphthalene[2-]	2.98E+03[b]	3.86E+00	2.46E+01[b]	5.50E-02
Naphthalene	2.00E+03	3.30E+00	3.10E+01	8.50E-02
Phenanthrene	1.40E+04	4.46E+00	1.15E+00	1.12E-04
Propylbenzene[1-]	2.80E+03	3.69E+00[c]	1.40E+01	3.42E+00[c]
Pyrene	6.80E+04	4.88E+00	1.35E-01	4.50E-06
Styrene	9.10E+01	2.95E+00	3.10E+02	6.40E+00
Tetrachloroethene	2.70E+02	3.40E+00	2.00E+02	1.85E+01
Toluene	1.82E+02	2.73E+00	5.26E+02	2.84E+01
Trimethylbenzene[1,2,4-]	3.70E+03	3.63E+00	2.60E+01	2.10E+00
Trimethylbenzene[1,3,5-]	8.20E+02	3.42E+00	4.80E+01	2.10E+00
Xylene(Total)	2.00E+02	3.12E+00	1.61E+02	7.99E+00
Xylene[1,2-]	2.40E+02	3.12E+00	1.78E+02	7.99E+00
Xylene[1,3-]+Xylene[1,4-]	2.00E+02	3.12E+00	1.61E+02	7.99E+00

[a] K_{oc} and solubility values from NMED (2006, 092513), unless otherwise noted.

[b] Values from Risk Assessment Information System at http://rais.ornl.gov/cgi-bin/tox/TOX_select?select=csf.

[c] Log K_{ow} and vapor pressure values from ChemFinder at http://chemfinder.com.

[d] Values from Superfund Chemical Data Matrix at http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm.

[e] na = Not available.

Table E-4.1-1
Frequency of Detection of Contaminants of Concern

Chemical	Number of Samples	Number of Detections	Maximum Detected Concentration (mg/kg)
Benzene	22	2	27
Toluene	22	7	380
Ethylbenzene	22	6	230
Xylenes (total)	12	6	870
1,2-Dibromoethane	22	0	—*
1,2-Dichloroethane	22	0	—
Methyl tertiary butyl ether	15	0	—
Acenaphthene	22	0	—
Anthracene	22	0	—
Benz(a)anthracene	22	0	—
Benzo(a)pyrene	22	0	—
Benzo(b)fluoranthene	22	0	—
Benzo(k)fluoranthene	22	0	—
Chrysene	22	0	—
Dibenz(a,h)anthracene	22	0	—
Fluoranthene	22	0	—
Fluorene	22	0	—
Total naphthalenes	22	9	1530
Phenanthrene	22	0	—
Pyrene	22	1	0.0129
Lead	22	22	52.5

*— = Not detected.

Table E-4.1-2
Average Concentrations of Contaminants of Concern

Chemical	Average Concentration (mg/kg)		
	All Samples	0–1 ft bgs	0–15 ft bgs
Benzene	1.62	0.0028	2.69
Toluene	19.7	0.0028	35.0
Ethylbenzene	15.6	0.0028	21.4
Xylenes (total)	90.9	0.0028	104
Dibromoethane[1,2-] (EDB)	0.41	0.0028	0.25
Dichloroethane[1,2-] (EDC)	0.46	0.0028	0.37
Methyl tertiary butyl ether (MTBE)	0.40	NA*	0.008
Acenaphthene	0.36	0.19	0.32
Anthracene	0.36	0.19	0.32
Benzo(a)anthracene	0.36	0.19	0.32
Benzo(a)pyrene	0.36	0.19	0.32
Benzo(b)fluoranthene	0.36	0.19	0.32
Benzo(k)fluoranthene	0.36	0.19	0.32
Chrysene	0.36	0.19	0.32
Dibenz(a,h)anthracene	0.36	0.19	0.32
Fluoranthene	0.36	0.19	0.32
Fluorene	0.36	0.19	0.32
Total naphthalenes	84.9	0.37	142
Phenanthrene	0.36	0.19	0.32
Pyrene	0.36	0.19	0.32
Lead	20.9	42.6	21.2

*NA = Not analyzed in samples from this depth interval.

Attachment E-1

Ecological Scoping Checklist

Part A—Scoping Meeting Documentation

Site ID	SWMU 61-002
Form of site releases (solid, liquid, vapor). Describe all relevant known or suspected <u>mechanisms</u> of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential <u>areas</u> of release. Reference locations on a map as appropriate.	SWMU 61-002 is a former storage area in Technical Area (TA) 61, east of the Radio Repair Shop (Building 61-23) on East Jemez Road, and was part of a fenced area measuring 81 ft x 91 ft. The area historically was used to store capacitors and transformers. In addition, the storage area contained several oil-filled containers as well as unmarked containers. Before 1985, containers of polychlorinated biphenyl (PCB)-contaminated oil were stored in this area. The containers were known to have leaked. During the ACA, an area of TPH contamination was found and subsequently investigated and remediated.
List of Primary Impacted Media **(Indicate all that apply.)**	**Surface soil –** X **Surface water/sediment –** **Subsurface –** X **Groundwater –** **Other, explain –**
FIMAD vegetation class based on Arcview vegetation coverage (Indicate all that apply.)	**Water –** **Bare Ground/Unvegetated –** X **Spruce/fir/aspen/mixed conifer –** **Ponderosa pine –** **Piñon juniper/juniper savannah –** **Grassland/shrubland –** **Developed –** X
Is T&E Habitat Present? **If applicable, list species known or suspected to use the site for breeding or foraging.**	No
Provide list of Neighboring/ Contiguous/ Up-gradient sites, include a brief summary of COPCs and form of releases for relevant sites and reference map as appropriate. **(Use information to evaluate need to aggregate sites for screening.)**	The TA-61 sites surround SWMU 61-002.
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 run-on sources.**	Erosion matrix score is 10.6. Run-off subscore is 0.0; there is no evidence of run-off discharging from this site.

Part B—Site Visit Documentation

Site ID	SWMU 61-002
Date of Site Visit	10-26-2005
Site Visit Conducted by	Mary Lee Hogg, Kate Herrell, Gary Stoops

Receptor Information:

Estimate cover	**Relative vegetative cover (high, medium, low, none) =** low to none **Relative wetland cover (high, medium, low, none) =** none **Relative structures/asphalt, etc. cover (high, medium, low, none) =** high
Field notes on the FIMAD vegetation class to assist in ground-truthing the Arcview information	Area is developed, with small areas of grass and a few shrubs along with asphalt. Site is adjacent to the Security Perimeter Road complex.
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.	There is no viable T&E habitat available within or in close proximity to this SWMU. The area is highly developed, with little vegetation.
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.**	No ecological receptors, except some plants, were observed.

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).**	See "Surface Water Erosion Potential Information" on pg. 1
Are there any off-site transport pathways (surface water, air, or groundwater)? **(yes/no/uncertain)** **Provide explanation**	No.
Interim action needed to limit off-site transport? **(yes/no/uncertain)** **Provide explanation/ recommendation to project lead for IA SMDP.**	No.

