3-1-2006

Justification for Class III Permit Modification March 2006 SWMU 196 Building 6597 Cistern (Techincal Area V)

Sandia National Laboratories/NM

This work supported by the
United States Department of Energy
under contract DE-AC04-94I85000.

Sandia National Laboratories

SWMU 196
Building 6597 Cistern
(Poster 1 of 2)

Environmental Restoration Project

Site History

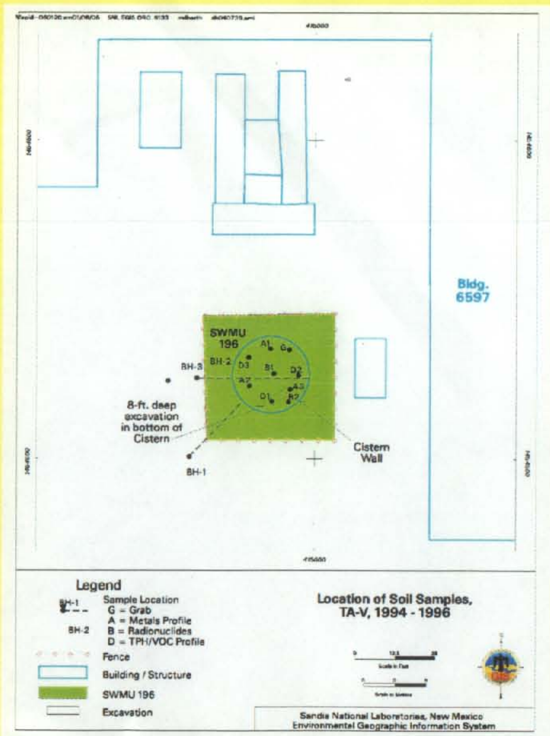
- SWMU 196, the Building 6597 Cistern, is approximately 1,600 sq ft (0.037 acre) located in TA-V.
- The Cistern is a 25-ft-diameter, vertically oriented, concrete cylinder that extends approximately 22 ft bgs with an unlined earthen bottom. The concrete cylinder also extended approximately 3 ft above the ground surface.
- The Cistern is approximately 37 ft west of Building 6597, which previously housed the PROTO 1 facility. From 1978 to 1989, the Cistern received insulation oil and wash water from the PROTO 1 facility. The Cistern also served as an emergency catch basin for the series of underground storage tanks (SWMU 37) previously connected to the PROTO 1 facility. No records of discharges to the Cistern were maintained. No discharges to the Cistern have occurred since 1989 when the PROTO 1 facility was closed. The Cistern was not connected to any surface or storm water systems.

Depth to Groundwater

- Depth to the regional aquifer is approximately 500 ft bgs.

Constituents of Concern

- VOCs
- SVOCs
- TPH
- Metals
- Radionuclides



Summary of Investigation

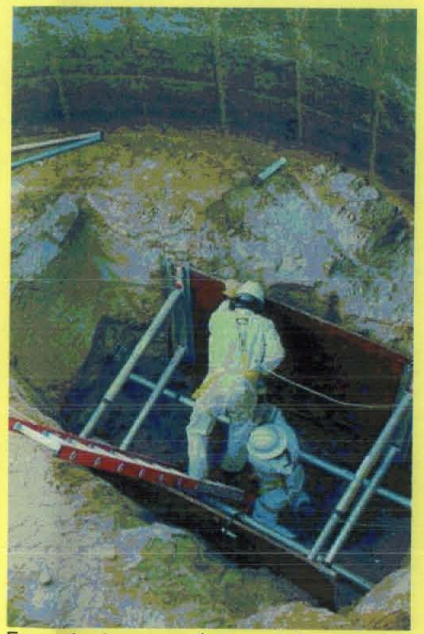
- During sampling activities at the bottom of the Cistern in 1994, it was determined that there was not a concrete bottom to the Cistern, as previously thought. The bottom of the Cistern is native soil and is open to the ground beneath it. In June 1994, a grab sample was collected from the bottom surface of the Cistern. It was analyzed at an off-site laboratory for VOCs, PCBs, TPH and metals. Five metals (cadmium, copper, lead, nickel, and silver) had concentrations above background values. No VOCs, PCBs or SVOCs were detected above the MDLs. The TPH concentration was 60,500 mg/kg.
- In April 1995, two composite soil samples were collected from the bottom of the Cistern for radionuclide analyses. There was a detection of U-235 slightly above the background value and the critical level for the tritium exceeded the background value. The MDAs for U-235 and U-238 exceeded background values.
- In May 1995, 21 soil samples plus one duplicate were collected from three locations from the surface to 3 ft below the bottom of the Cistern in 0.5 ft intervals. These samples were analyzed for selected metals using a field-screening method. These field-screening results were not used in the final risk assessment.
- In March 1996, an 8-ft deep trench was excavated in the bottom of the Cistern and 12 soil samples plus one duplicate were collected using a hand auger from one location within the trench and two locations outside the trench to a maximum depth of 13 ft below the bottom of the Cistern. The samples were analyzed for VOCs and TPH at an off-site laboratory. No VOCs were detected. A maximum TPH concentration of 40,000 mg/kg was detected in a sample collected at 12 ft below the Cistern bottom.
- In September 1999, a drill rig was employed to collect soil samples from the subsurface at SWMU 196. As it was not possible to place the drill rig in the Cistern, borehole locations were placed as close to the Cistern as possible. Two angled boreholes were advanced to obtain soil samples from beneath the Cistern and one vertical borehole was placed approximately 5 ft west of the Cistern wall. The first attempt at drilling an angled borehole was unsuccessful at obtaining samples and was plugged and abandoned. Auger refusal was encountered in the second angled borehole at a depth of 75 linear ft along the borehole. The vertical borehole was advanced to 100 ft bgs. Nineteen samples plus duplicates were collected in the boreholes and analyzed at an off-site laboratory for VOCs, SVOCs, TPH, and RCRA metals plus beryllium. A maximum TPH concentration of 25,300 mg/kg was detected in the last sample from the angled borehole. Five VOCs were detected. Two samples in the angled borehole had barium concentrations that exceeded the background value. The presence of the insulating oil in the soil caused matrix interference and many of the analytical results were rejected in the data validation process.
- Due to problems encountered in 1999 (refusal and rejected data), additional characterization was needed and a larger drill rig was employed to collect soil samples. SNL/NM and the NMED defined a sampling plan that consisted of advancing another borehole and collecting soil samples for TPH analysis until two consecutive, field-screened samples had concentrations of less than 100 mg/kg TPH. In June 2003, a vertical borehole was located approximately 20 ft west of the Cistern wall. Nineteen soil samples were collected at intervals beginning at 100 ft to a maximum depth of 300 ft. Each soil sample was split; one fraction was used for screening and the other for confirmation. The screening fraction was analyzed for TPH by a local off-site laboratory; the results were used to determine the borehole depth. The confirmatory fraction was analyzed by another off-site laboratory for VOCs, SVOCs, and TPH. Nine VOCs and six SVOCs, most with a J qualification, were detected in the confirmatory soil samples. No TPH was detected above the MDL of 1.89 mg/kg in any of the confirmatory samples.
- The Cistern was backfilled as requested by the NMED in September 2005.

Summary of data Used for NFA Justification

- A total of 55 soil samples were used to characterize the site and complete a risk assessment. The soil samples collected from the bottom surface of the Cistern, from beneath the Cistern, and from boreholes located outside, but as close as possible, to the Cistern were used for the final risk assessment.

Recommended Future Land Use

- Industrial land use was established for this site.



Excavation to uncover the expected concrete base of the Cistern, March 1996.

SWMU 196
Building 6597 Cistern
(Poster 2 of 2)

This work supported by the
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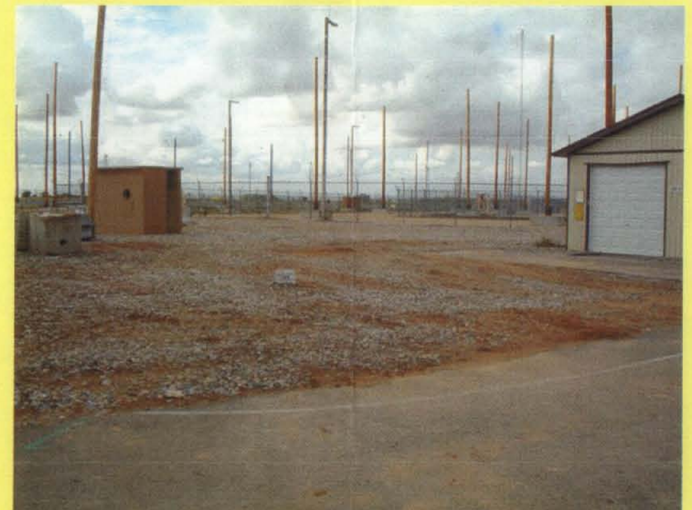
Collecting subsurface soil samples near the Cistern, September 1999.



SWMU 196 after completion of backfilling activities, September 2005.

Results of Risk Analysis

- Risk assessment results for the residential land-use scenario are calculated per NMED risk assessment guidance as presented in "Supplemental Risk Document Supporting Class 3 Permit Modification Process".
- Because COCs were present in concentrations or activities greater than background-screening levels or because constituents were present that did not have background-screening levels, it was necessary to perform a risk assessment for the site. The risk assessment analysis evaluated the potential for adverse health effects for the industrial and residential land-use scenarios.
- The maximum concentration for lead was 180 mg/kg; this value exceeds the background value. The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. However, the NMED guidance for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1500 mg/kg, respectively. The EPA screening guidance value for a residential land-use scenario is 400 mg/kg. The maximum concentration value for lead at this site was less than all the screening values; therefore, lead was eliminated from further consideration in the human health risk assessment.
- The total human health HI was 0.27 for the residential land-use scenario, which is significantly lower than the NMED guideline of 1. The total estimated excess cancer risk was 6E-6 for the residential land-use scenario, which is below the NMED guideline of 1E-5.
- The human health TEDE for a residential land-use scenario was 4.3E-1 mrem/yr, which is below the EPA numerical guideline of 75 mrem/yr, and the human health TEDE for the industrial land-use scenario was 1.2E-1 mrem/yr for the radiological COCs, which is below the EPA guidance of 15 mrem/yr. Therefore, SWMU 196 is eligible for unrestricted radiological release.
- Using the SNL ecological risk assessment methodology, the ecological risk for SWMU 196 is predicted to be low.
- In conclusion, human health risk under a residential land-use scenario and ecological risk are acceptable per NMED guidance. SWMU 196 was proposed for CAC without institutional controls. However, the NMED has issued a certificate for CAC with institutional controls for this site.

Risk Assessment Values for SWMU 196 Nonradiological COCs

COC	Maximum Concentration (All Samples) (mg/kg)	Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk
Inorganic			
Barium	286	0.05	–
Cadmium	2.5	0.06	2E-9
Copper	213	0.08	–
Nickel	17.8	0.01	–
Silver	2.9	0.01	–
Organic			
Butanone, 2-	0.5[b]	0.00	–
Carbon disulfide	0.0043 J	0.00	–
Chloromethane	0.5[b]	0.00	4E-7
Chrysene	0.086 J	0.00	1E-9
Dichloroethane, 1,2-	0.25[b]	0.01	7E-7
Dichloroethene, 1,1-	0.25[b]	0.00	4E-7
Diethylphthalate	0.39	0.00	–
Ethyl benzene	0.25[b]	0.00	4E-8
Ethylhexyl)phthalate, bis(2-	0.43	0.00	1E-8
Fluoranthene	0.33	0.00	–
Methylene chloride	0.25[b]	0.00	3E-8
Phenanthrene	0.14 J	0.00	–
Pyrene	0.22 J	0.00	–
Trichloroethane, 1,1,1-	0.25[b]	0.00	–
Tetrachloroethene	0.25[b]	0.00	2E-7
Toluene	0.25[b]	0.00	–
Trichloroethene	0.25[b]	0.02	5E-6
Xylene	0.25[b]	0.00	–
	Total	0.27	6E-6
	NMED Guidance	*<1*	*<1E-5*

[a]EPA 1989.
[b]Maximum concentration was one-half of the detection limit.

For More Information Contact

U.S. Department of Energy
Sandia Site Office
Environmental Restoration
Mr. John Gould
Telephone (505) 845-6089

Sandia National Laboratories
Environmental Restoration Project
Task Leader: Brenda Langkopf
Telephone (505) 284-3272

Sandia National Laboratories

Justification for Class III Permit Modification

March 2006

SWMU 196
Operable Unit 1306
Building 6597 Cistern (Technical Area V)

RFI Report (NFA) Submitted July 1996
NOD Submitted October 1997
NOD Submitted July 1998
RSI Submitted November 2000
RSI Submitted November 2004
RSI Submitted May 2005
RSI Submitted August 2005
RSI Submitted October 2005

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

RFI Report

ER/1304/REP/96 RFI

Department of Energy
Field Office, Albuquerque
Kirtland Area Office
P.O. Box 5400
Albuquerque, New Mexico 87115

CERTIFIED MAIL - RETURN RECEIPT REQUESTED JUL 3 1996

Mr. Benito Garcia, Bureau Chief
New Mexico Environment Department
Hazardous and Radioactive Materials Bureau
2044 Galisteo Street
P.O. Box 26110
Santa Fe, NM 87505-2100

Dear Mr. Garcia:

Enclosed are two copies of the final report on the Results of the Technical Areas III and V RCRA Facility Investigation (RFI) conducted by Sandia National Laboratories/New Mexico (SNL/NM), ID Number NM5890110518-1. The EPA letter of April 19, 1994, approving the RFI Work Plan for these Technical Areas required submission of this report by April of 1997.

If you have any questions, please contact John Gould at (505) 845-6089, or Mark Jackson at (505) 845-6288.

Sincerely,

George K. Laskar

for Michael J. Zamorski
Acting Area Manager

Enclosure

cc w/enclosure:
T. Trujillo, AL, ERD
W. Cox, SNL, MS 1147
N. Weber, NMED-AIP
R. Kern, NMED-AIP
D. Neleigh, EPA, Region 6 (2 copies)

cc w/o enclosure:
B. Oms, DOE/KAO
E. Krauss, SNL, MS 0141
B. Hoditschek, NMED
B. Sweeney, NMED
F. Nimick, SNL, MS 1147
L. Dawson, SNL, MS1147
P. Slavin, SNL, MS 1147
W. Keener, SNL, MS 1315
N. Morlock, USEPA, Region VI
R. Mayer, USEPA, Region VI
M. J. Davis, SNL, MS 1147

Sandia National Laboratories

Results of the Technical Areas III and V RCRA Facility Investigation

June 1996

Environmental Restoration Project

United States Department of Energy
Albuquerque Operations Office

RESULTS OF THE TECHNICAL AREAS III AND V RCRA FACILITY INVESTIGATION

Prepared by
Paula J. Slavin (GRAM, Inc.) and Lon A. Dawson
Department 7582: Environmental Restoration for Technical Areas
and Miscellaneous Sites

EXECUTIVE SUMMARY

A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted in 1994 and 1995 at 21 Environmental Restoration (ER) sites within Technical Areas III and V (TA-III/V) at Sandia National Laboratories in Albuquerque, New Mexico (SNL/NM). This report details the investigations at each of the sites.

In the RFI Work Plan (SNL/NM 1993a, 1993b), the ER sites were grouped into five categories:

1. Sites proposed for No Further Action (NFA);
2. Potential petroleum-impacted sites;
3. Sites potentially impacted only by hazardous constituents of concern (COCs);
4. Sites potentially impacted only by radioactive constituents; and
5. Sites potentially impacted by both hazardous and radioactive compounds.

The sites were investigated separately and are discussed in the report in individual sections (Sections 3.0 through 23.0).

Three of the sites proposed for NFA (ER Sites 105, 188, and 195) were submitted to the U.S. Environmental Protection Agency (EPA) in 1995 for administrative NFA decisions. All three were granted NFA status in July 1995.

Based on confirmatory sampling, the following sites are proposed for NFA in this RFI report: Sites 26, 31, 34, 35, 36, 37, 51, 78, 100, 102, 107, 111, 196, and 241. A Class III permit modification request will be submitted following final determinations on sites addressed within this RFI report. This RFI report constitutes the NFA proposals for these sites. Most sites in this group exhibited no contamination above background levels; the remainder of these sites were contaminated at levels far below regulatory limits. Although Site 107 falls into this group, it has been identified as the preferred site for a future temporary unit and corrective action management unit (TU/CAMU) for the ER Project. Thus additional activities related to its TU/CAMU status will be conducted.

Several of the ER sites are still active (i.e., testing is currently being conducted at or immediately adjacent to the sites). Because of this, only limited investigations were conducted at Sites 26, 83, and 84 where ongoing testing significantly impacts thorough site characterization. Investigations at these sites included geophysical surveys to identify buried material at Sites 26 and 84 and surface radiation surveys (discussed below) at Sites 83 and 84. Investigations will be completed when these sites are decommissioned or placed in final inactive status. Site 240 was reactivated for testing after site characterization was completed. Thus, proposed geophysical investigations of Site 240 will be postponed until the site is placed in final inactive status.

A Voluntary Corrective Measure (VCM) was performed to survey and remove surface radiation hazards associated with testing conducted at several ER sites. Sites 18, 83, 84, 102, 240, and 241 were surveyed for radioactive anomalies. Removal activities were conducted at sites where anomalies were demonstrated to exist (Sites 18, 83, 84, and 240).

A VCM also was conducted at the Gas Cylinder Disposal Pit (Site 78) to mitigate the immediate hazard posed to human health and the environment. The site exhibited many unruptured gas cylinders containing hazardous and toxic gases, high-explosive (HE) residues, and radioactively contaminated soil and slag. The VCM was accelerated from the original schedule of site assessment, remedy selection, and full-scale remediation. The entire contents of the pit were removed and examined, the contaminants were identified, and hazardous, radioactive, and solid wastes were disposed in a manner appropriate to regulatory requirements. As indicated above, Site 78 is proposed for NFA based on the results of the VCM.

The investigation of Site 18 revealed limited chemical contamination for which a VCM is planned. Site 18 exhibited elevated levels of polychlorinated biphenyls (PCBs) in an area approximately 10 feet by 80 feet. The contamination is believed to be restricted to the upper few inches of soil; shallow excavation (scraping the soil) is proposed to remediate the hazard posed by the PCBs. The results of the VCM at Site 18 will be documented in an NFA proposal, and the adequacy of the cleanup will be evaluated in a Class 3 permit modification process.

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ACRONYMS AND ABBREVIATIONS

AIP	Agreement in Principle
AMSL	above mean sea level
ASTM	American Society for Testing and Materials
CA	Corrective Action
CEARP	Comprehensive Environmental Assessment and Response Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CMS	corrective measures study
Cn	critical number
COC	constituent of concern
CWL	Chemical Waste Landfill
DCP	direct current plasma
DNT	dinitrotoluene
DOE	U.S. Department of Energy
DOE/AL	U.S. Department of Energy/Albuquerque Operations Office
DOT	U.S. Department of Transportation
DQO	Data Quality Objective
DU	depleted uranium
EA	Environmental Assessment
EDE	effective dose equivalent
EM	electromagnetic
EORC	Environmental Operations Records Center
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ES&H	Environment, Safety, and Health
FID	flame ionization detector
FOP	Field Operating Procedure
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
GCDP	Gas Cylinder Disposal Pit
GIF	Gamma Irradiation Facility
GIS	Geographic Information System
GJPO	Grand Junction Projects Office (DOE)
GM	Geiger-Müller
GPS	Global Positioning System
HASP	Health and Safety Plan
HE	high explosive
HERMES	High-Energy Radiation Megavolt Electron Source
HPCA	High Pressure Container Access
HPGE	high purity germanium

HSWA	Hazardous and Solid Waste Amendment
HWMF	Hazardous Waste Management Facility
ICM	interim corrective measure
ICP	inductively coupled plasma
ID	inner diameter
IH	industrial hygiene
KAFB	Kirtland Air Force Base
KAO	Kirtland Area Office
LCS	laboratory control sample
LIHE	light-initiated high explosive
LLW	low-level waste
LWDS	Liquid Waste Disposal System
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDA	minimum detectable activity
MDL	method detection limit
ms/msd	matrix spike/matrix spike duplicate
MSA	Mine Safety Appliances
MSD	mass selective detector
MSDS	Material Safety Data Sheet
MWL	Mixed Waste Landfill
NA	not applicable
ND	nondetect
NFA	No Further Action
NIST	National Institute of Standards and Testing
NMED	New Mexico Environment Department
NMUSTR	New Mexico Underground Storage Tank Regulations
NRC	Nuclear Regulatory Commission
OD	outer diameter
OP	Operating Procedure
OSI	on-site investigation
OVA	organic vapor analyzer
PA	preliminary assessment
PCB	polychlorinated biphenyl
PCE	tetrachloroethene (tetrachloroethylene or perchloroethylene)
PIC	pressurized ionization chamber
PID	photoionization detector
PIP	Project Implementation Plan
PLQ	practical limit of quantitation
PPE	personal protective equipment
PVC	polyvinyl chloride

QA	quality assurance
QC	quality control
QAP	Quality Assurance Program
QAPjP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RMMA	Radioactive Materials Management Area
SAP	Sampling and Analysis Plan
SASN	silver acetylyde-silver nitrate
SI	site investigation
SMO	Sample Management Office
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWHC	Site-Wide Hydrogeologic Characterization
SWMU	Solid Waste Management Unit
TA	Technical Area
TAL	target analyte list
TCA	trichloroethane
TCE	trichloroethene (trichloroethylene)
TCLP	Toxicity Characteristic Leaching Procedure
TD/GC	thermal desorption/gas chromatography
TNT	trinitrotoluene
TPH	total petroleum hydrocarbon
TU-CAMU	temporary unit and corrective action management unit
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance limit
VCM	Voluntary Corrective Measure
VOC	volatile organic compound
WRS	Wilcoxon Rank Sum
XRF	X-ray fluorescence

ABBREVIATIONS

Ag	silver
Am-241	americium-241
As	arsenic
Ba	barium
Be	beryllium

Bldg	Building
bgs	below ground surface
°C	degrees Celsius
Cd	cadmium
cm	centimeter(s)
C_n	critical number
Co-60	cobalt-60
cpm	counts per minute
cps	counts per second
Cr	chromium
Cs-137	cesium-137
Cu	copper
°F	degrees Fahrenheit
ft	foot (or feet)
ft^2	square feet
ft^3	cubic feet
g	gram(s)
gal.	gallon(s)
hr	hour(s)
in.	inch(es)
kg	kilogram(s)
km	kilometer(s)
L	liter(s)
lb	pound(s)
MBK	2-hexanone
MEK	2-butanone
MIBK	methyl isobutyl ketone
m	meter(s)
m^2	square meter(s)
mg	milligram(s)
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
µg	microgram
µg/kg	microgram(s) per kilogram
µR/hr	microroentgens per hour
mrem/yr	millirem per year
mi	mile(s)
min	minute(s)
mL	milliliter(s)
mm	millimeter(s)
mph	miles per hour

NaI	sodium iodide
Ni	nickel
Pb	lead
pCi/L	picocuries per liter
pCi/g	picocuries per gram
ppb	parts per billion
ppm	parts per million
psig	pounds per square inch, gauge
Se	selenium
sec	second(s)
Th	thorium
U	uranium
U_{tot}	total uranium
yd	yard(s)
yd^3	cubic yard(s)
yr	year
Zn	zinc

Approximate Conversion Factors for Selected SI (Metric) Units

Multiply SI (Metric) Unit	By	To Obtain U.S. Customary Unit
Cubic meters (m^3)	35.3	Cubic feet (ft^3)
Cubic meters (m^3)	1.31	Cubic yards (yd^3)
Centimeters (cm)	0.394	Inches (in.)
Meters (m)	3.28	Feet (ft)
Kilometers (km)	0.621	Miles (mi)
Square kilometers (km^2)	0.386	Square miles (mi^2)
Hectares (ha)	2.47	Acres
Liters (L)	0.264	Gallons (gal.)
Grams (g)	0.035	Ounces (oz)
Kilograms (kg)	2.2	Pounds (lb)
Micrograms per kilogram (μg/kg)	1	Parts per billion (ppb)
Milligrams per kilogram (mg/kg)	1	Parts per million (ppm)
Micrograms per liter (μg/L)	1 (approximately)	Parts per billion (ppb)
Milligrams per liter (mg/L)	1 (approximately)	Parts per million (ppm)
Celsius (°C)	9/5 + 32	Fahrenheit (°F)

Mass-to-mass ratio based on aqueous solutions.

1.0 INTRODUCTION

1.1 Site Background

The Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration (ER) Project is chartered with the assessment and cleanup of inactive waste sites at its facilities. This document presents the results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of the SNL/NM sites within Technical Areas III and V (TA-III/V). The sites were identified during a preliminary assessment/site investigation (PA/SI) (DOE 1987) as potential areas of concern or as solid waste management units (SWMUs) as a result of past practices in TA-III/V. Detailed descriptions of these sites are found in the TA-III/V RFI Work Plan (SNL/NM 1993a, 1993b). The purpose of the RFI was to determine the presence or absence of contamination at each of the TA-III/V ER sites.

Sandia Corporation, a subsidiary of Lockheed Martin Corporation, operates SNL/NM as a prime contractor to the U.S. Department of Energy (DOE), which owns SNL/NM. SNL/NM conducts research, development, design, and testing of nuclear and conventional weapons, energy systems, and other programs. Figure 1-1 identifies SNL/NM and its technical areas in relation to Kirtland Air Force Base (KAFB) and the city of Albuquerque, and several surrounding physical features. TA-III/V were established in 1953 for testing weapons components in a variety of natural and simulated environments. TA-III/V are located approximately 6 kilometers (km) south of the main laboratories and offices known as Technical Area I (TA-I) (Figure 1-1).

1.2 RFI Work Plan Overview and Objectives

This RFI has been conducted in accordance with the U.S. Environmental Protection Agency (EPA)-approved TA-III/V RFI Work Plan (SNL/NM 1993a) and its amendment (SNL/NM 1993b). A total of 19 sites in TA-III/V were originally identified as requiring investigation. Varying levels of investigation were conducted at all sites originally identified in the RFI Work Plan. Table 1-1 provides a summary of the sites, their status, and the field investigations conducted at each site and Figure 1-2 shows the location of each site.

Sites were classified as active and inactive, based on use at the time of this RFI. Both active and inactive sites were investigated but full investigation and remediation of active sites was postponed until facility decommissioning. Two sites that were originally grouped together in the Work Plan were subdivided based on physical separation and difference in historical activities: Site 18 was divided into Site 18 (Concrete Pad) and Site 241 (Storage Yard); Site 83 was divided into Site 83 (Long Sled Track) and Site 240 (Short Sled Track).

The objectives of the RFI were to identify the nature and extent of contamination at sites within TA-III/V, evaluate potential risks posed by the contamination, and provide guidance for selecting remedial alternatives. The objective of this RFI report is to document and transmit this information to all stakeholders, including SNL/NM, the DOE, the EPA, the New Mexico Environment Department (NMED), and the general public.

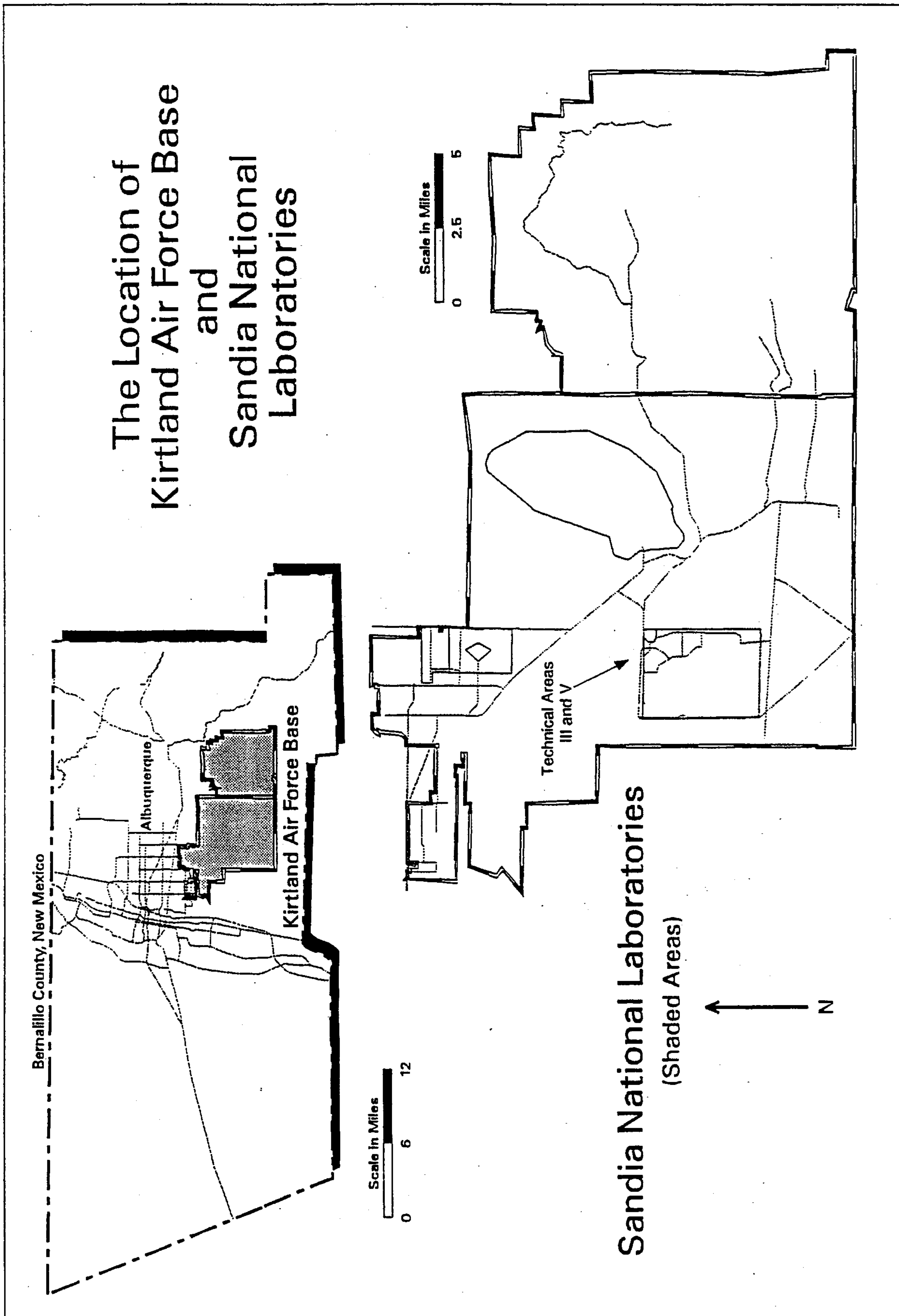


Figure 1-1 Location of Technical Areas III and V at Sandia National Laboratories, Albuquerque

Table 1-1
Summary of Environmental Restoration Sites Within Technical Areas III and V

Site Number	Site Name	Location	Areal Extent	Potential Contaminants[a]/ Detected During RFI?	Period of Operation (Status)	Sampling Method and Date	Total Samples	Field Screen Samples	Off-Site Analyses	Notes[b]
18	Concrete Pad	Central TA-III; South of Short Sled Track.	125 ft by 400 ft	Metals/Yes Radionuclides/Yes HEs/No Oil/Yes PCBs/Yes	1979 - present (Active).	Phase I: Surface, 04/27/94.	43	43	12	Rad. VCM completed. Extent of contamination defined for metals, PCBs, and TPH.
						Phase II: Auger, 01/24/95.	13	13	9	VCM planned.
26	Burial Site	West TA-III; West of Long Sled Track.	145 acres	Metals/NA[c] Radionuclides/Yes	Prior to 1989 (Inactive). Co-located with active Long Sled Track.	NA	NA	NA	NA	Geophysics done; found potential burials. These to be investigated with Site 83. Proposed for NFA.
31	Transformer Oil Spill	Central TA-III; Centrifuge Facility.	20 ft by 20 ft	Oil/No PCBs/No	1971 - present (Active).	Surface, 03/29/94.	11	3	11	No COCs above background. Proposed for NFA.
34	Centrifuge Oil Spill	Central TA-III; Centrifuge Facility.	90-ft diameter	Oil/No	1955 - present (Active).	Shallow subsurface, 05/20/95.	18	18	10	No COCs above background. Proposed for NFA.
35	Vibration Facility Oil Spill	Central TA-III.	20 ft by 50 ft	Oil/Yes PCBs/No	1955 - present (Active).	Phase I: Surface, 04/15/94.	4	0	4	Extent of oil defined. Proposed for NFA.
						Phase II: Shallow subsurface, 06/29/94.	13	13	4	

[a]Contaminants as follows: HEs = high explosives; PCBs = polychlorinated biphenyls; VOCs = volatile organic compounds.
[b]VCM = Voluntary Corrective Measure; TPH = Total petroleum hydrocarbons; NFA = No Further Action; COC = constituent of concern.
[c]NA = Not applicable. These sites were not sampled during the RCRA Facility Investigation (RFI); see Notes column.