Ecological Effects Information:

Physical Disturbance **(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)**	Site shows extensive physical disturbance as a result of usage as well as ACA activities. Site is an active parking lot and operations facility for the Los Alamos County Landfill.
Are there obvious ecological effects? **(yes/no/uncertain)** **Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).**	Extensive physical disturbance of the area.
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.

No Exposure/Transport Pathways:

If there are no complete exposure pathways to ecological receptors on-site 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. Subsurface contamination not available to potential ecological receptors.

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.)**	Nature and extent have been determined.
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

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-m/mol and molecular weight <200 g/mol).**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Volatile organic compounds (VOCs) are present at depth (> 5 ft) and there are no plants or burrowing animals present.

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): Uncertain

Provide explanation: Some contaminants are present at the surface, which has been remediated.

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: Standard Operating Procedure (SOP) 2.01 provided a run-off score of 0.0 and an overall erosion matrix score of 10.6, indicating a low potential for erosion.

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 discharging to the surface. Groundwater is approximately 1000 ft below the surface.

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.**

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Depth to groundwater is at least 1000 ft bgs and the majority of COPCs have low mobility.

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 SWMU is not near a mesa edge, and the erosion matrix score is low.

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: 1

Terrestrial Animals: 1

Provide explanation: VOCs are at depth. There are no burrows and few plants present, and the habitat is marginal.

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: 1

Terrestrial Animals: 1

Provide explanation: Some contaminants are present at the surface, but most are in a dense soil/fill/small rock mix that would not easily become airborne.

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: There are few plants present and the area is highly developed.

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: SWMU 61-002 is highly developed, with little, if any, habitat.

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: Little, if any, viable habitat is available for receptors.

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: 2

Provide explanation: PCBs are present. However, there is little, if any, viable habitat or forage available for receptors.

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: There are no radionuclide COPCs present.

<u>Question N:</u>

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: No sediment or water present on or near the site.

<u>Question O:</u>

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: No sediment or water present on or near the site.

<u>Question P:</u>

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: No sediment or water present on or near the site.

<u>Question Q:</u>

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: No sediment or water present on or near the site.

<u>Question R:</u>

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 radionuclide COPCs at the site.

<u>Question S:</u>

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: No aquatic habitat present.

<u>Question T:</u>

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: No aquatic habitat present.

<u>Question U:</u>

Could contaminants bioaccumulate in sedimentary or water column organisms?

- **Lipophilic 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: No aquatic habitat present.

<u>Question V:</u>

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.**

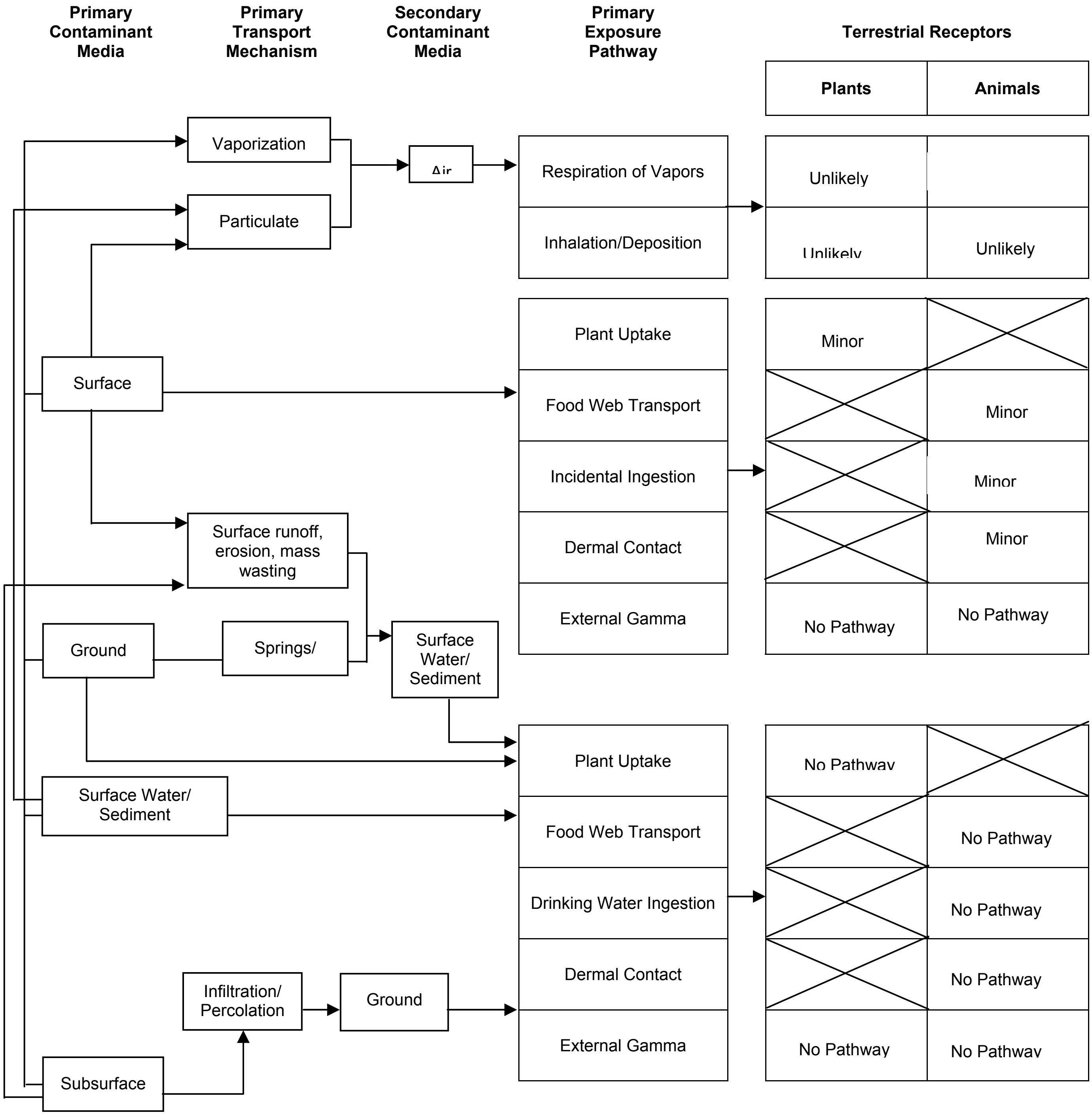
Provide quantification of exposure pathway (0=no pathway, 1=unlikely pathway, 2=minor pathway, 3=major pathway):