Table 1-1
Summary of Environmental Restoration Sites Within Technical Areas III and V (Continued)

Site Number	Site Name	Location	Areal Extent	Potential Contaminants[a]/ Detected During RFI?	Period of Operation (Status)	Sampling Method and Date	Total Samples	Field Screen Samples	Off-Site Analyses	Notes[b]
36	HERMES Oil Spill	Central TA-V; North of Bldg 6596.	1 acre	Oil/Yes VOCs/Yes	1968 - 1989 (Inactive).	Phase I: Shallow subsurface, 07/6/94.	28	28	11	No oil detected in shallow subsurface. Defined extent of oil and VOCs.
						Phase II: Drilling, 03/10/95.	40	40	36	Proposed for NFA.
37	PROTO Oil Spill	Central TA-V; East of Bldg 6597.	1 acre	Oil/No	1978 - 1989 (Inactive).	Auger, 06/9/94.	23	23	8	No COCs above background. Proposed for NFA.
51	Bldg 6924 Pad, Tank, Pit	Southeast TA-III; Northwest of Site 241.	1/2 acre	Metals/Yes HEs/No VOCs/No	1963 - 1990 (Inactive).	Excavation, 09/6/94.	5	4	5	No COCs above background. Proposed for NFA.
78	Gas Cylinder Disposal Pit	Southeast TA-III; East of Chemical Waste Landfill.	80 ft by 180 ft	Toxic, corrosive, reactive, and flammable gases/Yes Radionuclides/Yes Metals/Yes HEs/Yes	1963 - 1984 (Inactive).	Phase I: Excavation - Radioactive.	94	386	91	Health and safety and geophysics surveys. Began VCM 07/94; finished 02/95.
						Phase I: Excavation - Chemical.	94	37	186	Detected chromium, thorium, gases, and reactive chemicals.
						Phase II: Gas analyses.	97	0	97	
						Phase II: Reactive chemicals.	32	32	0	No off-site analysis of reactive chemicals was feasible.
						Phase III: Confirmatory shallow subsurface.	20	0	20	No COCs above background during Phase III. Proposed for NFA.

[a]Contaminants as follows: HEs = high explosives; PCBs = polychlorinated biphenyls; VOCs = volatile organic compounds.
[b]VCM = Voluntary Corrective Measure; TPH = Total petroleum hydrocarbons; NFA = No Further Action; COC = constituent of concern.
[c]NA = Not applicable. These sites were not sampled during the RCRA Facility Investigation (RFI); see Notes column.

Table 1-1
Summary of Environmental Restoration Sites Within Technical Areas III and V (Continued)

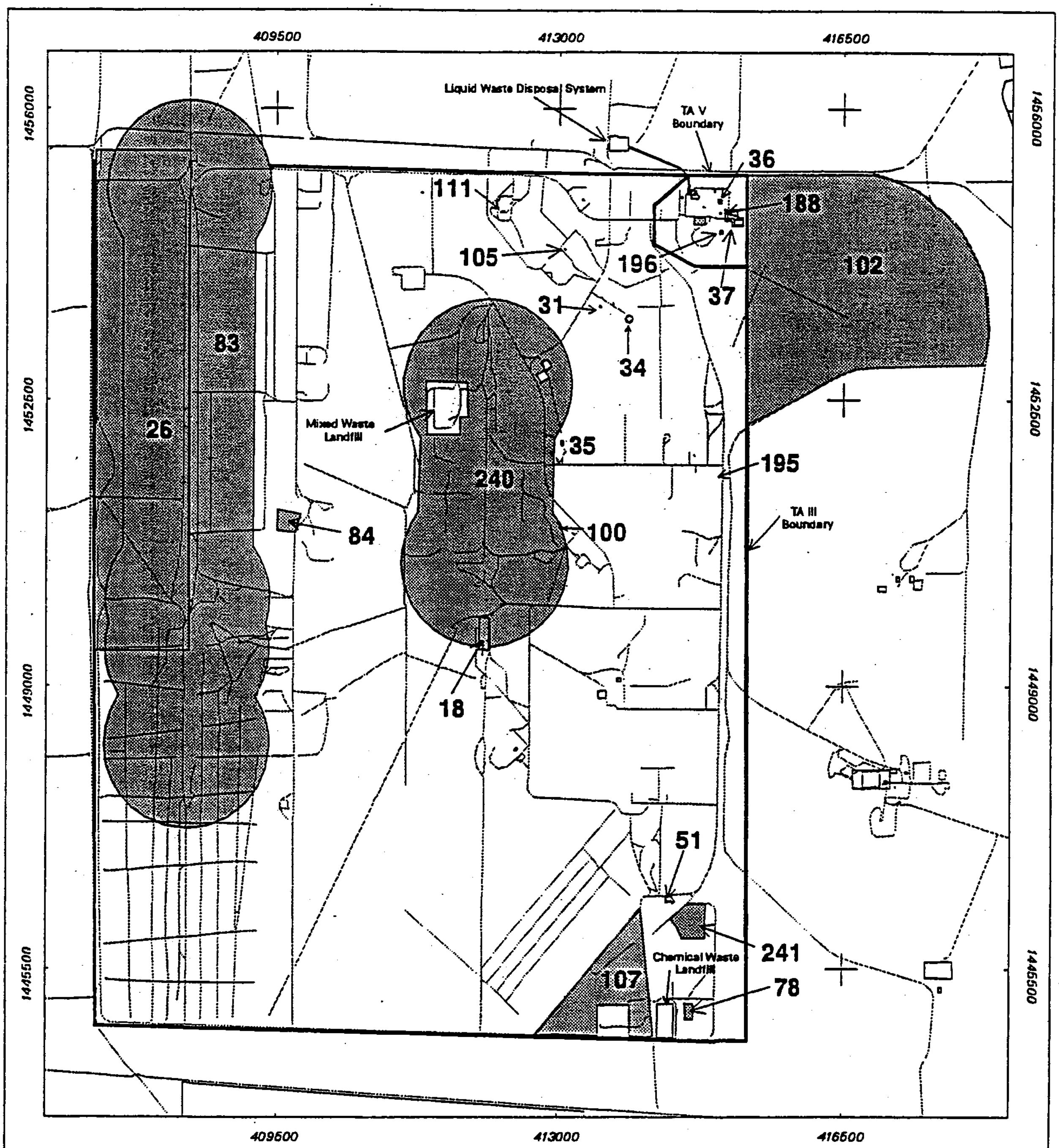
Site Number	Site Name	Location	Areal Extent	Potential Contaminants[a]/ Detected During RFI?	Period of Operation (Status)	Sampling Method and Date	Total Samples	Field Screen Samples	Off-Site Analyses	Notes[b]
83	Long Sled Track	West TA-III boundary.	350 acres	Metals/NA[c] HEs/NA Radionuclides/Yes	1966 - present (Active).	Surface, 04/15/94.	6	0	6	Minor surface sampling done. Rad. VCM completed. Full RFI when site deemed inactive.
84	Gun Facilities	West-central TA-III; East of Long Sled Track.	2 acres	Metals/NA HEs/NA Radionuclides/Yes	1965 - present (Active).	NA	NA	NA	NA	Rad. VCM completed. Full RFI when site deemed inactive.
100	Bldg 6620 Drain/Sump	Central TA-III, immediately southeast of Short Sled Track.	25 ft by 60 ft	Metals/NA HEs/NA	1958 - unknown (Inactive).	Exploratory trenching, 07/25/94.	0	0	0	Site not located during RFI. Proposed for NFA.
102	Radioactive Disposal Area	East of TA-V.	155 acres	Radionuclides/No	Unknown - 1967 (Inactive).	Excavation, 07/25/94.	3	0	3	Rad. survey done. No COCs above background. Proposed for NFA.
105	Mercury Spill at Bldg 6536	North-central TA-III.	20 ft by 20 ft	Mercury/NA	1972 - 1985 (Inactive).	Document search.	NA	NA	NA	Administrative NFA approved July 1995.
107	Explosives Test Area	Southeast TA-III; West of Chemical Waste Landfill.	25 acres	Metals/No HEs/No Nitrate and nitrite/No Radionuclides/No	1953 - 1972 (Inactive).	Surface, 05/17/94.	11	11	11	No COCs above background. Proposed for NFA. Future site of TU-CAMU.

[a]Contaminants as follows: HEs = high explosives; PCBs = polychlorinated biphenyls; VOCs = volatile organic compounds.
[b]VCM = Voluntary Corrective Measure; TPH = Total petroleum hydrocarbons; NFA = No Further Action; COC = constituent of concern.
[c]NA = Not applicable. These sites were not sampled during the RCRA Facility Investigation (RFI); see Notes column.

Table 1-1
Summary of Environmental Restoration Sites Within Technical Areas III and V (Concluded)

Site Number	Site Name	Location	Areal Extent	Potential Contaminants[a]/ Detected During RFI?	Period of Operation (Status)	Sampling Method and Date	Total Samples	Field Screen Samples	Off-Site Analyses	Notes[b]
111	Bldg 6715 Sump/Drain	North-central TA-III.	20 ft by 20 ft	Silver/No HEs/No VOCs/No	1971 - 1988 (Inactive).	Shallow subsurface, 06/17/94.	10	9	4	No COCs above background. Proposed for NFA.
188	Bldg 6597 Aboveground Spill Contain.	TA-V; co-located with Site 37.	15 ft by 25 ft	Used oil/NA[c]	1983 - 1986 (?) (Inactive).	Aerial photographs; confirmatory sampling.	37	22	22	Administrative NFA approved July 1995 - water tanks.
195	Experimental Test Pit	East-central TA-III.	6 ft by 6 ft	Cobalt-60/NA	1955 - 1956 (Inactive).	Document search.	NA	NA	NA	Administrative NFA approved July 1995.
196	TA-V Cistern	South TA-V; West of Bldg 6597.	25-ft diameter	Metals/Yes Oil/Yes VOCs/No	Unknown - 1989 (Inactive).	Phase I: Sludge sampling, 06/27/94 and 10/10/94.	4	3	1	Defined extent of metals in soil. No VOCs or PCBs. Proposed for NFA.
						Phase II: Excavation, 05/95.	2	0	2	
						Phase III: Auger, 06/5/95.	26	26	3	
240	Short Sled Track	Central TA-III.	160 acres	Metals/Yes HEs/No Radionuclides/Yes	1951 - 1966 (Inactive).	Surface, 06/13/94 and 06/22/94.	201	40	40	Rad. VCM completed. Detected rad. and lead.
241	Storage Yard	Southeast TA-III, North of Site 78.	3 acres	Metals/Yes HEs/No Radionuclides/No	1953 - 1994 (Inactive).	Surface, 05/24/94.	29	29	16	Defined extent of lead. Proposed for NFA.

[a]Contaminants as follows: HEs = high explosives; PCBs = polychlorinated biphenyls; VOCs = volatile organic compounds.
[b]VCM = Voluntary Corrective Measure; TPH = Total petroleum hydrocarbons; NFA = No Further Action; COC = constituent of concern.
[c]NA = Not applicable. Thzese sites were not sampled during the RCRA Facility Investigation (RFI); see Notes column.



Legend

TA-III/V ER Sites

Technical Area Boundary

Roads

Buildings, Elevation Contours and Drainages not shown.

Sandia National Laboratories, New Mexico
Environmental Restoration Geographic Information System

Figure 1-2
ER Sites within
Technical Areas III/V

0 1000 2000
Scale in Feet

0 240 480
Scale in Meters

Unclassified

FINAL

1:24000

Transverse Mercator Projection, New Mexico State Plane Coordinate System, Central Zone
1927 North American Horizontal Datum, 1929 North American Vertical Datum

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This RFI report consists of an executive summary, an introduction, a discussion of the Sampling and Analysis Program, descriptions of investigations conducted at individual sites, Voluntary Corrective Measures (VCMs) conducted at several sites, a summary and conclusion, a list of references, and supporting documentation in several appendices.

1.3 Facility Setting

SNL/NM consists of 2,820 acres of research laboratories and office facilities entirely contained within the 52,223-acre confines of KAFB (Figure 1-1). KAFB is bounded on the north and northwest by the city of Albuquerque, on the east by the Cibola National Forest, on the south by the Isleta Indian Reservation, and on the west by land owned by the State of New Mexico, the KAFB buffer zones, and the Albuquerque International Airport. Cibola National Forest access is controlled by the U.S. Forest Service (USFS) and is restricted within the buffer zones on the southwest corner of the base and within the Isleta Indian Reservation.

KAFB is located on a high, arid mesa (mean elevation of 5,350 feet [ft]) approximately 5 miles (mi) east of the Rio Grande. The mesa is cut by Tijeras Arroyo, which runs east-west and ultimately drains into the Rio Grande. The east side of KAFB is bounded by the southern end of the Sandia Mountains and the Manzanita Mountains. Most of the area is relatively flat, although the eastern portions of KAFB and SNL/NM extend into the Manzanita Mountains where some of the terrain is precipitous, rough, and cut by numerous arroyos (ERDA 1977).

1.4 Climate

The climate for SNL/NM is typical of high altitude, dry continental climates with a normal daily winter temperature range of 23 degrees Fahrenheit (°F) to 52°F and a normal daily summer temperature range of 57°F to 91°F (Bonzon et al. 1974). The average annual precipitation for the Albuquerque area is 8.54 inches (in.), and most rain occurs in the summer months (Williams 1986). Wind speeds seldom exceed 32 miles per hour (mph) but strong east winds, often accompanied by blowing dust, can occur (Bonzon et al. 1974).

1.5 Geology

The Albuquerque-Belen structural basin is one of the largest north- to south-trending basins in the Rio Grande Rift. The basin is a compound graben measuring 90 mi long and 30 mi wide, bordered by uplifted fault blocks to the east and west (Bjorklund and Maxwell 1961). The eastern boundary is marked by the Sandia, Manzanita, and Manzano mountains. The western side of the basin is bounded by the Lucero uplift, with the Ladron Mountains to the south and minor physiographic relief on the northwest side of the basin.

During the Miocene and Pliocene epochs, erosion from the surrounding highlands filled the Albuquerque Basin with up to 10,000 ft of sediments. This sequence of sediments is called the Santa Fe Group and consists of debris flows and channel, floodplain, and aeolian deposits; the Santa Fe Group thins toward the edges of the basin and is truncated by the bounding uplifts. The Santa Fe Group sediments are interbedded with Tertiary and Quaternary basalts and pyroclastics, and are overlain in places by the Pliocene-age Ortiz gravel deposits and Rio Grande fluvial deposits (Bjorklund and Maxwell 1961).

1.6 Soil Characteristics

According to the Bernalillo County Soil Survey (USDA 1977), soils in TA-III/V consist of the Tijeras Series. The Tijeras Series is a deep, well-drained soil formed in decomposed granitic alluvium on old alluvial fans. The surface layer is a 4-in.-thick, brown, gravelly, sandy loam. The subsoil consists of 15 in. of brown, sandy loam, with some accumulation of calcium carbonate in the lower part. Below 19 in. is a pale brown, very gravelly, loamy sand extending to a depth of 5 ft. The gravel is angular and derived from granite (USDA 1977).