Aquatic Plants: 0

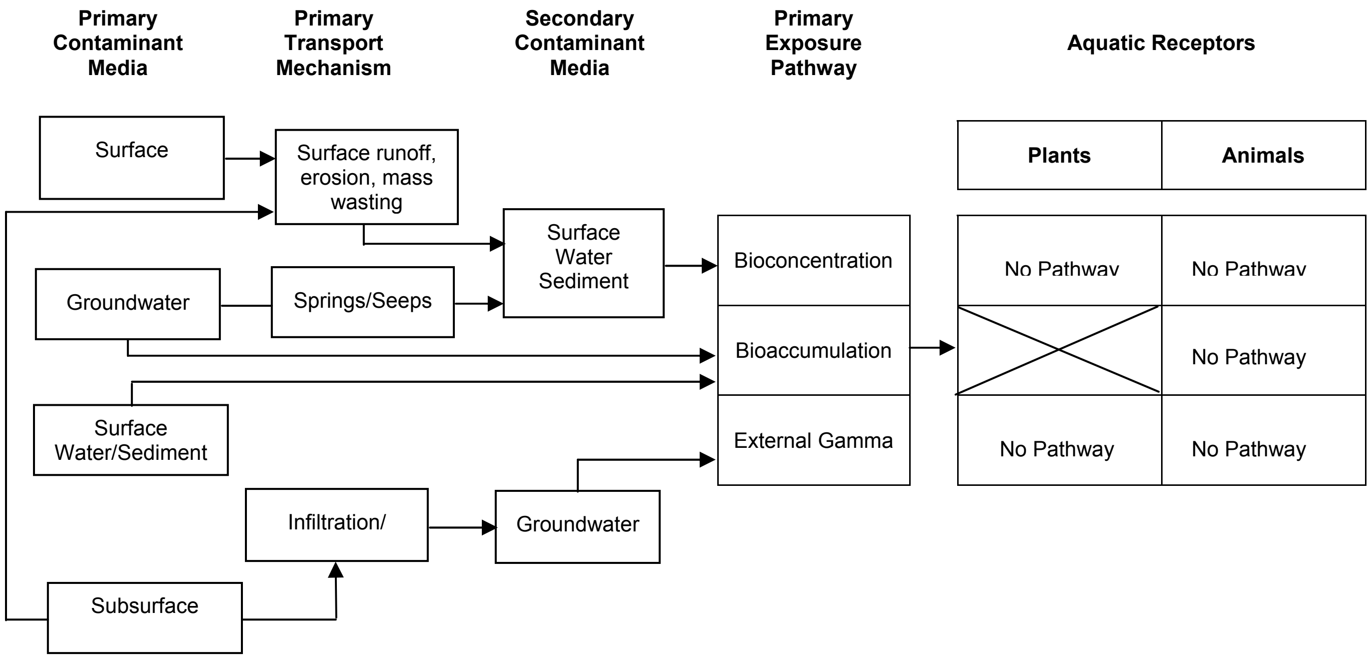
Aquatic Animals: 0

Provide explanation: No aquatic habitat present.

Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model



Aquatic Receptors
Ecological Pathways Conceptual Exposure Model



Signatures and certifications:

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

Name (printed): Mary Lee Hogg

Name (signature):

Organization: TerranearPMC

Phone number: 505-662-1362

Date Completed: 10/27/2005

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

Name (printed): Richard J. Mirenda

Name (signature): Richard J. Mirenda

Organization: ERSS-GS

Phone number: 665-6953

Attachment E-2

Tier One Evaluation Report for SWMU 61-002

Tier 1 Report Forms

Risk-Based Decision Making For Petroleum Releases At Underground Storage Tank Sites In New Mexico

SITE NAME:	*Former Storage Area*
SITE LOCATION:	*Los Alamos, NM*
SITE ID:	*SWMU 61-002*
FACILITY ID:	*Los Alamos National Laboratory*
SUBMITTAL DATE:	*May 3, 2007*
PREPARED BY:	*Environmental Programs*
REVIEWED BY:	

TABLE OF CONTENTS *(Page 1 of 3)*

☐ *Check the box against the item, if the item is included.*

TABLE OF CONTENTS *(Page 2 of 3)*

All maps submitted to NMED must include a bar scale, legend, north arrow, location of all known soil borings and monitoring wells, and date of map, where appropriate.

☐ *Check the box against the item, if the item is included.*

Map No. Description **MAPS**

Maps 1-6 are part of 14 Day Report and maps 7-10 are part of Investigation Report. Update and resubmit as appropriate.

Note: Maps may be combined, as appropriate.

Map No.	Description	
1.	Topographic map.	☐
2.	Site map with UST system location(s), including tank ID number(s).	☐
3.	Site map with utility locations.	☐
4.	Land use map (radius of 1,000 feet).	☐
5.	Receptor survey map: with detailed land use in the vicinity of the site (at least 1,000 feet in the downgradient direction and one property deep on all other sides including across the street).	☐
6.	Area map with water use well locations: within one mile radius of the site (the wells on the map must be labeled). Maps must also indicate the location of surface water drains including but not limited to streams, lakes and well head protection areas, within a 500 foot radius of the site.	☐
7.	NAPL thickness contour map.	☐
8.	Area geologic map.	☐
9.	Groundwater gradient map: contoured map with the predominant flow direction from the most recent gauging event (add additional maps if the flow direction fluctuates).	☐
10.	Soil and groundwater concentration contour maps showing boring and well locations and concentrations in each: for benzene, MTBE, total BTEX, and Total PAHs from the most recent sampling event.	☐
11.	Map identifying the location of data points used to calculate representative soil concentrations protective of groundwater.	☐
12.	Map Identifying POE(s) and POC(s): for both current and future conditions.	☐

ADDITIONAL MAPS:

TABLE OF CONTENTS *(Page 3 of 3)*

☐ *Check the box against the item, if the item is included.*

Attachment No. Description **ATTACHMENTS**

Aattachments 1and 2 are part of 14 Day Report and attchments 3-7 are part of Investigation Report. Update and resubmit as appropriate.

ADDITIONAL ATTACHMENTS:

Laboratory analytical report(s) not previously submitted to the department.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 1

SITE ID: SWMU 61-002	**FACILITY ID: Los Alamos National Laboratory**
SUBMITTAL DATE: 03-May-07	**PREPARED BY: Environmental Programs**

EXECUTIVE SUMMARY

Facility name:	*Los AlamosNational Laboratory*
Facility address:	*Los Alamos, New Mexico*
Status of UST system:	☐ Active ☑ Inactive
Ground surface condition:	*Paved or bare soil/gravel.*
Estimated volume and type of product(s) released:	*Gasoline and/or diesel. Less than 1,000 gal.*
Has any vapor impacts been identified?	☑ No ☐ On-site ☐ Off-site
If yes (check all that apply):	☐ Utility corridor ☐ Subsurface structures ☐ Above surface structures
Is soil contaminated?	☐ No ☑ On-site ☐ Off-site
Is there any contaminant-saturated soil?	☑ No ☐ On-site ☐ Off-site
Is groundwater contaminated?	☑ No ☐ On-site ☐ Off-site
Has the source of release been identified?	☑ Yes ☐ No
Has NAPL ever been detected?	☐ Yes ☑ No
Was NAPL removed?	☐ Yes ☑ No
Was NAPL detected in the most recent sampling event?	☐ Yes ☑ No
Has surface water been contaminated by the release?	☐ Yes ☑ No ☐ Uknown ☐ Suspected
Shallowest depth to groundwater (ft bgs.):	*Approximately 1,000 ft*
Average depth to groundwater (ft bgs.):	*Approximately 1,000 ft*
Has a drinking water supply well been contaminated by this release?	☐ Yes ☑ No ☐ Unknown ☐ Suspected
If yes	☐ Drinking ☐ Irrigation ☐ Other

RECOMMENDATIONS

- ☑ No further action under tier 1
- ☐ Compliance monitoring
- ☐ Remediate to tier 1 RBSLs and WQCC standards to achieve no further action
- ☐ Perform interim remedial action and then re-evaluate
- ☐ Perform tier 2 evaluation
- ☐ Petition WQCC for approval of alternative groundwater standards

ADDITIONAL NOTES

Site investigation and cleanup of contaminated soil conducted as part of accelerated corrective action pursuant to LANL Consent Order. Tier 1 assessment voluntarily performed to evaluate whether current site conditions meet RBDM soil screening levels.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 2 - SCES
SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory	
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs	

SITE CONCEPTUAL EXPOSURE SCENARIO

CONTAMINATED MEDIA	PATHWAYS/TRANSPORT MECHANISMS	EXPOSURE ROUTES	Current Land Use – On-Site: Residents-Child	Current Land Use – On-Site: Residents - Adult	Current Land Use – On-Site: Commercial Workers	Current Land Use – On-Site: Construction Workers	Current Land Use – Off-Site: Residents-Child	Current Land Use – Off-Site: Residents - Adult	Current Land Use – Off-Site: Commercial Workers	Current Land Use – Off-Site: Construction Workers	Future Land Use – On-Site: Residents-Child	Future Land Use – On-Site: Residents - Adult	Future Land Use – On-Site: Commercial Workers	Future Land Use – On-Site: Construction Workers	Future Land Use – Off-Site: Residents-Child	Future Land Use – Off-Site: Residents - Adult	Future Land Use – Off-Site: Commercial Workers	Future Land Use – Off-Site: Construction Workers
Air Vapors		Inhalation (Indoors)				NA				NA				NA				NA
		Inhalation (Outdoors)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Surficial Soil	Wind Erosion/Dispersion/ Volatilization/Vapor Migration	Inhalation (vapors & particulates) and Dermal Contact and Ingestion			C	C							C	C				
Subsurface Soils	Volatilization/Vapor Migration	Inhalation (Indoors)				NA				NA				NA				NA
		Inhalation (Outdoors)	NA	NA	NA	C	NA	NA	NA	C	NA	NA	NA	C	NA	NA	NA	C
		Dermal Contact and Ingestion	NA	NA	NA	C	NA	NA	NA		NA	NA	NA	C	NA	NA	NA	
Groundwater	Volatilization/Vapor Migration	Inhalation (Indoors)				NA				NA				NA				NA
		Inhalation (Outdoors)	NA	NA	NA		NA	NA	NA		NA	NA	NA		NA	NA	NA	
	Drinking Water	Ingestion				NA	C	C	C	NA				NA	C	C	C	NA

	YES	NO
Contaminant-saturated soil present?	☐	☑
Nonaqueous phase liquid present?	☐	☑
Utilities Threatened ?	☐	☑
Surface Waters within a 500 foot radius?	☐	☑
Ecological Receptors?	☑	☐
Leaching to groundwater?	☑	☐

C Indicates potentially completed pathways

NA Not applicable as per the NMED policy

For construction worker, no distinction is made between the surficial and subsurface soils.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 3 - RESIDENT
SITE ID: SWMU 61-002	**FACILITY ID: Los Alamos National Laboratory**	
SUBMITTAL DATE: 03-May-07	**PREPARED BY: Environmental Programs**	

JUSTIFICATION OF PATHWAYS - ON-SITE RESIDENT (CHILD AND ADULT)

ROUTES OF EXPOSURE	CURRENT CONDITIONS		FUTURE CONDITIONS	
	C/ NC*	JUSTIFICATION	C/ NC*	JUSTIFICATION
SURFICIAL SOIL				
Ingestion, outdoor inhalation of vapors and particulate matter, and dermal contact	*NC*	*Current land use is not residential*	*NC*	*Future land use will be restricted and will not include residential.*
SUBSURFACE SOIL				
Indoor inhalation of vapors (only when depth to contamination is less than 15 ft bgs)	*NC*	*Current land use is not residential*	*NC*	*Future land use will be restricted and will not include residential.*
GROUNDWATER				
Indoor inhalation of vapors (only when depth to groundwater is less than 15 ft bgs)	*NC*	*Current land use is not residential. Detph to groundwater is greater than 15 ft.*	*NC*	*Future land use will be restricted and will not include residential. Depth to groundwater is greater than 15 ft.*
Ingestion (only when groundwater is used, from an impacted on-site well, for drinking)	*NC*	*Current land use is not residential. No on-site supply wells.*	*NC*	*Future land use will be restricted and will not include residential. No futuure on-site supply wells.*

JUSTIFICATION OF PATHWAYS - OFF-SITE RESIDENT (CHILD AND ADULT)

ROUTES OF EXPOSURE	C/ NC*	JUSTIFICATION	C/ NC*	JUSTIFICATION
SURFICIAL SOIL				
Ingestion, Outdoor Inhalation of Vapors and Particulate Matter, and Dermal Contact	*NC*	*Off-site residents greater than 1,000 ft from site.*	*NC*	*Future off-site residents will be greater than 1,000 ft.*
SUBSURFACE SOIL				
Indoor inhalation of vapors (only when depth to contamination is less than 15 ft bgs)	*NC*	*Off-site residents greater than 1,000 ft from site.*	*NC*	*Future off-site residents will be greater than 1,000 ft.*
GROUNDWATER				
Indoor inhalation of vapors (only when depth to groundwater is less than 15 ft bgs)	*NC*	*Depth to groundwater is greater than 15 ft.*	*NC*	*Depth to groundwater is greater than 15 ft.*
Ingestion (only when groundwater is used, from an impacted off-site well, for drinking)	*C*	*Off-site well could be impacted and will be evaluated for completeness.*	*C*	*Off site well could be impacted and will be evaluated for completeness.*

NOTE:

* **C** : Complete Pathway, **NC** : Not Complete

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 3 - COMMERCIAL WORKER
SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory	
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs	

JUSTIFICATION OF PATHWAYS - ON-SITE COMMERCIAL WORKER

ROUTES OF EXPOSURE	CURRENT CONDITIONS		FUTURE CONDITIONS	
	C/ NC*	JUSTIFICATION	C/ NC*	JUSTIFICATION
SURFICIAL SOIL				
Ingestion, outdoor inhalation of vapors and particulate matter, and dermal contact	*C*	*On site industrial worker could be exposed to surficial soil contamination.*	*C*	*On site industrial worker could be exposed to surficial soil contamination.*
SUBSURFACE SOIL				
Indoor inhalation of vapors (only when depth to contamination is less than 15 ft bgs)	*NC*	*No structures currently on site.*	*NC*	*No structures will be constructed on site in future.*
GROUNDWATER				
Indoor inhalation of vapors (only when depth to groundwater is less than 15 ft bgs)	*NC*	*Depth to groundwater greater than 15 ft.*	*NC*	*Depth to groundwater greater than 15 ft.*
Ingestion (only when groundwater is used, from an impacted on-site well, for drinking)	*NC*	*No on-site supply wells.*	*C*	*No future on-site supply wells.*