The Tijeras Series is a level to gently sloping soil (0 to 5 percent) subject to moderate runoff and water erosion. Permeability is moderate, with an available water capacity of 0.10 to 0.16 in. This soil is moderately alkaline and the effective rooting depth is 5 ft deep or more (USDA 1977).

1.7 Hydrogeology

The Rio Grande flows in a southerly direction and is the primary surface drainage feature in the Albuquerque-Belen Basin. In the basin, the ground-water system is controlled by the Rio Grande and its floodplain, tributary inflow, mountain front runoff, and recharge.

The principal aquifer in the area occurs in the unconsolidated and semiconsolidated sands, gravels, silts, and clays of the Santa Fe Group. The aquifer is generally unconfined, although semiconfined conditions may exist locally because of discontinuous, lenticular silt and clay-rich deposits.

Beneath KAFB, the regional aquifer generally flows toward the Rio Grande at an average gradient of approximately 10 ft/mi; however, local perturbations in the water table exist near municipal wells and as a result of lithologic and structural controls. Prior to extensive development of the regional aquifer by the city of Albuquerque and KAFB, the predominant ground-water flow direction in the SNL/NM KAFB area was west-southwest (Bjorklund and Maxwell 1961); however, pumping by the city of Albuquerque and KAFB has substantially affected the natural ground-water flow regime (Reeder et al. 1967; Kues 1987). The production wells have a substantial effect on the hydraulic gradient in the area, creating a depression in the potentiometric surface in the northern portion of KAFB. U.S. Geological Survey (USGS) projections indicate that, by the end of the century, the water table in the Albuquerque area will drop an estimated 30 to 50 ft from 1989 levels (Reeder et al. 1967).

Major structural controls on the local flow regime are in the form of a complex assemblage of faults along the margin of the basin. These fault systems include the Manzano, Hubbell Springs, Sandia, and Tijeras faults, all of which are expressed within a zone 1.5 mi east of TA-V. The specific impact of local faulting on ground-water flow is largely unknown; however, the Tijeras and Hubbell Springs faults may control ground-water movement. It has been postulated that travertine deposition (precipitation of calcium carbonate from solution in ground water) within fault fractures has reduced permeabilities such that the faults act as barriers to ground-water movement. Springs have been observed along the fault alignments, and there is a shallow water table east of the faults. The primary regional aquifer, the valley fill, underlies KAFB west of the Hubbell Springs fault at a depth of 400 to 600 ft and east of the fault at a depth of 50 to 150 ft (DOE 1987).

The primary source of ground water in the TA-III/V area is the unconsolidated and semiconsolidated sedimentary deposits of the basin-fill aquifer. A relatively thick unsaturated zone of approximately 460 ft overlies the Santa Fe Group deposits. The basin-fill aquifer underlying TA-III/V is recharged primarily by inflow from the mountain areas to the east. Recharge resulting from direct infiltration of precipitation is inferred to be minor because of high surface coverage, high evaporation, low precipitation, and an extensive vadose zone.

Based on water levels measured in monitoring wells near the Liquid Waste Disposal System (LWDS) in TA-V and near the Chemical Waste Landfill (CWL) and MWL in TA-III, the depth to ground water is approximately 480 to 490 ft below ground surface (bgs) in TA-III/V. Water levels measured in all wells in TA-III indicate the general ground-water flow direction is west-northwest.

2.0 SAMPLING AND ANALYSIS PROGRAM

The sampling and analysis program for the sites in TA-III/V followed standard EPA procedures for sample collection (EPA 1987a), quality assurance/quality control (QA/QC) protocols (EPA 1987b, 1980), and statistical analysis (EPA 1992a). Each of these is discussed in the following sections.

2.1 Field Methods

Field investigations at the ER sites within TA-III/V followed phased approaches according to those proposed in the RFI Work Plan (SNL/NM 1993a, 1993b), except at six sites. Field conditions dictated that methods other than those specified in the Work Plan be used at Sites 34, 36, 78, 102, 111, and 196. Deviations from the Work Plan are noted in the individual descriptions of site activities (Sections 6.0, 8.0, 11.0, 15.0, 18.0, and 21.0).

The methods of investigation used during the TA-III/V RFI included the following:

- Aerial photograph analysis and ground-truthing;
- Nonintrusive geophysical investigations;
- Radiological surveying and scrap/debris removal;
- Surface soil sampling;
- Shallow subsurface soil sampling and deep subsurface soil sampling; and
- Trenching and excavation.

Protocols for sampling and analysis at SNL/NM followed the methodologies in the ER Project Quality Assurance Project Plan (QAPjP) and Operating Procedures (OPs) developed specifically for the ER Project. A complete list of OPs used during this project is provided in Table 2-1. Although much of the field work was done before the formal issuance of the SNL/NM ER OPs, activities were conducted in accordance with generally accepted practices and professional experience and judgment (i.e., American Society for Testing and Materials [ASTM] procedures, best engineering practices, and draft OPs), which ultimately formed the basis of the final OPs. All work was conducted following the requirements of site-specific Health and Safety Plans (HASPs), which are available for review in the Environmental Operations Records Center (EORC).

The following activities were conducted at the sites noted:

- Aerial photographic interpretation—all sites;

- Geophysical surveys—Sites 26, 78, and 84;

- Radiation surveys and associated removal of radioactive anomalies—Sites 18, 83, 84, 102, 240, and 241;

Table 2-1
Sandia National Laboratories/New Mexico Environmental Restoration Project Operating Procedures Applicable to Technical Areas III and V RFI Work

Operating Procedure (OP) Number	Title
AOP 94-40	ER Project Site Posting and Security
FOP 94-01	Safety Meetings, Inspections, and Pre-Entry Briefings
FOP 94-05	Borehole Lithologic Logging
FOP 94-22	Deep Soil Gas Sampling
FOP 94-23	Hand Auger and Thin-Wall Tube Sampler
FOP 94-25	Documentation of Field Activities
FOP 94-26	General Equipment Decontamination
FOP 94-27	Thin-Walled Tube Sampling of Soils
FOP 94-28	Health and Safety Monitoring of Organic Vapors (Flame Ionization Detector [FID] and Photoionization Detector [PID])
FOP 94-30	Health and Safety Monitoring of Combustible Gas Levels
FOP 94-34	Field Sample Management and Custody
FOP 94-38	Drilling Methods and Drill Site Management
FOP 94-39	Excavating Methods
FOP 94-40	Test Pit Logging, Mapping, and Sampling
FOP 94-52	Spade and Scoop Method for Collection of Soil Samples
FOP 94-57	Decontaminating Drilling and Other Field Equipment
FOP 94-68	Field Change Control
FOP 94-69	Personnel Decontamination (Level D, C & B Protection)
FOP 94-71	Land Surveying
FOP 94-78	Environmental Restoration Project Waste Management and Characterization Procedure
FOP 94-81	Establishment and Management of Less-Than-90-Day Accumulation Areas for Environmental Restoration Project Sites
FOP 95-23	Shallow Subsurface Drilling and Soil Sampling Using Mechanized Hydraulic Augers or the Geoprobe® Soil Core Sampler

Source: SNL/NM (1995a).

- Sampling of surface soils—Sites 18, 31, 35, 78, 107, 240, and 241;

- Subsurface sampling using augers, a hydraulic probe, or a full-size drill rig—Sites 18, 34, 35, 36, 37, 78, and 111;

- Trenching, excavation, and other cleaning—Sites 51, 78, 100, 102, 196, and 241; and

- Voluntary removal actions or cleanups (excluding the radiological removals)—Site 78.

Further investigation of Sites 26, 83, 84, and 240 (active sites) will be postponed until site decommissioning in the future. Site 26 is proposed in this RFI report (Section 4.0) to be combined with Site 83 for future investigation. No schedule for decommissioning or corrective action at these sites has been identified at this time.

Two VCMs were conducted during the course of the RFI. One was performed to survey and remove radiological constituents at the six sites listed above; details of this VCM are provided in Section 24.0. The second was performed at Site 78 to remove gas cylinders and mitigate health and safety hazards; the details of this VCM are provided in Section 11.0.

Should be 1995a

Subsurface and ground-water investigations conducted at the neighboring LWDS in TA-V are detailed in the RFI report submitted for that site in September 1995 (SNL/NM 1995b). Because no ground-water investigations were conducted during the TA-III/V RFI, the LWDS RFI report should be consulted for information on this subject. Reports on the ongoing investigation at the CWL in TA-III also should be consulted for ground-water information.

2.1.1 Aerial Photograph Analysis and Ground-Truthing

An examination of aerial photographs was conducted to locate possible additional ER sites within TA-III/V and to gather supplemental data on existing sites. Aerial photographs from 1973 to 1990 were assembled and digitized using an Arc/Info Geographic Information System (GIS) and were used to produce a set of year-specific overlays. A base photographic image was combined with the year-specific overlays to illustrate the changes in surface features over time (Plate I). All of the sites were evaluated within 1,000 ft of the site boundaries (unless noted otherwise) for signs of soil disturbance, vegetation changes, or new construction. Surface features were grouped into eight categories including cleared or disturbed surface, concrete pad, landfill, pile, possible excavation, tank/concrete target, trench, and unknown. An attempt was made to further subcategorize features, but no additional or valuable information was revealed.

After the aerial photograph interpretation was completed, ground-truthing (field verification) was performed to determine whether the interpretations were valid. Field personnel inspected the suspect areas for evidence of potential site impacts; e.g., cleared or disturbed surfaces were located to within 10 ft of the area seen on the photographs and were examined for signs of burning, scraping, or blading for road or facility construction, and were validated as such. In a few instances, revegetation and cultural activities did not permit the unequivocal verification of features identified in early photographs. Site-specific discussions of the aerial photograph interpretation are included in each site section.

2.1.2 Nonintrusive Geophysical Investigations

Nonintrusive electromagnetic (EM) conductivity (metal detection) and vertical-gradient magnetometer surveys were conducted at ER Sites 26, 78, and 84 to locate any potential subsurface objects. The sites were gridded to detect objects of a certain size and are listed below.

- Site 26, Northern Portion—Locate and map any objects equivalent to or larger than two 55-gallon (gal.) drums buried at a depth of 5 ft.
- Site 26, Southern Portion—Locate and map any objects equivalent to or larger than one 55-gal. drum buried at a depth of 5 ft.
- Site 78—Locate and map subsurface concentrations of metal, particularly cylinders with dimensions of 12 in. by 2 in.
- Site 84—Locate major fragments of depleted uranium (DU), lead, and metallic materials larger than 3 in. by 3 in. buried to a depth of 1.5 ft; and significant burials equivalent to a 5-gal. bucket buried to a depth of 3 ft.

Wooden stakes and plastic pin flags were used to delineate the traverse spacings. Electromagnetic data were gathered using a Geonics Ltd.™ EM-61 high-precision metal detector; magnetic data were gathered using a Geometrics™ G-856-AX proton precession magnetometer deployed in the vertical mode. A brief description of each follows.

The EM-61 generates EM pulses by passing a current through a 1-square-meter (m^2) coil. These pulses penetrate the subsurface and briefly induce secondary EM fields; soil has relatively low conductivity, and the secondary fields dissipate rapidly. Buried metallic objects have essentially infinite conductivity when compared to soil, and their secondary fields persist much longer. The EM-61 measures the strength of the secondary fields during the "off time" between the primary pulses. The measurement is delayed until the response from the soil has dissipated and only the response of buried metal is present. The secondary EM fields are measured by a 1-m^2 main sensor which is coincident with the transmitter coil, and by a second focusing coil positioned 40 centimeters (cm) above the main coil. Each sensor coil measures the secondary field strength during a time period between the primary pulses. Two sensor coils are used to allow differentiation between shallow objects and deeper objects. The EM-61 was deployed in the trailer mode, towed on wheels behind the operator, with data acquisition triggered by the wheel approximately every 20 cm.

The G-856-AX consists of two magnetic sensors mounted on the same vertical staff separated by a known distance. The instrument generates a pulse and registers the difference in time for the return magnetic pulse to be recorded by the top and bottom sensors. This difference is then converted to a standard reading. The G-856-AX was held vertically, and moved along the traverse manually, from grid node to grid node. Data acquisition was performed manually or programmed to be collected at regular intervals (every few seconds [sec]).

2.1.3 Surface Radiological Survey and Scrap/Debris Removal

Nonintrusive surface radiological surveys were performed at 64 sites at SNL/NM including six sites within TA-III/V, as part of a coordinated facility-wide assessment and removal VCM. Surveys were conducted in a manual sweep pattern using a line of five to six 2-in. by 2-in. sodium iodide (NaI) detectors optimized to detect DU. Gridded areas were surveyed by technicians in straight traverses, each covering a 6-ft-wide swath.

A list of radioactive anomalies (both point and area sources) at each site was compiled. After the surveys were complete, all the point sources and the majority of the area sources were removed by hand and placed in a container. Subsequent to the removal action, soil samples were collected to confirm effective cleanup. Brief discussions of results are included in the individual site sections, and a more detailed description of the radiological surveys conducted at the sites within TA-III/V that were suspected of exhibiting radioactive soil contamination is provided in Section 24.0.

2.1.4 Surface Soil Sampling

Surface soil samples were collected from a depth of 0 to 1 ft bgs using a stainless-steel trowel and bowl. All sampling equipment was cleaned between samples using dry decontamination methods (i.e., paper towels, brushing, etc.) where possible or rinsed with distilled water. Sample location coordinates are provided in Appendix A.

2.1.5 Shallow Subsurface Soil Sampling

Shallow subsurface soil sampling was accomplished using either hand or power augers or a small-diameter hydraulic probe. Discussions of these techniques follow.

Auger Sampling

Augering using a hand bucket or power auger and thin-walled stainless-steel samplers was generally performed at sites where sampling depth was a maximum of 10 ft bgs. Soil augering was performed to a predetermined depth approximately 6 in. above the level to be sampled, and the bucket auger was extracted. Loose soil was removed, and a separate sampling auger was used to collect the sample. All augering and sampling equipment was cleaned between sample locations using dry decontamination methods where possible or rinsed with distilled water.

Small-Diameter Boring

At sites where augering techniques would not attain the desired depths (generally greater than 10 ft bgs), a vehicle-mounted, hydraulically powered soil probing machine that uses static force and a percussion hammer was utilized to advance small-diameter sampling tools into the subsurface to collect soil samples to 30 ft bgs. The unit used was manufactured by Geoprobe™. The probe produced no drill cuttings and obtained samples through probe holes of 1 to 1.5 in. diameter with typical penetration rates of 1 to 2 ft per minute.

Small quantities of soil were obtained by driving the probe to a predetermined depth, disengaging an expendable drive point at the target depth and pulling back 3 to 6 in. on the probe rods, and then redriving the hollow rods. The end of the rod was filled with soil cut from the wall of the hole.

2.1.6 Deep Subsurface Sampling

Drilling was conducted at Site 36 using an air rotary casing hammer rig to drill to depths of greater than 300 ft bgs. A more detailed discussion of the drilling and sampling procedures used at the site is included with the Site 36 activity description in Section 8.0.

2.1.7 Excavation and Trenching

Excavation, trenching, and cleanouts were accomplished using a backhoe, trackhoe, clamshell, or front-end loader at several sites. Details of the excavations and cleanouts are provided in the individual site sections for Sites 51, 78, 100, 102, 196, and 241.

2.2 Field Screening and On-Site Laboratory Analysis Methods

Where feasible, field screening was conducted on approximately 100 percent of the collected soil samples from all sites investigated in TA-III/V. At least 20 percent of these were submitted for confirmatory analysis at an EPA-approved Contract Laboratory Program (CLP) laboratory (Section 2.3). The field screening data for each site are included in Appendix B. Discussions of the following field-screening methods used during the RFI are included in subsequent sections:

- Photoionization detection (PID) and flame ionization detection (FID) of volatile organic compounds (VOCs);
- Soil vapor detection of VOCs;
- Thermal desorption detection of mineral oil;
- Immunoassay detection of polychlorinated biphenyls (PCBs) and high explosives (HEs);
- X-ray fluorescence (XRF) analysis of metals;
- Direct current plasma (DCP) and inductively coupled plasma (ICP) analysis of metals; and
- Gamma spectroscopic analysis of radionuclides.