JUSTIFICATION OF PATHWAYS - OFF-SITE COMMERCIAL WORKER

ROUTES OF EXPOSURE	C/ NC*	JUSTIFICATION	C/ NC*	JUSTIFICATION
SURFICIAL SOIL				
Ingestion, Outdoor Inhalation of Vapors and Particulate Matter, and Dermal Contact	*NC*	*Cotamination does not extend off site.*	*NC*	*Cotamination should not migrate off site.*
SUBSURFACE SOIL				
Indoor inhalation of vapors (only when depth to contamination is less than 15 ft bgs)	*NC*	*Subsurface contamination does not extend off site.*	*NC*	*Subsurface contamination does not extend off site.*
GROUNDWATER				
Indoor inhalation of vapors (only when depth to groundwater is less than 15 ft bgs)	*NC*	*Depth to groundwater greater than 15 ft.*	*NC*	*Depth to groundwater greater than 15 ft.*
Ingestion (only when groundwater is used, from an impacted off-site well, for drinking)	*C*	*Off-site well could be impacted and will be evaluated for completeness.*	*C*	*Off-site well could be impacted and will be evaluated for completeness.*

NOTE:
* **C** : Complete Pathway, **NC** : Not Complete

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 3-CONSTRUCTION WORKER
SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory	
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs	

JUSTIFICATION OF PATHWAYS - ON-SITE CONSTRUCTION WORKER

ROUTES OF EXPOSURE	CURRENT CONDITIONS		FUTURE CONDITIONS	
	C/ NC*	JUSTIFICATION	C/ NC*	JUSTIFICATION
SOIL WITHIN THE TYPICAL CONSTRUCTION DEPTH				
Ingestion, outdoor inhalation of vapors and particulate matter, and dermal contact	*C*	*Construction worker could be exposed to surficial soil contamination.*	*C*	*Construction worker could be exposed to surficial soil contamination.*
GROUNDWATER				
Outdoor inhalation of vapors	*NC*	*Depth to groundwater greater than 15 ft.*	*NC*	*Depth to groundwater greater than 15 ft.*

JUSTIFICATION OF PATHWAYS - OFF-SITE CONSTRUCTION WORKER

ROUTES OF EXPOSURE	C/ NC*	JUSTIFICATION	C/ NC*	JUSTIFICATION
SOIL WITHIN THE TYPICAL CONSTRUCTION DEPTH				
Ingestion, Outdoor Inhalation of Vapors and Particulate Matter, and Dermal Contact	*NC*	*Subsurface contamination does not extend off site.*	*NC*	*Subsurface contamination does not extend off site.*
GROUNDWATER				
Outdoor inhalation of vapors	*NC*	*Depth to groundwater greater than 15 ft.*	*NC*	*Depth to groundwater greater than 15 ft.*

NOTE:

* **C** : Complete Pathway, **NC** : Not Complete
No distinction is made between surficial soil and subsurface soil for a construction worker within the zone of construction since subsurface soil may be brought to the surface during construction/excavation activities.

NEW MEXICO RBDM — TIER 1 REPORT — FORM 4 - RESIDENT

SITE ID: SWMU 61-002 — FACILITY ID: Los Alamos National Laboratory

SUBMITTAL DATE: 03-May-07 — PREPARED BY: Environmental Programs

COMPARISON OF TIER 1 RBSLs WITH REPRESENTATIVE CONCENTRATIONS - ON-SITE RESIDENT (CHILD AND ADULT)

CONTAMINANTS OF CONCERN	SURFICIAL SOIL			SUB-SURFACE SOIL			GROUNDWATER					
	Ingestion, inhalation,and dermal contact		NC	Indoor inhalation of vapors		NC	Indoor inhalation of vapors		NC	Ingestion		NC
	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [µg/L]	RBSLs [µg/L]	E/Exceeds or NE/Not Exceeds	Concentration at the tap [µg/L]	MCL [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS												
Benzene												
Toluene												
Ethylbenzene												
Xylenes (Total)												
Ethylene Dibromide (EDB)												
1,2-Dichloroethane (EDC)												
MTBE												
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene												
Anthracene												
Benzo(a)anthracene												
Benzo(a)pyrene												
Benzo(b)fluoranthene												
Benzo(k)fluoranthene												
Chrysene												
Dibenz(a-h)anthracene												
Fluoranthene												
Fluorene												
Total Naphthalenes												
Phenanthrene												
Pyrene												
METALS												
Lead												

NOTE:

Enter the representative concentration and indicate.

Representative concentration is: *Soil:*

Groundwater:

Page 1 of

N/A: Not applicable
>RES: Calculated RBSLs exceeded residual soil saturation level.
>SOL: Calculated RBSLs exceeded pure component water solubility.
This comparative evaluation is performed automatically after the user has completed Report Form No.3 and entered the representative concentration on this form for complete pathways.

NEW MEXICO RBDM | TIER 1 REPORT | FORM 4 - RESIDENT

SITE ID: SWMU 61-002 | FACILITY ID: Los Alamos National Laboratory

SUBMITTAL DATE: 03-May-07 | PREPARED BY: Environmental Programs

COMPARISON OF TIER 1 RBSLs WITH REPRESENTATIVE CONCENTRATIONS - OFF-SITE RESIDENT (CHILD AND ADULT)

CONTAMINANTS OF CONCERN	SURFICIAL SOIL			SUB-SURFACE SOIL			GROUNDWATER					
	Ingestion, inhalation,and dermal contact		NC	Indoor inhalation of vapors		NC	Indoor inhalation of vapors		NC	Ingestion		C
	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [µg/L]	RBSLs [µg/L]	E/Exceeds or NE/Not Exceeds	Concentration at the tap [µg/L]	MCL [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS												
Benzene												
Toluene												
Ethylbenzene												
Xylenes (Total)												
Ethylene Dibromide (EDB)												
1,2-Dichloroethane (EDC)												
MTBE												
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene												
Anthracene												
Benzo(a)anthracene												
Benzo(a)pyrene												
Benzo(b)fluoranthene												
Benzo(k)fluoranthene												
Chrysene												
Dibenz(a-h)anthracene												
Fluoranthene												
Fluorene												
Total Naphthalenes												
Phenanthrene												
Pyrene												
METALS												
Lead												

NOTE:

Enter the representative concentration and indicate.

Representative concentration is:

Soil:

Groundwater:

N/A: Not applicable

>RES: Calculated RBSLs exceeded residual soil saturation level.

>SOL: Calculated RBSLs exceeded pure component water solubility.

This comparative evaluation is performed automatically after the user has completed Report Form No.3 and entered the representative concentration on this form for complete pathways.

NEW MEXICO RBDM	TIER 1 REPORT	FORM 4 - COMMERCIAL WORKER
SITE ID: SWMU 61-002		FACILITY ID: Los Alamos National Laboratory
SUBMITTAL DATE: 03-May-07		PREPARED BY: Environmental Programs

COMPARISON OF TIER 1 RBSLs WITH REPRESENTATIVE CONCENTRATIONS - ON-SITE COMMERCIAL WORKER

CONTAMINANTS OF CONCERN	SURFICIAL SOIL			SUB-SURFACE SOIL			GROUNDWATER					
	Ingestion, Inhalation,and Dermal Contact		C	Indoor inhalation of vapors		NC	Indoor inhalation of vapors		NC	Ingestion		C
	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [µg/L]	RBSLs [µg/L]	E/Exceeds or NE/Not Exceeds	Concentration at the tap [µg/L]	MCL [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS												
Benzene	0.00	7.33E+01	NE									
Toluene	0.00	1.48E+04 >RES	NE									
Ethylbenzene	0.00	7.77E+03 >RES	NE									
Xylenes (Total)	0.00	8.62E+04 >RES	NE									
Ethylene Dibromide (EDB)	0.00	2.59E-02	NE									
1,2-Dichloroethane (EDC)	0.00	2.34E+01	NE									
MTBE												
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene	0.19	2.77E+04 >RES	NE									
Anthracene	0.19	1.57E+05 >RES	NE									
Benzo(a)anthracene	0.19	2.18E+01 >RES	NE									
Benzo(a)pyrene	0.19	2.19E+00 >RES	NE									
Benzo(b)fluoranthene	0.19	2.17E+01 >RES	NE									
Benzo(k)fluoranthene	0.19	2.19E+01 >RES	NE									
Chrysene	0.19	2.15E+03 >RES	NE									
Dibenz(a-h)anthracene	0.19	2.21E+00 >RES	NE									
Fluoranthene	0.19	2.21E+04 >RES	NE									
Fluorene	0.19	1.96E+04 >RES	NE									
Total Naphthalenes	0.37	1.85E+04 >RES	NE									
Phenanthrene	0.19	1.45E+04 >RES	NE									
Pyrene	0.19	1.67E+04 >RES	NE									
METALS												
Lead	42.6	1.00E+03 N/A	NE									

NOTE:

Enter the representative concentration and indicate.

Representative concentration is: *Soil:* ***Average of concentrations of samples from 0 to 1 ft bgs***

Groundwater:

N/A: Not applicable

>RES: Calculated RBSLs exceeded residual soil saturation level.

>SOL: Calculated RBSLs exceeded pure component water solubility.

This comparative evaluation is performed automatically after the user has completed Report Form No.3 and entered the representative concentration on this form for complete pathways.

NEW MEXICO RBDM | TIER 1 REPORT | FORM 4 - COMMERCIAL WORKER

SITE ID: SWMU 61-002 | **FACILITY ID:** Los Alamos National Laboratory

SUBMITTAL DATE: 03-May-07 | **PREPARED BY:** Environmental Programs

COMPARISON OF TIER 1 RBSLs WITH REPRESENTATIVE CONCENTRATIONS - OFF-SITE COMMERCIAL WORKER

CONTAMINANTS OF CONCERN	SURFICIAL SOIL			SUB-SURFACE SOIL			GROUNDWATER					
	Ingestion, inhalation, and dermal contact		NC	Indoor inhalation of vapors		NC	Indoor inhalation of vapors		NC	Ingestion		C
	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [µg/L]	RBSLs [µg/L]	E/Exceeds or NE/Not Exceeds	Concentration at the tap [µg/L]	MCL [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS												
Benzene												
Toluene												
Ethylbenzene												
Xylenes (Total)												
Ethylene Dibromide (EDB)												
1,2-Dichloroethane (EDC)												
MTBE												
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene												
Anthracene												
Benzo(a)anthracene												
Benzo(a)pyrene												
Benzo(b)fluoranthene												
Benzo(k)fluoranthene												
Chrysene												
Dibenz(a-h)anthracene												
Fluoranthene												
Fluorene												
Total Naphthalenes												
Phenanthrene												
Pyrene												
METALS												
Lead												

NOTE:

Enter the representative concentration and indicate.

Representative concentration is:

Soil:

Groundwater:

N/A: Not applicable

>RES: Calculated RBSLs exceeded residual soil saturation level.

>SOL: Calculated RBSLs exceeded pure component water solubility.

This comparative evaluation is performed automatically after the user has completed Report Form No.3 and entered the representative concentration on this form for complete pathways.

NEW MEXICO RBDM | TIER 1 REPORT | FORM NO. 4 - CONSTRUCTION WORKER

SITE ID: SWMU 61-002 | FACILITY ID: Los Alamos National Laboratory

SUBMITTAL DATE: 03-May-07 | PREPARED BY: Environmental Programs

COMPARISON OF TIER 1 RBSLs WITH REPRESENTATIVE CONCENTRATIONS - ON-SITE CONSTRUCTION WORKER

CONTAMINANTS OF CONCERN	SOIL WITHIN THE TYPICAL CONSTRUCTION ZONE: Ingestion, inhalation,and dermal contact — Representative concentration [mg/kg]	RBSLs [mg/kg]		C — E/Exceeds or NE/Not Exceeds	GROUNDWATER: Outdoor inhalation of vapors — Representative concentration [µg/L]	RBSLs [µg/L]	NC — E/Exceeds or NE/Not Exceeds
ORGANICS							
Benzene	2.69	1.67E+02		NE			
Toluene	35	6.31E+03	>RES	NE			
Ethylbenzene	21.4	5.98E+03	>RES	NE			
Xylenes (Total)	104	8.00E+03	>RES	NE			
Ethylene Dibromide (EDB)	0.25	6.19E-01		NE			
1,2-Dichloroethane (EDC)	0.37	1.30E+02		NE			
MTBE	0.008	3.77E+02		NE			
POLYCYCLIC AROMATIC HYDROCARBONS							
Acenaphthene	0.32	1.16E+04	>RES	NE			
Anthracene	0.32	9.96E+04	>RES	NE			
Benzo(a)anthracene	0.32	4.19E+02	>RES	NE			
Benzo(a)pyrene	0.32	4.28E+01	>RES	NE			
Benzo(b)fluoranthene	0.32	4.10E+02	>RES	NE			
Benzo(k)fluoranthene	0.32	4.27E+02	>RES	NE			
Chrysene	0.32	3.99E+04	>RES	NE			
Dibenz(a-h)anthracene	0.32	4.32E+01	>RES	NE			
Fluoranthene	0.32	1.60E+04	>RES	NE			
Fluorene	0.32	1.10E+04	>RES	NE			
Total Naphthalenes	142	3.23E+03	>RES	NE			
Phenanthrene	0.32	7.90E+03	>RES	NE			
Pyrene	0.32	1.24E+04	>RES	NE			
METALS							
Lead	21.2	1.00E+03	N/A	NE			

NOTE:

Enter the representative concentration and indicate.

Representative concentration is: *Soil:* *Average of concentrations in samples from 0 to 15 ft bgs.*

Groundwater:

N/A: Not applicable

>RES: Calculated RBSLs exceeded residual soil saturation level.