2.2.1 Photoionization Detection and Flame Ionization Detection of Volatile Organic Compounds

Screening for VOCs in the field was generally accomplished using hand-held PIDs and FIDs. The units used were manufactured by HNU and Foxboro. Soil samples were placed in a glass jar, sealed, agitated, and warmed to allow volatile constituents to develop in the headspace of the jar. The PID or FID sample probe was placed in the headspace, where a sample of vapor was drawn into a chamber, ionized, and interpreted by the instrument. The low sample rate allowed for only very localized readings. Monitoring for health and safety levels was also performed during drilling activities at 5-ft intervals downhole, as well as in the breathing zone. Where elevated organic vapor levels were encountered, monitoring was performed continuously in the breathing zone. The instrument calibrations and readings were recorded in the field logbook.

2.2.2 Soil Vapor Analysis

Soil samples were collected for on-site analysis of soil vapor for the presence of VOCs during drilling activities at Site 36 and were immediately transported to the TA-III ER Field Laboratory for analysis. Soil vapors were collected by polyethylene tubing connected to a glass bulb using a pump under vacuum.

Soil vapor analyses were conducted by purging a 500-milliliter (mL) gas bulb for 20 minutes (min) with helium onto a trap and desorbing the trap onto a gas chromatograph equipped with a mass selective detector (MSD). Purging the entire contents of the sample bulb allowed attainment of lower detection levels for the sensitive soil vapor analysis. All analyses were performed on an HP 5972 MSD with an HP 5890 Series II plus gas chromatograph. EPA Methods 8240/8260 (EPA 1986) procedures were used for calibration and quantitation. The target analyte list (TAL) for EPA Method 8240 was used. For heavily contaminated soils, a smaller aliquot of gas was subsampled from the 500-mL bulb.

2.2.3 Thermal Desorption/Gas Chromatography

SNL/NM ER personnel conducted an investigation of available technologies to locate an alternative heavy-end total petroleum hydrocarbon (TPH) field-screening technique that was more reliable than the Hanby Method. Neither the Hanby Method nor field screening using immunoassay kits was effective because neither is sensitive to the nonaromatic High Energy Radiation Megavolt Electron Source (HERMES) transformer oil (discussed below). As a response to these ineffective screening methods, SNL/NM developed a technique that employs thermal desorption/gas chromatography (TD/GC) to rapidly quantify non-PCB-containing transformer oil in soil.

The transformer oil used at the HERMES-II facility is primarily a mixture of aliphatic and alicyclic hydrocarbons, and contains no significant quantities of EPA-regulated hazardous constituents as manufactured (e.g., PCBs or VOCs). Indeed, any appreciable amount of VOCs in the dielectric oil would have significantly altered the insulating properties of the oil. The boiling point for the mineral oil ranges from approximately 120 degrees Celsius (°C) to 365°C; its relatively low volatility makes it undetectable by real-time field monitoring instruments such as PIDs and FIDs, which rely on volatilization of contaminants at ambient conditions.

TD/GC has been used to characterize fuel-contaminated soils (i.e., those containing volatile and/or semivolatile constituents) and soils containing PCBs (Goldsmith 1994). The technique utilizes the direct injection of organic contaminants from soil onto a GC column, avoiding the use of environmentally harmful solvents. The method detection limit (MDL) is 10 milligrams per kilogram (mg/kg). The low MDL is a result of direct sample analysis without the potential dilution problems associated with sample preparation. Method sensitivity is also enhanced by analysis of the soil sample within hours of field collection, which minimizes potential storage loss and cross-contamination.

TD/GC analyses for mineral oil were performed using an SRI Model 8610 GC equipped with a TD oven and a manual sampling valve. The system was equipped with an FID that was used for the detection and quantitation of the oil after it had passed through the TD/GC sequence. An aliquot of soil (approximately 1.0 gram [g]) was placed in the desorption chamber for 1 min at 325°C to vaporize organic constituents. The vapors were then swept onto the GC column for separation. A relatively nonpolar megabore capillary column (J&W Scientific, DB-5, 8 ft by 0.53 millimeter [mm]) was used for constituent separation and quantitation. A five-point calibration curve was generated by spiking clean sand with a mixture of HERMES oil in toluene (10 to 500 mg/kg). The curve was linear with a correlation coefficient of $r^2 = 0.998$. TPH in soil was quantified by "pattern recognition" using the total area under the distinctive mineral oil chromatogram. An external standard (dodecane) was added to determine sample matrix interference and injection efficacy. QA samples included replicate analyses for every 10 samples and a mid-range calibration check standard prior to daily sample analyses, after every 20 samples, or at the end of a 12-hour (hr) period.

2.2.4 Immunoassay Tests for Polychlorinated Biphenyls and High Explosives

Immunoassay tests for chemical constituents are based on the antibody response of mammalian immune systems to the introduction of chemical contaminants. To produce the desired antibodies in the kit, predetermined concentrations of specific chemicals are introduced into a test animal, causing the animal's immune system to produce antibodies to that chemical. Antibodies are extracted, separated, purified, and encapsulated for test kits. The antibodies in the test kits respond to varying concentrations of chemical compounds by giving varying responses. The test kits for PCBs and HEs, both manufactured by EnSys Inc., are discussed below.

PCBs

The protocol for PCB test kits conforms to SW-4020, immunoassay-based field screening for PCBs in soil. Detection limits range from 400 microgram per kilogram (µg/kg) for Aroclors 1254 and 1260 (prevalent Aroclors in dielectric fluids at SNL/NM) to 1, 2, 4, and 4 mg/kg for Aroclors 1248, 1242, 1016, and 1232, respectively. The test is specific to PCBs and has no anticipated interferences. The field test is positively biased for PCBs. Rigorous testing against lab-GC SW-8080 (prior to commercial availability of the test kit) resulted in false negatives in less than 1 percent of field tests performed. When testing samples, the method requires standard replicate analysis with each environmental sample analyzed; the relative standard deviation must be within ±20 percent, or the sample analysis will be repeated.

HEs

The field test kit for HE conforms to proposed SW-8515 for field screening for trinitrotoluene (TNT) in soil and can detect TNT, dinitrotoluene (DNT) isomers, and trinitrobenzene at concentrations of approximately 1 mg/kg in soil as measured by colorimetric reaction. The test is positively biased for HEs. Prior to commercialization of the test kit, false negatives were identified by SW-8515 in less than one percent of the field samples.

2.2.5 X-Ray Fluorescence

XRF was conducted using a Spectrace® 6000 Spectrometer. XRF is a whole-rock quantitation method for analyzing concentrations of elemental metals in environmental samples. Characteristic X-ray spectra are emitted when a specimen is irradiated with a beam of sufficiently short wavelength X-radiation. Standard reference materials of the National Institute of Standards and Testing (NIST) are used to verify the accuracy of the calibration. XRF can analyze metals with detection limits of 10 to 60 mg/kg. XRF is a nondestructive method for analyzing environmental samples and generates no waste; samples are dried and ground prior to analysis. XRF was used during sampling activities as a field-screening tool for metals to direct the sampling for off-site laboratory analyses.

2.2.6 Direct Current Plasma/Inductively-Coupled Plasma

DCP and ICP elemental analyses for metals concentrations were conducted in accordance with SW-6010A using a Leeman PS 1000 sequential ICP. Soil samples were prepared by microwave-assisted acid digestion (EPA Methods 3051 and 6010 QA requirements). An aerosolized sample is introduced into a plasma of argon gas, producing characteristic spectra.

2.2.7 Mercury Analysis

Soil samples were analyzed for mercury content following EPA SW-7471A, "Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique)" (EPA 1994). The instruments used were a Leeman AP200 Automated Mercury Preparation System and a Leeman PS200 Automated Mercury Analyzer. A 0.1-g aliquot of soil was used for sample preparation and analysis. The practical limit of quantitation (PLQ) was 0.3 µg/kg.

2.2.8 Gamma Spectroscopy

All soil samples collected from areas suspected to be impacted by radioactive compounds were screened for radiological constituents using gamma spectroscopy. In some instances, these screens were mandatory to allow samples to be shipped to an off-site laboratory for chemical analysis. In other cases, the only analysis of the samples was the gamma spectroscopy.

Soil samples were collected in 500-mL Marinelli beakers, sealed, swiped, and counted in the field for loose, surface, radioactive contamination. Upon completion of the field check, the samples were transported to the SNL/NM 7715 laboratory for fixed gamma spectroscopic analysis.

The equipment used by the SNL/NM 7715 laboratory consists of a Canberra high purity germanium (HPGE) detector shielded by 4 in. of lead lined with cadmium and copper sheets. Twelve samples in Marinelli beakers can be run unattended using an autosampler. A typical sample is counted for 600 sec. Peaks generated during the gamma spectroscopy are matched against a user-defined library to identify individual radionuclides. Laboratory control sample (LCS) analyses are performed for americium-241, cesium-137, and cobalt-60 with identical analytical methods to monitor routine sample analysis data usability.

2.3 Off-Site Laboratory Chemical Analyses

Off-site laboratory analyses for constituents of concern (COCs) from each site were conducted in accordance with the EPA-approved protocols listed in SW-846 (EPA 1986). The COCs, field-screening techniques, laboratory analysis methods, and the corresponding method numbers are listed in Table 2-2. The data are provided in electronic format in Appendix C.

Table 2-2
Field Screening and Laboratory Analyses for Constituents of Concern[a]

Constituent of Concern	Field-Screening Techniques	On-Site Laboratory Analysis Methods	Off-Site Laboratory Analysis Methods	EPA Method Number
Metals	NA[a]	X-ray Fluorescence/ Directly Coupled Plasma	Inductively Coupled Plasma/Atomic Absorption	6010/7000
Volatile Organic Compounds (VOCs)	Photoionization Detector/ Flame Ionization Detector	Gas Chromatography/ Mass Spectrometry	Gas Chromatography/ Mass Spectrometry/ Toxicity Characteristic Leaching Procedure	8240 1311
Total Petroleum Hydrocarbons (TPH)	NA	Thermal Desorption/Gas Chromatography	Infrared	418.1
High Explosives (HEs)	Colorimetry	High-Performance Liquid Chromatography	High-Performance Liquid Chromatography	8330
Polychlorinated Biphenyls (PCBs)	Immunoassay	NA	Gas Chromatography	8080
Nitrates/Nitrites	NA	Colorimetry	Colorimetry	353.2
Radionuclides	G-M Pancake Probe/Sodium Iodide (NaI) Scintillometer	Gamma Spectroscopy	Gamma Spectroscopy/ Isotopic Analyses	6010

Source: EPA 1986.

[a]NA = Not applicable.

2.4 Summary of Quality Assurance/Quality Control Activities

As part of the sampling activities conducted in support of the RFI, a plan for QA/QC was developed to ensure that sampling procedures and laboratory analyses were performed to a rigid standard. The following QA/QC soil and water samples were collected to assure sampling procedure integrity and laboratory quality:

- Field Blank—Water poured directly from a freshly opened bottle of distilled water into laboratory-prepared sample bottles to determine whether any field conditions affected sample collection.

- Trip Blank—Laboratory-prepared water sample for analysis of VOCs to determine whether any VOCs were inadvertently introduced during sampling or shipment.

- Equipment Blank—Water sample prepared in the field after decontaminating equipment to determine whether any contaminants were introduced from improperly cleaned equipment.

- Duplicate—Soil sample split from an original field sample to determine reproducibility of laboratory analytical results.

- Matrix Spike/Matrix Spike Duplicate—Soil sample split from an original field sample to determine effects of matrix (e.g., soil) on laboratory results (i.e., whether any interference occurred); sample is spiked with a known concentration of a reference chemical, then analyzed to ascertain recovery of that chemical.

Results of the QA/QC program indicated very few problems with the collection of the data. Some general trends in laboratory QC were noted. The off-site laboratory used for the chemical analyses has consistently shown levels of VOCs (primarily acetone and methylene chloride) in their method blanks; however, this mainly impacted the data collected for Site 36, where elevated levels of several VOCs were noted (see Section 8.0). Independent analyses conducted by the on-site SNL/NM laboratory confirmed the presence of contamination in the samples, however, so the impact of laboratory contamination is somewhat lessened.

Some elevated levels of VOCs were noted in some soil trip blanks submitted for Site 78. Preparation of the soil trip blanks involved collection of soil from an area known to be uncontaminated, followed by heating of the sample to drive off any potential VOCs, which effectively removed any moisture that might have been in the sample. It is believed that, because the sample was dehydrated, when it reached the laboratory, the ambient humidity and vapor-phase VOCs typical of many laboratories (i.e., those VOCs commonly used for sample preparation [acetone, methylene chloride, toluene, etc.]) caused rapid adsorption of the laboratory chemicals onto the soil matrix, producing erroneous results. The process for preparing soil blanks on-site is currently under review, because it does not appear to be a useful tool in its present form, given the problems cited above. Regardless of the results of the trip blanks for Site 78, no elevated VOCs were noted in the soil samples collected for confirmatory analyses.

The same laboratory exhibited low concentrations of lead in their blanks, affecting the data for the rinsate and field blanks from Sites 18 and 107, but at concentrations too low to account for the concentrations detected above the statistical background levels for Site 18.

Matrix spike/matrix spike duplicate (ms/msd) data indicated occasional elevated recoveries for some metals (antimony, barium, beryllium, and zinc) that are ubiquitous in the surrounding granite-derived soils. No general problems with the laboratory's recovery were noted, however. The single exception is for the ms/msd data for antimony at Site 241. Because of apparent erroneous recovery data, the sample that had been split for a ms/msd had an anomalously high antimony concentration (29.6 mg/kg). The location (plus two others) was resampled and found to have nondetectable antimony. The results of the QA/QC program are provided in electronic format in Appendix D.

2.5 Statistical Analysis of Background Data

To determine whether the soil sampling results for potentially contaminated sites within TA-III/V indicated the presence of COCs, the results were compared to the samples collected from TA-III and TA-V during the site-wide investigation of background concentrations at SNL/NM (IT 1994a). Thus, a subset of the full site-wide background data set was selected for the TA-III/V evaluation. The COCs for evaluation (barium, beryllium, cadmium, chromium, copper, lead, nickel, silver, uranium, and zinc) were chosen based on site knowledge and their likelihood of being a site contaminant within TA-III/V. At the time the statistical tests were completed, no site-wide background data sets existed for other COCs of interest (e.g., antimony, mercury, PCBs, etc.); thus a direct comparison to the applicable site-wide upper tolerance limits (UTLs, discussed below) updated in January 1996 was made for those COCs.

2.5.1 Background Concentration Determinations

To determine the range of background concentrations, the 95th UTL and 95th percentile were calculated for parametric and nonparametric data sets, respectively. The following steps were completed: (1) a priori screening of the data; (2) determination of the percentage of nondetects in the data sets, with a cutoff level of 15 percent; (3) distribution analysis of the portion of the data set that exhibited less than 15 percent nondetects, including coefficients of skewness, histograms, and probability plots; (4) a second screening of the data performed by the calculation of the T_n statistic for parametric data; and finally (5) calculation of the UTL for parametric data sets or the 95th percentile for nonparametric data sets. Each is discussed in the following sections, and example calculations, together with histograms and probability plots, are provided in Appendix E.

A Priori Screening

The a priori test involved a visual inspection of the data to eliminate any outliers. The data values were sorted from highest to lowest to facilitate the inspection. Maximum values that were a factor of three higher than their nearest neighbor were removed from the data set before the next test in the sequence was applied.

Determination of Parametric Versus Nonparametric Data

The data sets were divided into parametric or nonparametric by this process (discussed in the following paragraphs):

- Initial division based on the percentage of nondetect data; and
- Subdivision of the data sets with fewer than 15 percent nondetect values into normal, lognormal, or nonparametric.