>SOL: Calculated RBSLs exceeded pure component water solubility.

This comparative evaluation is performed automatically after the user has completed Report Form No.3 and entered the representative concentration on this form for complete pathways.

NEW MEXICO RBDM | TIER 1 REPORT | FORM NO. 4 - CONSTRUCTION WORKER

SITE ID: SWMU 61-002 | FACILITY ID: Los Alamos National Laboratory

SUBMITTAL DATE: 03-May-07 | PREPARED BY: Environmental Programs

COMPARISON OF TIER 1 RBSLs WITH REPRESENTATIVE CONCENTRATIONS - OFF-SITE CONSTRUCTION WORKER

CONTAMINANTS OF CONCERN	SOIL WITHIN THE TYPICAL CONSTRUCTION ZONE			GROUNDWATER		
	Ingestion, inhalation,and dermal contact		NC	Outdoor inhalation of vapors		NC
	Representative concentration [mg/kg]	RBSLs [mg/kg]	E/Exceeds or NE/Not Exceeds	Representative concentration [µg/L]	RBSLs [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS						
Benzene						
Toluene						
Ethylbenzene						
Xylenes (Total)						
Ethylene Dibromide (EDB)						
1,2-Dichloroethane (EDC)						
MTBE						
POLYCYCLIC AROMATIC HYDROCARBONS						
Acenaphthene						
Anthracene						
Benzo(a)anthracene						
Benzo(a)pyrene						
Benzo(b)fluoranthene						
Benzo(k)fluoranthene						
Chrysene						
Dibenz(a-h)anthracene						
Fluoranthene						
Fluorene						
Total Naphthalenes						
Phenanthrene						
Pyrene						
METALS						
Lead						

NOTE:

Enter the representative concentration and indicate. Representative concentration is: *Soil:* *Groundwater:*

N/A: Not applicable

>RES: Calculated RBSLs exceeded residual soil saturation level.

>SOL: Calculated RBSLs exceeded pure component water solubility.

This comparative evaluation is performed automatically after the user has completed Report Form No.3 and entered the representative concentration on this form for complete pathways.

NEW MEXICO RBDM — TIER 1 REPORT — FORM NO. 5

SITE ID: SWMU 61-002 | **FACILITY ID: Los Alamos National Laboratory**

SUBMITTAL DATE: 03-May-07 | **PREPARED BY: Environmental Programs**

TIER 1 GROUNDWATER PROTECTION - NO PETITION FOR VARIANCE TO WQCC STANDARDS REQUIRED

	COMPARISON FOR SOURCE SOIL			COMPARISON FOR GROUNDWATER											
				MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10		
CONTAMINANTS OF CONCERN	Source rep. conc.* [mg/kg]	RBSLs** [mg/kg]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	WQCC std. or RBSL [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS															
Benzene	1.62														
Toluene	19.7														
Ethylbenzene	15.6														
Xylenes (Total)	90.9														
Ethylene Dibromide (EDB)	0.41	3.00E-02	**E**												
1,2-Dichloroethane (EDC)	0.46	4.90E+00	**NE**												
MTBE	0.4	2.77E+01	**NE**												
POLYCYCLIC AROMATIC HYDROCARBONS															
Acenaphthene	0.36														
Anthracene	0.36														
Benzo(a)anthracene	0.36														
Benzo(a)pyrene	0.36														
Benzo(b)fluoranthene	0.36														
Benzo(k)fluoranthene	0.36														
Chrysene	0.36														
Dibenz(a-h)anthracene	0.36														
Fluoranthene	0.36														
Fluorene	0.36														
Total Naphthalenes	84.9														
Phenanthrene	0.36														
Pyrene	0.36														
METALS															
Lead	20.9														

NOTE:

* Source representative concentration is: *Average soil concentration from all samples depths.*

** Back-calculated from WQCC groundwater standards for distance to POE=0 (from Table 4-15 of the Guidance Document)

\# The representative concentrations in each monitoriing well should be the maximum for the most recent 8 consecutive quarters, unless otherwise approved.

N/A: Not applicable

This comparative evaluation is performed automatically after the user has input representative concentrations and target levels for soil and representative concentrations for groundwater.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 5
SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory	
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs	

TIER 1 GROUNDWATER PROTECTION - NO PETITION FOR VARIANCE TO WQCC STANDARDS REQUIRED

	COMPARISON FOR GROUNDWATER														
	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16	MW-17	MW-18	MW-19	MW-20	MW-21	MW-22	MW-23		
CONTAMINANTS OF CONCERN	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	Recent# 8 qrtr max. [µg/L]	WQCC std. or RBSL [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS															
Benzene															
Toluene															
Ethylbenzene															
Xylenes (Total)															
Ethylene Dibromide (EDB)															
1,2-Dichloroethane (EDC)															
MTBE															
POLYCYCLIC AROMATIC HYDROCARBONS															
Acenaphthene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b)fluoranthene															
Benzo(k)fluoranthene															
Chrysene															
Dibenz(a-h)anthracene															
Fluoranthene															
Fluorene															
Total Naphthalenes															
Phenanthrene															
Pyrene															
METALS															
Lead															

NOTE:

N/A: Not applicable

The representative concentrations in each monitoriing well should be the maximum for the most recent 8 consecutive quarters, unless otherwise approved.

This comparative evaluation is performed automatically after the user has input the representative concentrations.

NEW MEXICO RBDM — TIER 1 REPORT — FORM NO. 6

SITE ID: SWMU 61-002 | **FACILITY ID: Los Alamos National Laboratory**

SUBMITTAL DATE: 03-May-07 | **PREPARED BY: Environmental Programs**

TIER 1 GROUNDWATER PROTECTION - PETITION FOR VARIANCE TO WQCC STANDARDS REQUIRED

				Distance from source to Point of Exposure (POE) =								
	COMPARISON FOR SOURCE SOIL			COMPARISON FOR COMPLIANCE WELLS								
COMPLIANCE WELL NUMBER	N/A											
DISTANCE FROM SOURCE	N/A											
RECENT TREND	N/A											
CONTAMINANTS OF CONCERN	Source rep. conc.* [mg/kg]	RBSLs** [mg/kg]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS												
Benzene												
Toluene												
Ethylbenzene												
Xylenes (Total)												
Ethylene Dibromide (EDB)												
1,2-Dichloroethane (EDC)												
MTBE												
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene												
Anthracene												
Benzo(a)anthracene												
Benzo(a)pyrene												
Benzo(b)fluoranthene												
Benzo(k)fluoranthene												
Chrysene												
Dibenz(a-h)anthracene												
Fluoranthene												
Fluorene												
Total Naphthalenes												
Phenanthrene												
Pyrene												
METALS												
Lead												

NOTE:

* Source representative concentration is: ______ ** Back-calculated from WQCC standards using tier 1 default parameters.

\# The representative concentrations in each compliance well should be the maximum for the most recent 8 consecutive quarters, unless otherwise approved.

N/A: Not applicable

This comparative evaluation is performed automatically after the user has input the representative concentrations and the target levels.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 6
SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory	
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs	

TIER 1 GROUNDWATER PROTECTION - PETITION FOR VARIANCE TO WQCC STANDARDS REQUIRED

	Distance to Point of Exposure (POE) =											
	COMPARISON FOR COMPLIANCE WELLS											
COMPLIANCE WELL NUMBER												
DISTANCE FROM SOURCE												
RECENT TREND												
CONTAMINANTS OF CONCERN	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds	Recent# 8 qrtr max. [µg/L]	RBSLs** [µg/L]	E/Exceeds or NE/Not Exceeds
ORGANICS												
Benzene												
Toluene												
Ethylbenzene												
Xylenes (Total)												
Ethylene Dibromide (EDB)												
1,2-Dichloroethane (EDC)												
MTBE												
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene												
Anthracene												
Benzo(a)anthracene												
Benzo(a)pyrene												
Benzo(b)fluoranthene												
Benzo(k)fluoranthene												
Chrysene												
Dibenz(a-h)anthracene												
Fluoranthene												
Fluorene												
Total Naphthalenes												
Phenanthrene												
Pyrene												
METALS												
Lead												

NOTE:

** Back-calculated from WQCC standards using tier 1 default parameters.

The representative concentrations in each compliance well should be the maximum for the most recent 8 consecutive quarters, unless otherwise approved.

N/A: Not applicable

This comparative evaluation is performed automatically after the user has input the representative concentrations and the target levels.

NEW MEXICO RBDM | TIER 1 REPORT | FORM NO. 7

SITE ID: SWMU 61-002 | **FACILITY ID: Los Alamos National Laboratory**

SUBMITTAL DATE: 03-May-07 | **PREPARED BY: Environmental Programs**

TIER 1 APPLICABLE TARGET LEVELS FOR VARIOUS MEDIA

NOTE: The RBSLs listed in this table, for each route of exposure, are the lowest of the RBSLs for all the receptors for that particular route of exposure.
The applicable target levels for each medium would be the lowest of the RBSLs listed in this table.

CONTAMINANTS OF CONCERN	SURFICIAL SOIL		SUBSURFACE SOIL		GROUNDWATER						GROUNDWATER PROTECTION	
	Ingestion, inhalation, and dermal contact		Indoor inhalation		Indoor inhalation		Outdoor inhalation		Ingestion	Resource protection	Soil concentrations protective of groundwater - no petition required	Soil concentrations protective of groundwater - petition required
	[mg/kg]		[mg/kg]		[µg/L]		[µg/L]		[µg/L]	[µg/L]	[mg/kg]	[mg/kg]
	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	ON-SITE	OFF-SITE				
ORGANICS												
Benzene	7.33E+01		1.67E+02									
Toluene	6.31E+03		6.31E+03									
Ethylbenzene	5.98E+03		5.98E+03									
Xylenes (Total)	8.00E+03		8.00E+03									
Ethylene Dibromide (EDB)	2.59E-02		6.19E-01								3.00E-02	
1,2-Dichloroethane (EDC)	2.34E+01		1.30E+02								4.90E+00	
MTBE	3.77E+02		3.77E+02								2.77E+01	
POLYCYCLIC AROMATIC HYDROCARBONS												
Acenaphthene	1.16E+04		1.16E+04									
Anthracene	9.96E+04		9.96E+04									
Benzo(a)anthracene	2.18E+01		4.19E+02									
Benzo(a)pyrene	2.19E+00		4.28E+01									
Benzo(b)fluoranthene	2.17E+01		4.10E+02									
Benzo(k)fluoranthene	2.19E+01		4.27E+02									
Chrysene	2.15E+03		3.99E+04									
Dibenz(a-h)anthracene	2.21E+00		4.32E+01									
Fluoranthene	1.60E+04		1.60E+04									
Fluorene	1.10E+04		1.10E+04									
Total Naphthalenes	3.23E+03		3.23E+03									
Phenanthrene	7.90E+03		7.90E+03									
Pyrene	1.24E+04		1.24E+04									
METALS												
Lead	1.00E+03		1.00E+03									

N/A: Not applicable

SITE ID: SWMU 61-002	**FACILITY ID: Los Alamos National Laboratory**
SUBMITTAL DATE: 03-May-07	**PREPARED BY: Environmental Programs**

ADDITIONAL NOTES

As shown in Form 5, the representative concentration of EDB (0.41 mg/kg) exceeds the RBSL for protection of groundwater (0.03 mg/kg). The representative concentration was calculated from a data set consisting of all nondetected values, with detection limits ranging from 0.00103 mg/kg to 5.82 mg/kg.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 8

SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs

TIER 1 CONCLUSIONS AND RECOMMENDATIONS

1.	***Has the site been adequately investigated and characterized?***
	Yes,
2.	***Has NAPL been removed?***
	Not applicable. No NAPL encountered.
3.	***Is the groundwater plume stable or shrinking, based on the concentration trend plots?***
	Not applicable. No groundwater data.
4.	***Are on-site soil and groundwater concentrations protective of current and reasonable future on-site receptors?***
	Representative soil concentrations are below RBSLs for all applicable pathways realated to soil exposure. No groundwater concentration data.
5.	***Are off-site soil and groundwater concentrations protective of current and reasonable future off-site receptors?***
	Representative soil concentrations are below RBSLs for all applicable pathways realated to soil exposure. No groundwater concentration data.
6.	***Are soil concentrations protective of groundwater?***
	Representative soil concentration of EDB is above RBSL for protection of groundwater. No EDB was detected and representative concentration is calculated from nondetected values only, thus there is no evidence of EDB at the site. RBSL is probably overestimated based on great distance to supply well. EDB should not present threat to groundwater.
7.	***Are groundwater concentrations below the applicable standards?***
	Not applicable. No groundwater data.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 8

SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs

TIER 1 CONCLUSIONS AND RECOMMENDATIONS

8.	*Is a waiver petition for alternative groundwater protection standards recommended?*
	No.
9.	*Is compliance monitoring of groundwater recommended?*
	No. Groundwater monitoring will be performed as required by Consent Order.
10.	*Is an interim remediation and tier 1 re-evaluation recommended?*
	Remediation has been performed as part of corrective action performed under Consent Order.
11.	*Is remediation to tier 1 target levels recommended?*
	No additional remediation is recommended.
12.	*Is site recommended for NFA status?*
	Yest.
13.	*Is a Tier 2 evaluation recommended? If yes, list the receptors, routes of exposure, and the COCs to be evaluated.*
	No.
14.	*Other relevant information*
	Site is being recommended for corrective action complete with controls under Consent Order. Controls will prevent residential use of property.

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 9
SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory	
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs	

REFERENCES AND PROTOCOLS

NEW MEXICO RBDM	TIER 1 REPORT	FORM NO. 9

SITE ID: SWMU 61-002	FACILITY ID: Los Alamos National Laboratory
SUBMITTAL DATE: 03-May-07	PREPARED BY: Environmental Programs

REFERENCES AND PROTOCOLS

Appendix F

Waste Management Data
(on CD included with this document)