First, the percentage of nondetect data in each of the data sets was determined. Raw nondetect data were not equated with "zero" values; rather, they were replaced with a coded value of one-half of the PLQ (EPA 1992a). Those sets with fewer than 15 percent nondetect values were identified as eligible for parametric distribution analysis; those sets with greater than 15 percent nondetect values were identified as eligible for nonparametric analysis. Coded data sets tend to skew the data toward zero and decrease the effectiveness of reporting the mean. Therefore, the median is reported as the measure of central tendency when greater than 15 percent of the data are nondetects (i.e., the data set appears nonparametric).

Distribution analyses then were conducted on the data to determine whether the data were parametric (normal or lognormal) or nonparametric. The distribution analyses included computing the coefficients of skewness and producing the histograms and probability plots for each COC for normal and lognormal (i.e., log transformed) data; the histograms and probability plots for each tested COC are included in Appendix E.

Calculation of T_n Statistic

The T_n statistic test was performed on data determined to be parametric (normal or lognormal) after the distribution analysis was completed to verify that no other statistical outliers existed. The datum was considered an outlier if the T_n statistic exceeded the critical number (C_n) identified in the EPA guidance for a given sample size (EPA 1992a). The test was run iteratively until the largest value in the data set passed. A new mean and standard deviation were calculated for each data set that had outliers removed in the T_n statistic analysis before the test was run again.

Calculation of UTL and 95th Percentile

Basic statistical parameters, including the mean, standard deviation, and UTL, were calculated for each normal or lognormal parametric population data set. The UTL establishes a concentration range that is constructed to contain a specified proportion of the population with a specified confidence. The proportion of the population included is referred to as the coverage, and the probability with which the tolerance interval includes the proportion is referred to as the tolerance coefficient. The EPA-recommended coverage value of 95 percent and tolerance coefficient value of 95 percent were used to calculate the UTLs (EPA 1992a). Most elementary statistical textbooks provide detailed descriptions of basic parametric statistics.

Nonparametric statistics were used when data sets did not exhibit normal or lognormal distributions, or when the percentage of nondetects exceeded 15 percent. The data sets examined exhibited fewer than 90 percent nondetects, so the median (50th percentile) was used to describe central tendency, and the 95th percentile was used for background comparison. Most elementary statistical textbooks provide detailed descriptions of basic nonparametric statistics.

Results

Table 2-3 presents the results of the a priori tests conducted on the data sets. None of the COCs examined were determined a priori to be outliers.

Table 2-4 provides the results of the probability plot, coefficient of skewness, and histogram for determination of the distribution type for each TA-III/V background data set. Background distributions for barium, beryllium, cadmium, copper, lead, nickel, and zinc were lognormal. The data set for silver was nonparametric, and the data set for total uranium (U_{tot}) was normally distributed.

Tests were performed for outliers using the T_n statistic (Table 2-5). Only the nickel data set was censored for the calculation of TA-III/V background values by removing the three highest values for nickel (30.9, 30.0, and 29.5 mg/kg. Three possible reasons for the anomalously high nickel data are noted. Nickel might exhibit a wide natural variation, and this sampling effort happened to access areas that were relatively mineral rich. Alternatively, laboratory error might have produced elevated analytical results. It is also possible that the higher nickel concentrations are anthropogenic, although these higher concentrations are well below the proposed RCRA Subpart S soil action level for nickel (2,000 mg/kg). To be conservative, these values were removed from the data set, and the censored data set was used for all subsequent comparisons for TA-III/V sites.

The natural logs of the means and standard deviations of the TAL metals and their corresponding UTLs or 95th percentiles are provided in Table 2-6. Proposed RCRA Subpart S soil action levels for the COCs detected during the RFI sampling effort are provided in Table 2-7. As stated earlier, only those COCs

Table 2-3
Technical Areas III and V Background Samples - A Priori Sampling

Parameter	Maximum Value	Next Maximum	X Factor[a]	Result
Barium	730	320	2.28	Pass
Beryllium	1.1	1.1	1.00	Pass
Cadmium	8.5	7.7	1.10	Pass
Chromium	58.1	57.3	1.01	Pass
Copper	29	27.5	1.05	Pass
Lead	73	73	1.00	Pass
Nickel	30.9	30	1.03	Pass
Silver	10	9.7	1.03	Pass
Uranium (total)	4.66	4.61	1.01	Pass
Zinc	59.9	56	1.07	Pass

[a]X factor is the ratio of the maximum value to the next maximum. If the ratio is greater than or equal to 3, it indicates the maximum value is anomalously high.

Table 2-4
Results of the Distribution Analysis for Technical Areas III and V

Parameter	Probability Plot	Coefficient of Skewness[a]	Histogram	Distribution Type
Barium	Lognormal	-2.3	Lognormal	Lognormal
Beryllium	Lognormal	-0.30	Lognormal	Lognormal
Cadmium	Lognormal	0.49	Lognormal	Lognormal
Chromium	Lognormal	-1.72	Lognormal	Lognormal
Copper	Lognormal	-0.15	Lognormal	Lognormal
Lead	Lognormal	0.50	Lognormal	Lognormal
Nickel	Lognormal	-0.48	Lognormal	Lognormal
Silver	Nonparametric	-0.59	Nonparametric	Nonparametric
Uranium (total)	Normal	-0.23	Lognormal	Normal
Zinc	Lognormal	0.69	Lognormal	Lognormal

[a]Critical Coefficient of Skewness is -1 to 1.

Table 2-5
Technical Areas III and V T_n Statistic Analysis for Target Analyte List Metals

Parameter	Distribution	Natural Log (Ln) of Maximum Value	Natural Log Mean	Natural Log Standard Deviation	T_n Statistic	Number of Samples	Critical Value[a]	Pass or Fail T_n Statistic
Barium	Lognormal	6.59	3.84	1.13	2.44	503	3.74	Pass
Beryllium	Lognormal	0.10	-1.14	0.43	2.87	331	3.60	Pass
Cadmium	Lognormal	2.14	-0.89	0.99	3.06	176	3.39	Pass
Chromium	Lognormal	4.06	1.86	0.8	2.75	538	3.76	Pass
Copper	Lognormal	3.37	1.82	0.48	3.22	392	3.66	Pass
Lead	Lognormal	4.29	1.89	0.73	3.29	259	3.52	Pass
Nickel (first iteration)	Lognormal	3.43	1.84	0.43	3.70	403	3.67	Fail
Nickel (second iteration)	Lognormal	3.40	1.83	0.42	3.74	402	3.67	Fail
Nickel (third iteration)	Lognormal	3.38	1.83	0.42	3.70	401	3.67	Fail
Nickel (fourth iteration)	Lognormal	3.31	1.83	0.41	3.62	400	3.67	Pass
Silver	Nonparametric	ND[b]	ND	ND	ND	247	ND	ND
Uranium (total)	Normal	4.66[c]	2.05[c]	0.99[c]	2.64	81	3.13	Pass
Zinc	Lognormal	4.09	3.1	0.34	2.89	158	3.36	Pass

[a]One-sided critical values for the upper 5 percent significance level; critical values derived from Table 8 (EPA 1992a) for given number of samples.
[b]ND = Not determined.
[c]Normal maximum values (i.e., actual values) provided for normally distributed uranium.

Table 2-6
Upper Tolerance Limits for Target Analyte List Metals in Technical Areas III and V Soil

Target Analyte List (TAL) Metal	Distribution	Censored?	Natural Log Mean	Natural Log Standard Deviation	Mean	Standard Deviation	One-Sided Tolerance Factor (K)	Natural Log UTL	UTL	Number of Samples
Barium	Lognormal	No	3.84	1.13	NA[a]	NA	1.76	5.83	341.0	503
Beryllium	Lognormal	No	-1.14	0.43	NA	NA	1.79	-0.37	0.7	331
Cadmium	Lognormal	No	-0.89	0.99	NA	NA	1.85	0.94	2.6	176
Chromium	Lognormal	No	1.86	0.8	NA	NA	1.76	3.27	26.2	538
Copper	Lognormal	No	1.82	0.48	NA	NA	1.78	2.67	14.5	392
Lead	Lognormal	No	1.89	0.73	NA	NA	1.81	3.21	24.8	259
Nickel	Lognormal	Yes	1.83	0.4	NA	NA	1.78	4.40	81.3	400
Silver[a]	Nonparametric	NA	NA	NA	NA	NA	NA	NA	NA	247
Uranium (total)	Normal	No	NA	NA	2.05	0.99	1.96	NA	4.0	81
Zinc	Lognormal	No	3.1	0.34	NA	NA	1.86	3.73	41.8	158

[a]NA = Not applicable.
[b]For silver, the 50th percentile value was 1 mg/kg and the 95th percentile value was 4 mg/kg; these describe the central tendency for nonparametrically distributed parameters.

Table 2-7
Generic Proposed Soil Action Levels Under Proposed RCRA Subpart S

Analyte	Proposed RCRA Subpart S Soil Action Level (mg/kg)
1,2-Dichloroethane	8
Acetone	8,000
Aluminum	NA[a]
Antimony	30
Arsenic	20
Barium	6,000
Beryllium	0.2
Bis (2-Ethylhexyl) Phthalate	50
2-Butanone	50,000
Cadmium	80
Calcium	NA
Chromium (VI)	400
Cobalt	NA
Copper	NA
2-Hexanone	NA
Iron	NA
Lead	2,000[b]
Lithium	NA
Magnesium	NA
Manganese	NA
Mercury	20
Nickel	2,000
Nitrate	100,000
Nitrite	8,000
Polychlorinated Biphenyls	0.1
Potassium	NA
Selenium	400
Silver	400
Sodium	NA
Toluene	20,000
Total Petroleum Hydrocarbon	100[c]
Uranium	NA
Vanadium	600
Xylenes (total)	200,000
Zinc	20,000

[a]NA = No proposed RCRA Subpart S soil action level is currently listed for the analyte.
[b]Lead action level not formally promulgated; proposed 2,000 mg/kg (EPA 1996). → sites w/ Pb
[c]Not EPA-regulated. Standard from New Mexico Environmental Improvement Board Underground Storage Tank Regulations (NMEIB/USTR 1990).

for which site-wide background data sets existed (at the time of this RFI) were analyzed for statistical significance. The proposed RCRA Subpart S soil action levels for the remaining COCs are provided for comparison to site sampling data.

2.5.2 Comparison Tests: Background Data Versus Environmental Restoration Site Data

Two nonparametric, two parametric tests, and one test that utilized both parametric and nonparametric analyses were used to compare TA-III/V background data to data from potentially contaminated TA-III/V ER sites (Appendix E). The nonparametric tests included the Wilcoxon Rank Sum (WRS) Test and the Quantile test. The parametric tests included Student's t-tests using assumptions of equal and of unequal variance. The hot-measurement comparison uses either the 95th UTL calculation (for parametric data) or the 95th percentile calculation (in the case of nonparametric data) as recommended by the EPA (EPA 1992a). Nonparametric tests were applied to all soil data; however, parametric tests were not applied to nonparametric data.

The WRS test is performed by ordering all observations from background and the potentially contaminated site according to their magnitude and then assigning a rank from lowest to highest. The ranks in the potentially contaminated area are summed and compared to a table of critical values to determine whether the site is contaminated.

The WRS test is a nonparametric test more powerful than the Quantile test (described below) in determining whether the potentially contaminated area has concentrations uniformly higher than background (EPA 1992a). However, the WRS test allows for fewer less-than measurements than the Quantile test. As a general rule, the WRS test should be avoided if more than 40 percent of the measurements taken at the potentially contaminated area or at background areas are nondetects. All soil analytical data were subjected to the WRS test in this analysis, although the test power was known to be greatly reduced when the nondetect percent was greater than 40.

The Quantile test is performed by separating background data and individual site data. The data are then ordered from highest to lowest. The number of background and individual site data points are calculated. The number of data points for background and the selected potentially contaminated site is then compared to a table that identifies how many of the highest measurements must come from the potentially contaminated site versus background to indicate contamination.

The Quantile test is a nonparametric test that has more power than the WRS test to detect when only a small portion of the remediated site has not been completely cleaned up. Also, the Quantile test can be used even when a fairly large proportion of the measurements is below the limit of detection (EPA 1992a).

The hot-measurement comparison consists of comparing each measurement from the potentially contaminated area with an upper-limit concentration value. This upper-limit concentration value is such that any measurement from the potentially contaminated area that is equal to or greater than this value indicates an area of relatively high concentrations that must be further investigated (EPA 1992a). Concentrations exceeding the upper-limit value may indicate inappropriate sample collection, handling, or analysis procedures, or actual contamination. The upper-limit concentration value was calculated as previously described based on the 95th percentile for nonparametric data and the 95th UTL for parametric data.

The t-test is a parametric test that compares the means of two samples. To use the t-test statistic, both sampled populations must be approximately normally (or lognormally) distributed with approximately equal population variances, and the random samples must be selected independently of each other. The equations and methodology for applying the t-test are explained in most statistics books, including McClave and Dietrich (1982) and Mendenhall (1975).

Results

Comparison tests between background data and the maximum concentrations for TA-III/V site data were performed for metals at Sites 18, 51, 107, 111, 240, and 241 in accordance with the RFI Work Plan (SNL/NM 1993a). In the case of Site 78, a simple comparison of maximum metal concentrations to the TA-III/V background UTLs were made for the samples collected during the confirmatory sampling event. These were the only sites where metals were regarded as suspect contamination. The respective text sections herein contain discussions of the significance of the statistical tests on data for each site and comparisons to the relevant proposed RCRA Subpart S soil action levels (Table 2-7) for each constituent.

2.6 Contaminant Fate and Transport/Risk Assessment

The majority of contaminants detected at sites in TA-III/V were restricted to the upper 2 ft of surface soils. No conclusive evidence has been found that any sites investigated during this RFI have had an impact on the local ground water (at depths of 480 to 500 ft bgs).

For those sites at which contaminants were elevated with respect to background, a comparison was made of each elevated constituent relative to its proposed RCRA Subpart S soil action level. All COCs were at least one to two orders of magnitude below their corresponding action levels, except at Site 18 (which displayed PCBs above the proposed RCRA Subpart S soil action level). As indicated in the individual section for this site, the efficacy of conducting a VCM was evaluated. Three other sites (35, 36, and 196) also exhibited TPH above the New Mexico Underground Storage Tank Regulations (NMUSTR) standard, but each of these is proposed for NFA because TPH is in the form of a nonhazardous mineral oil.

21.0 ER SITE 196: BUILDING 6597 CISTERN

The Building 6597 Cistern is a 20-ft-deep, 25-ft-diameter concrete-lined tank located approximately 30 ft west of Building 6597 in central TA-V (Figure 21-1). Transformer oil contaminated with water and possibly Freon™ was occasionally discharged into the Cistern in small quantities. About 5 gal. of contaminated waste oil per week was discharged into the Cistern, but was routinely removed from the site until 1989, when the PROTO Facility (ER Site 37) was closed. Some residual sludge remains at the bottom of the Cistern.

Although oil was the only COC (based on historical knowledge), sampling for VOCs, PCBs, and metals was conducted to determine whether they were present from undocumented disposals. A discussion of the field investigation protocols and results follows.

21.1 Field Investigation Protocols

The RFI Work Plan identified the following plan of action for investigating the Cistern. An initial "sludge" sample was to be collected for chemical analysis. The sludge would then be removed and the Cistern's concrete base scrubbed and examined for cracks indicating possible contaminant pathways. If no cracks were found, a single auger hole would be advanced in the center of the Cistern to sample for confirmatory soil analyses. If cracks were observed, angle drilling would commence to delineate any possible migrating contamination. As indicated in the succeeding sections, field conditions necessitated modifying this plan.

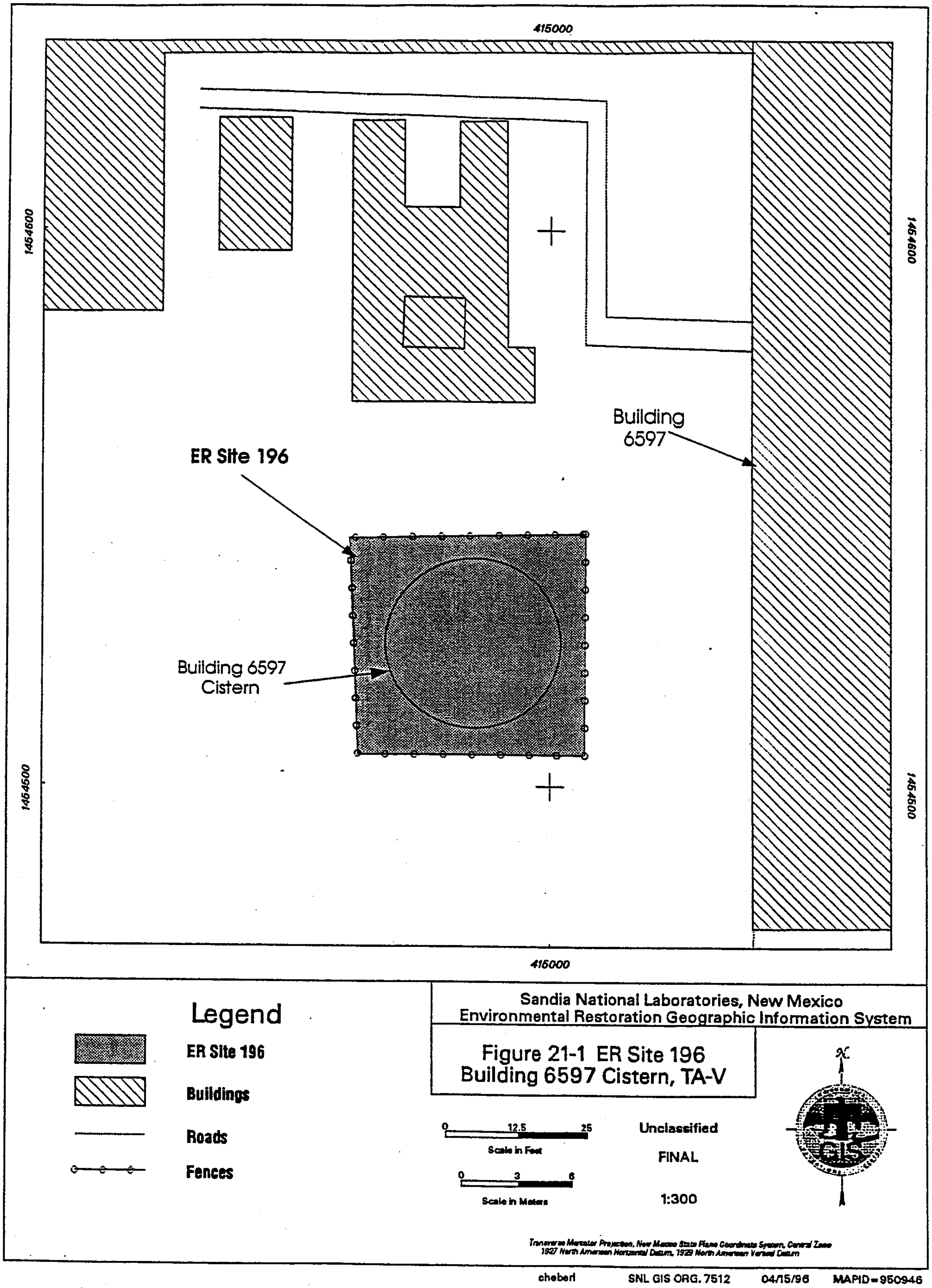
21.1.1 Aerial Photograph Analysis

Aerial photographs from 1973 to 1990 were assembled, digitized, and compared for changes in surface features during successive years at the Cistern. The area within 1,000 ft of the site boundaries was studied for signs of soil disturbance, vegetation changes, or new construction.

21.1.2 Sampling Strategies

21.1.2.1 Initial Grab Sample

Preliminary sampling was conducted at Site 196 in June 1994. A grab sample of soil was collected from the bottom of the Cistern using remote sampling methods (Figure 21-2). The sample was analyzed at an off-site laboratory for VOCs, PCBs, TPH, and metals in accordance with the EPA methods cited in Table 2-2. This grab sample exhibited elevated levels of TPH, copper, lead, and zinc. Additional samples (B1 and B2) were collected in October 1994 for on-site gamma spectroscopic analysis for waste characterization.


415000
1454600
1454600
1454500
1454500
416000
ER Site 196
Building
6597
Building 6597
Cistern
Legend
ER Site 196
Buildings
Roads
Fences
Sandia National Laboratories, New Mexico
Environmental Restoration Geographic Information System
Figure 21-1 ER Site 196
Building 6597 Cistern, TA-V
0 12.5 25
Scale in Feet
0 3 6
Scale in Meters
Unclassified
FINAL
1:300
GIS
chebert
SNL GIS ORG. 7512
04/15/96
MAPID=950946

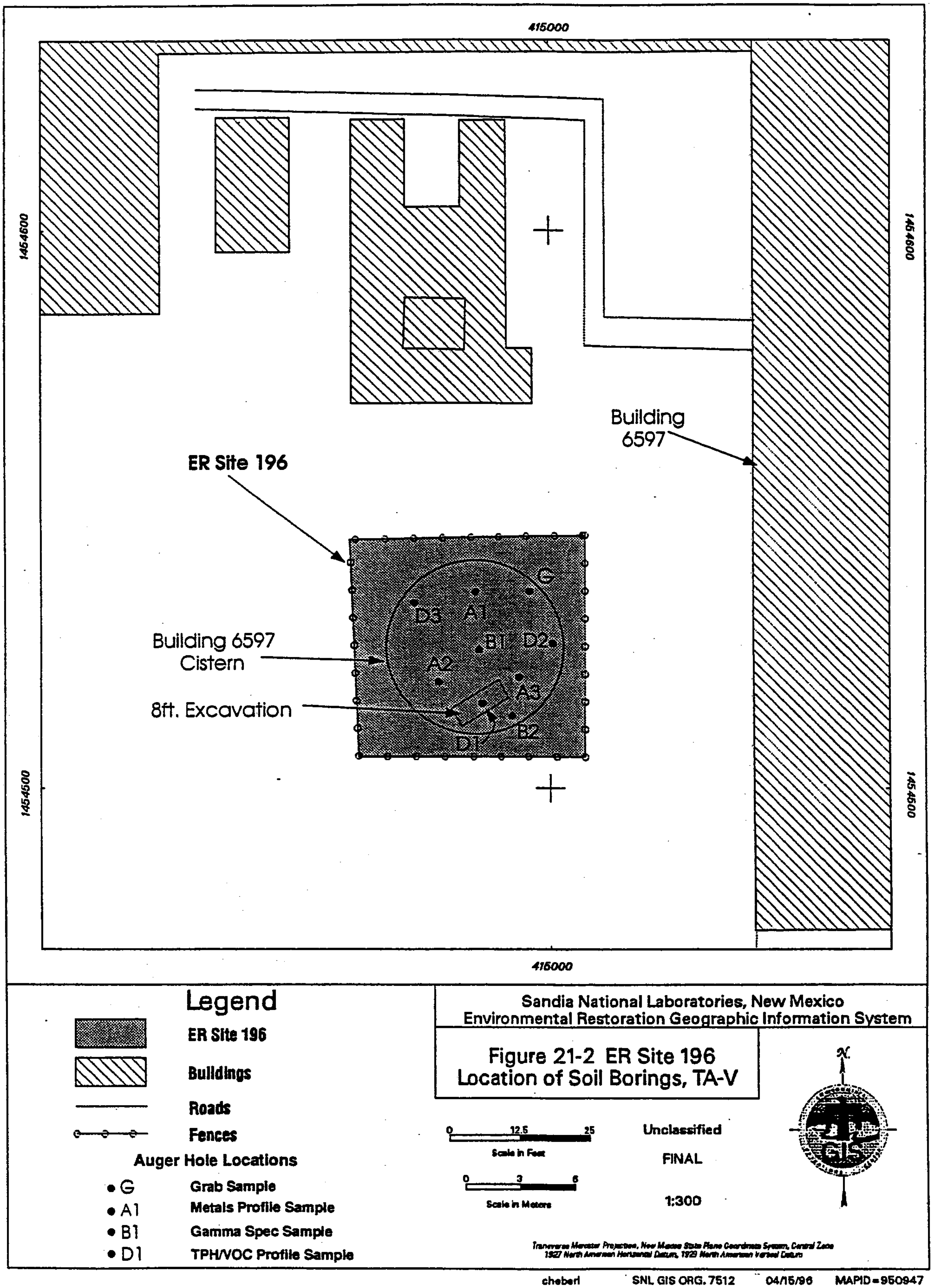


Figure 21-2 ER Site 196
Location of Soil Borings, TA-V

21.1.2.2 Sludge Thickness Determination

Subsequent to receipt of the chemical analyses, three auger holes were advanced in the Cistern to determine the thickness of the sludge layer and to ascertain whether the Cistern had a concrete base. The auger holes encountered refusal at depths of 2 1/2 to 4 ft below the top of the soil. This refusal was attributed to the concrete base then believed to exist.

21.1.2.3 Excavation Activity

Based on the results of the augering, the decision was made to remove the top 4 ft of the soil down to the concrete base, in accordance with the RFI Work Plan. Upon removing the soil, the concrete base would be scrubbed and examined for cracks and signs of leaking. Operations commenced in May 1995 using a clamshell excavator. During excavation activities, it was determined, upon reaching a depth of 8 ft in one portion of the Cistern, that no concrete base apparently ever had existed. Subsequent investigations indicated that the concrete extended to a depth of only 6 in. below the surface of the contaminated soil and debris in the bottom of the Cistern (Figure 21-3). At this point in the investigation, following the original plan and completely excavating the Cistern became unfeasible. A vertical contamination profile was required to guide future activities.

21.1.2.4 Metals Profile Activity

Because the initial chemical analyses of the single grab sample of soil had indicated elevated levels of copper, lead, and zinc in the upper few inches of material, three additional auger holes (A1, A2, and A3) were advanced to collect soil samples for metals analyses. Soil samples were collected from the surface at 6-in. intervals to a total depth of 3 ft in each of the three boreholes (Figure 21-2). The samples were submitted for screening to the SNL/NM on-site analytical laboratory and analyzed for total copper, lead, and zinc using XRF techniques.

21.1.2.5 Activity to Profile Total Petroleum Hydrocarbons and Volatile Organic Compounds

A vertical contamination profile was conducted to determine the extent of TPH and the presence, if any, of VOCs in the subsurface. Three auger holes (D1 through D3, Figure 21-2) were advanced to refusal in the bottom of the Cistern using an electric impact hammer. Auger hole D1 was advanced in the bottom of the 8-ft-deep trench to a depth of 5 ft (for a total of 13 ft below the Cistern floor). Auger hole D2, located beneath the drainlines, was driven to a total depth of 13 ft below the Cistern floor. The third auger hole (D3) was located in the northwestern section of the Cistern and was advanced to a total depth of 5 ft. Soil samples were collected from each borehole at approximately 2-ft intervals and were submitted for on-site analysis of TPH by TD/GC and for VOCs by EPA Method 8260; samples were split for off-site analysis of TPH by EPA Method 418.1 and for VOCs by EPA Method 8240/8260. In addition, a soil vapor sample was collected at the total depth of each borehole and analyzed on site for VOCs.

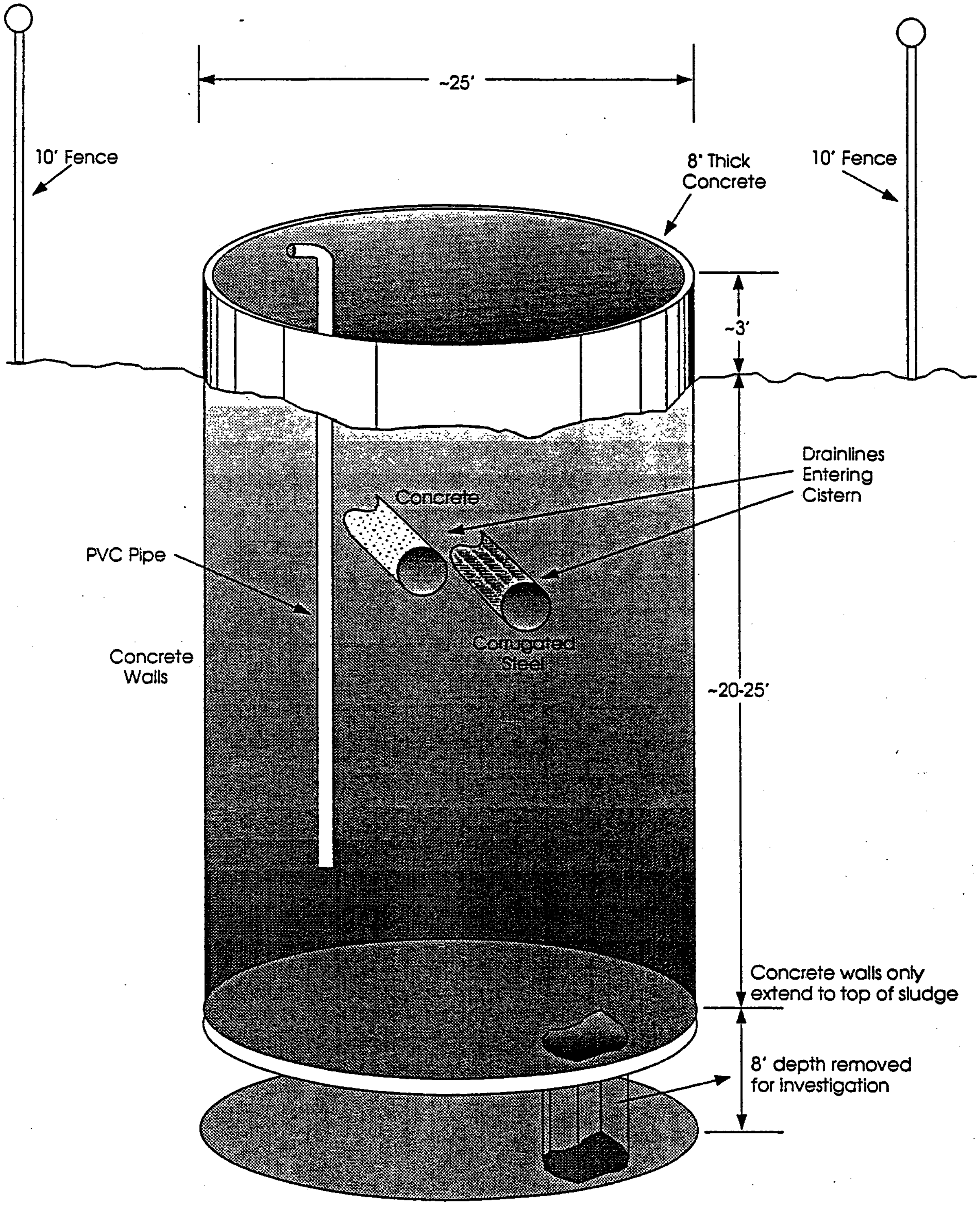


Figure 21-3. Schematic Cross Section of Site 196, Building 6597 Cistern (TA-V)

21.2 Field Investigation Results

21.2.1 Aerial Photograph Interpretation

There were no surface features noted in the 1973 to 1990 aerial photographs within 1,000 ft of the boundaries of ER Site 196 (Plate I). Photographs of TA-V from the same time showed indications of oil spilled in the vicinity of the high-energy radiation megavolt electron source (HERMES) (Site 36) and PROTO (Site 37) facilities.

21.2.2 Nature and Extent of Contamination

Results of each phase of sampling at the Cistern are summarized in Table 21-1 and are presented in greater detail in electronic format in Appendices B (field screening) and C (off-site laboratory data). As shown in Table 21-1, results of initial grab sampling indicated elevated levels of TPH, copper, lead, and zinc. Gamma spectroscopic analyses revealed no elevated DU or other radionuclides in the soil. No VOCs or PCBs were detected above their respective MDLs.

The results of Phase III of the investigation, during which the top 3 ft of material was profiled for metals content, indicated the majority of the metals impact occurred only in the upper 6 in. of material.

On-site TPH concentrations in Borehole D1 ranged from 4,500 to 13,000 mg/kg; off-site results ranged from 4,300 to 29,000 mg/kg (Table 21-1; Appendices B and C). The vertical extent of TPH was not ascertained in Boreholes D1 and D2 before refusal was encountered.

Minor VOC concentrations (<50 µg/kg total VOCs) were noted by the on-site analytical laboratory in the soil samples from Boreholes D1 and D3, but all were several orders of magnitude below their respective proposed RCRA Subpart S soil action levels. No VOCs were detected by the off-site laboratory in the soil samples (Table 21-1).

Minor VOC concentrations were noted in the vapor samples by the on-site laboratory. Borehole D1 contained minor TCE and methylene chloride. No VOC concentrations were detected in the soil vapor samples from Borehole D2. Borehole D3 contained minor vapor concentrations of TCE, 1,1,1-trichloroethane (TCA), benzene, and toluene (the latter two compounds were in "J" value concentrations, i.e., below the practical quantitation limit).

All of the constituents noted in Table 21-1 were detected at levels above their corresponding UTL (where one existed); none were above their respective proposed RCRA Subpart S soil action level, with the exception of the first TPH sample, which clearly exceeded the NMUSTR standard of 100 mg/kg. The vertical extent of TPH contamination was not adequately determined in Boreholes D1 or D2.

21.3 Evaluation of Data

The chemical analyses of the samples collected during Phases I and III of work at the site are in general agreement, even though the analytical techniques differed. It appears that on-site XRF analysis of metals approximates off-site analyses of metals by ICP and is thus a good screening tool.

Table 21-1
Summary of Off-Site Soil Sample Analytical Results, Site 196

Analyte	Sample ID	Sample Depth (ft)	Result (mg/kg)	Detection Limit (mg/kg)	UTL (mg/kg)	Proposed RCRA Subpart S Soil Action Level (mg/kg)
TPH	196-Cistern	Surface (Initial grab)	60,500	20	NA[a]	100 (NMUSTR)[b]
	D1 D2 D3	8-13 1-12 2-4	4,300-29,000 7,200-40,000 ND-35			
VOCs	196-Cistern	Surface (Initial grab)	ND	0.5-1.0	NA	Various
	D1 D2 D3	8-13 1-12 2-4	ND ND ND			
Copper	196-Cistern	Surface (Initial grab)	213	2.0	14.5	NA
	A1, A2, A3	Surface 0.5	380-680 ND-23	20 (XRF)		
Lead	196-Cistern	Surface (Initial grab)	180	0.3	24.8	2,000
	A1, A2, A3	Surface 0.5	53-309 21-23	15 (XRF)		
Zinc	196-Cistern	Surface (Initial grab)	458	2.0	41.8	20,000
	A1, A2, A3	Surface 0.5 1.0 1.5	842-1,414 ND-51 ND-62 ND-32	25 (XRF)		

Note: Results for metals shown for those samples that exceeded the UTLs. Samples collected from deeper than 1.5 ft bgs were below the UTLs for all metals. XRF screens conducted on site for samples A1, A2, and A3.

[a]NA = Not applicable.
[b]TPH action level of 100 mg/kg was derived from New Mexico Underground Storage Tank Regulations (NMUSTR) standards.

The presence of the metals in the soil was not expected, based on available site history. Interviews with facility personnel suggested that lead bricks might have been stored in the PROTO facility, but the mechanism for their having come in contact with the oil has not been explained. However, because copper, lead, and zinc concentrations decreased by one or more orders of magnitude in the upper 6 in. of soil, they are not anticipated to have reached ground water. Furthermore, all are below their proposed RCRA Subpart S soil action levels. Copper does not currently have an associated action level, but because it is an essential nutrient, its action level would likely be on the order of that for zinc (i.e., 20,000 mg/kg).

No VOCs were noted in the initial sludge sample collected from a depth of 6 in. or in any of the subsequent samples collected to profile TPH and VOCs.

Although the full extent of TPH beneath the Cistern was not defined, some parallels can be drawn to the nearby HERMES Site (ER Site 36, Section 8.0), which is approximately 100 yd from the Cistern and received greater quantities of a similar contaminant oil. Similar lithologies and depth to ground water (approximately 500 ft) are assumed for both sites. Thus, distribution patterns comparable to those seen at Site 36 are anticipated for the Cistern oil. The vertical extent of TPH is assumed to be less than that at Site 36 where it extends to a depth of approximately 220 ft, several hundred feet above the water table. Based on this and the lack of elevated concentrations of hazardous constituents detected during the site investigation, Site 196 is not believed to have impacted the ground water.

21.4 Summary and Conclusions

Investigations at the Cistern revealed the absence of a concrete base, which might imply that any contamination present would have a clear pathway to reach ground water; however, the soil profiling that was conducted demonstrated that metals contamination was restricted to the upper 0.5 to 1.0 ft of soil. None of the metals were present in a concentration that exceeded its respective proposed RCRA Subpart S soil action level. Only TPH exceeded the NMUSTR action level of 100 mg/kg; however, as manufactured, the oil is considered nonhazardous, and none of the metals associated with the soil is in a concentration that would render the oil hazardous.

Because no hazardous constituents were detected during the site investigation and the mineral oil is not anticipated to have impacted the water table, the site is proposed for NFA in accordance with Criterion 5 listed in Section 4.4 of this RFI report.

APPENDIX B. FIELD SCREENING RESULTS

SITE 196 SOIL SCREENING RESULTS

Location	Sample Date	Analyte	On-site Lab Results VOCs (8240) (ppb)	On-site Lab Results METALS XRF (ppm)	On-site Lab Results TPH (TD/GC) (ppm)	Off-Site Lab Results VOCs (8240) (ppb)	Off-Site Lab Results TPH (418.1) (ppm)
196A1-0	5-Jun-95	Chromium		36			
		Copper		680			
		Lead		81			
		Zinc		1341			
196A1-0D	5-Jun-95	Chromium		44			
		Copper		460			
		Lead		54			
		Zinc		1177			
196A1-0.5	5-Jun-95	Chromium		31			
		Copper		4			
		Lead		21			
		Zinc		10			
196A1-1.0	2-Jun-95	Chromium		14			
		Copper		20			
		Lead		23			
		Zinc		62			
196A1-1.5	5-Jun-95	Chromium		17			
		Copper		ND			
		Lead		13			
		Zinc		ND			
196A1-2.0	5-Jun-95	Chromium		1			
		Copper		ND			
		Lead		23			
		Zinc		ND			
196A1-2.5	2-Jun-95	Chromium		12			
		Copper		ND			
		Lead		22			
		Zinc		ND			

196A1-3.0	2-Jun-95	Chromium		4			
		Copper		ND			
		Lead		7			
		Zinc		ND			
196A2-0	5-Jun-95	Chromium		32			
		Copper		380			
		Lead		309			
		Zinc		842			
196A2-0.5	5-Jun-95	Chromium		20			
		Copper		4			
		Lead		23			
		Zinc		27			
196A2-1.0	2-Jun-95	Chromium		33			
		Copper		23			
		Lead		23			
		Zinc		61			
196A2-1.5	2-Jun-95	Chromium		51			
		Copper		6			
		Lead		24			
		Zinc		32			
196A2-2.0	5-Jun-95	Chromium		15			
		Copper		ND			
		Lead		7			
		Zinc		ND			
196A2-2.5	5-Jun-95	Chromium		11			
		Copper		2			
		Lead		15			
		Zinc		18			
196A2-3.0	5-Jun-95	Chromium		17			
		Copper		ND			
		Lead		17			
		Zinc		2			
196A3-0	5-Jun-95	Chromium		59			
		Copper		545			
		Lead		54			

		Zinc		1414			
196A3-0.5	5-Jun-95	Chromium		54			
		Copper		23			
		Lead		22			
		Zinc		51			
196A3-1.0	5-Jun-95	Chromium		44			
		Copper		5			
		Lead		9			
		Zinc		4			
196A3-1.5	2-Jun-95	Chromium		7			
		Copper		ND			
		Lead		8			
		Zinc		ND			
196A3-2.0	5-Jun-95	Chromium		18			
		Copper		ND			
		Lead		12			
		Zinc		ND			
Soil Sample Results							
TA3/5-196-D1-008	26-Mar-96	Total VOCs	NA		4,500		29,000
TA3/5-196-D1-009	26-Mar-96	Total VOCs	ND		6,000		15,000
TA3/5-196-D1-13	27-Mar-96	Acetone	40		13,000	ND	4,300
TA3/5-196-D2-000	27-Mar-96	Total VOCs				ND	
TA3/5-196-D2-001	27-Mar-96	TPH, Total VOCs			8,000		19,000
TA3/5-196-D2-004	27-Mar-96	Chlorobenzene	5		NA	ND	
TA3/5-196-D2-005	27-Mar-96	TPH			9,000		7,800
TA3/5-196-D2-006	27-Mar-96	Total VOCs				ND	
TA3/5-196-D2-007	27-Mar-96	TPH			2,300		7,200
TA3/5-196-D2-010	27-Mar-96	Total VOCs				ND	
TA3/5-196-D2-010-DUP	27-Mar-96	Total VOCs				ND	
TA3/5-196-D2-011	27-Mar-96	TPH			3,800	ND	23,000
TA3/5-196-D2-013	27-Mar-96	TPH			6,000		
TA3/5-196-D3-001	27-Mar-96	TPH, Acetone	48		ND	ND	
TA3/5-196-D3-002	27-Mar-96	TPH, Total VOCs				ND	35
TA3/5-196-D3-003	27-Mar-96	Total VOCs				ND	
TA3/5-196-D3-004	27-Mar-96	TPH					ND
TA3/5-196-D3-005	27-Mar-96	TPH, Acetone	42		ND	ND	
		TPH, Chlorobenzene	5		ND		

TA3/5-196-D3-006	27-Mar-96	TPH						
Soil Vapor Results								
TA3/5-196-D1-SV1	27-Mar-96	Methylene chloride	50					
		Trichloroethene	3.6 J					
TA3/5-196-D2-013-SG	27-Mar-96	Total VOCs	ND					
TA3/5-196-D3-006-SG	27-Mar-96	1,1,1-Trichloroethene	28					
		Trichloroethene	32					
		Benzene	16 J					
		Toluene	4.4 J					

APPENDIX C. LABORATORY ANALYTICAL DATA

ERSITE	Test Method	Analyte	Sample ID	Sample Depth (ft)	Sample Date	Result	Units	Detection Lim	Qualifier
196									
Chemical Data	3550/418	TPH	TA3/5-196-CISTERN	0	27-JUN-94	60500	mg/kg	2000	
			TA3/5-196-D1-13	13	27-Mar-96	4300	mg/kg	20	
			TA3/5-196-D2-001	1	27-Mar-96	19000	mg/kg	20	
			TA3/5-196-D2-005	5	27-Mar-96	7800	mg/kg	20	
			TA3/5-196-D2-007	7	27-Mar-96	7200	mg/kg	20	
			TA3/5-196-D2-011	11	27-Mar-96	23000	mg/kg	20	
			TA3/5-196-D2-011-DUP	11	27-Mar-96	21000	mg/kg	20	
			TA3/5-196-D2-012	12	27-Mar-96	40000	mg/kg	20	
			TA3/5-196-D3-002	2	27-Mar-96	35	mg/kg	20	
			TA3/5-196-D3-004	4	27-Mar-96	20	mg/kg	20	U
			TA3/5-196-D1-008	8	26-Mar-96	29000	mg/kg	20	
			TA3/5-196-D1-009	9	26-Mar-96	15000	mg/kg	20	
	6010	ALUMINUM	TA3/5-196-CISTERN	0	27-JUN-94	4900	mg/kg	10	
		ARSENIC	TA3/5-196-CISTERN	0	27-JUN-94	0.56	mg/kg	1	J
		BARIUM	TA3/5-196-CISTERN	0	27-JUN-94	87.3	mg/kg	1	
		BERYLLIUM	TA3/5-196-CISTERN	0	27-JUN-94	0.25	mg/kg	0.2	
		CADMIUM	TA3/5-196-CISTERN	0	27-JUN-94	2.5	mg/kg	0.5	
		CALCIUM	TA3/5-196-CISTERN	0	27-JUN-94	14700	mg/kg	20	
		CHROMIUM	TA3/5-196-CISTERN	0	27-JUN-94	14.8	mg/kg	1	
		COBALT	TA3/5-196-CISTERN	0	27-JUN-94	5.8	mg/kg	1	
		COPPER	TA3/5-196-CISTERN	0	27-JUN-94	213	mg/kg	2	
		IRON	TA3/5-196-CISTERN	0	27-JUN-94	8750	mg/kg	10	
		LEAD	TA3/5-196-CISTERN	0	27-JUN-94	180	mg/kg	0.3	
		MAGNESIUM	TA3/5-196-CISTERN	0	27-JUN-94	2640	mg/kg	20	
		MANGANESE	TA3/5-196-CISTERN	0	27-JUN-94	111	mg/kg	1	
		NICKEL	TA3/5-196-CISTERN	0	27-JUN-94	17.8	mg/kg	4	
		POTASSIUM	TA3/5-196-CISTERN	0	27-JUN-94	859	mg/kg	500	
		SILVER	TA3/5-196-CISTERN	0	27-JUN-94	2.9	mg/kg	1	
		SODIUM	TA3/5-196-CISTERN	0	27-JUN-94	144	mg/kg	500	J
		VANADIUM	TA3/5-196-CISTERN	0	27-JUN-94	13.8	mg/kg	1	
		ZINC	TA3/5-196-CISTERN	0	27-JUN-94	458	mg/kg	2	B
	8240	METHYLENE CHLORIDE	TA3/5-196-CISTERN	0	27-JUN-94	0.27	mg/kg	0.5	BJ

Radiological Data									
196	Gamma Spec	ACTINIUM-228	TA3/5-196-SS-B1	0	10-OCT-94	0.615	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.608	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.756	pCi/g	No Data	
		BERYLLIUM-7	TA3/5-196-SS-B1	0	10-OCT-94	3.67	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	1.6	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	2.72	pCi/g	No Data	
		BISMUTH-212	TA3/5-196-SS-B1	0	10-OCT-94	0.505	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.53	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.84	pCi/g	No Data	
		BISMUTH-214	TA3/5-196-SS-B1	0	10-OCT-94	0.648	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.6	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.548	pCi/g	No Data	
		CESIUM-137	TA3/5-196-SS-B1	0	10-OCT-94	0.147	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.0797	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.0974	pCi/g	No Data	
		LEAD-210	TA3/5-196-SS-B1	0	10-OCT-94	6.02	pCi/g	No Data	
		LEAD-212	TA3/5-196-SS-B1	0	10-OCT-94	0.591	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.671	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.654	pCi/g	No Data	
		LEAD-214	TA3/5-196-SS-B1	0	10-OCT-94	0.674	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.608	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.575	pCi/g	No Data	
		POTASSIUM-40	TA3/5-196-SS-B1	0	10-OCT-94	13	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	13.3	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	12	pCi/g	No Data	
		RADIUM-224	TA3/5-196-SS-B2	0	10-OCT-94	1.7	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	1.1	pCi/g	No Data	
		RADIUM-226	TA3/5-196-SS-B1	0	10-OCT-94	2.03	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	1.67	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	1.06	pCi/g	No Data	
		RADIUM-228	TA3/5-196-SS-B1	0	10-OCT-94	0.682	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.674	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.838	pCi/g	No Data	
		THALLIUM-208	TA3/5-196-SS-B1	0	10-OCT-94	0.592	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.557	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.523	pCi/g	No Data	

		THORIUM-228	TA3/5-196-SS-B1	0	10-OCT-94	0.589	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.668	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.651	pCi/g	No Data	
		THORIUM-232	TA3/5-196-SS-B1	0	10-OCT-94	0.682	pCi/g	No Data	
			TA3/5-196-SS-B2	0	10-OCT-94	0.674	pCi/g	No Data	
			TA3/5-196-SS-B3	0	10-OCT-94	0.838	pCi/g	No Data	
		THORIUM-234	TA3/5-196-SS-B2	0	10-OCT-94	1.85	pCi/g	No Data	
		URANIUM-238	TA3/5-196-SS-B2	0	10-OCT-94	1.85	pCi/g	No Data	

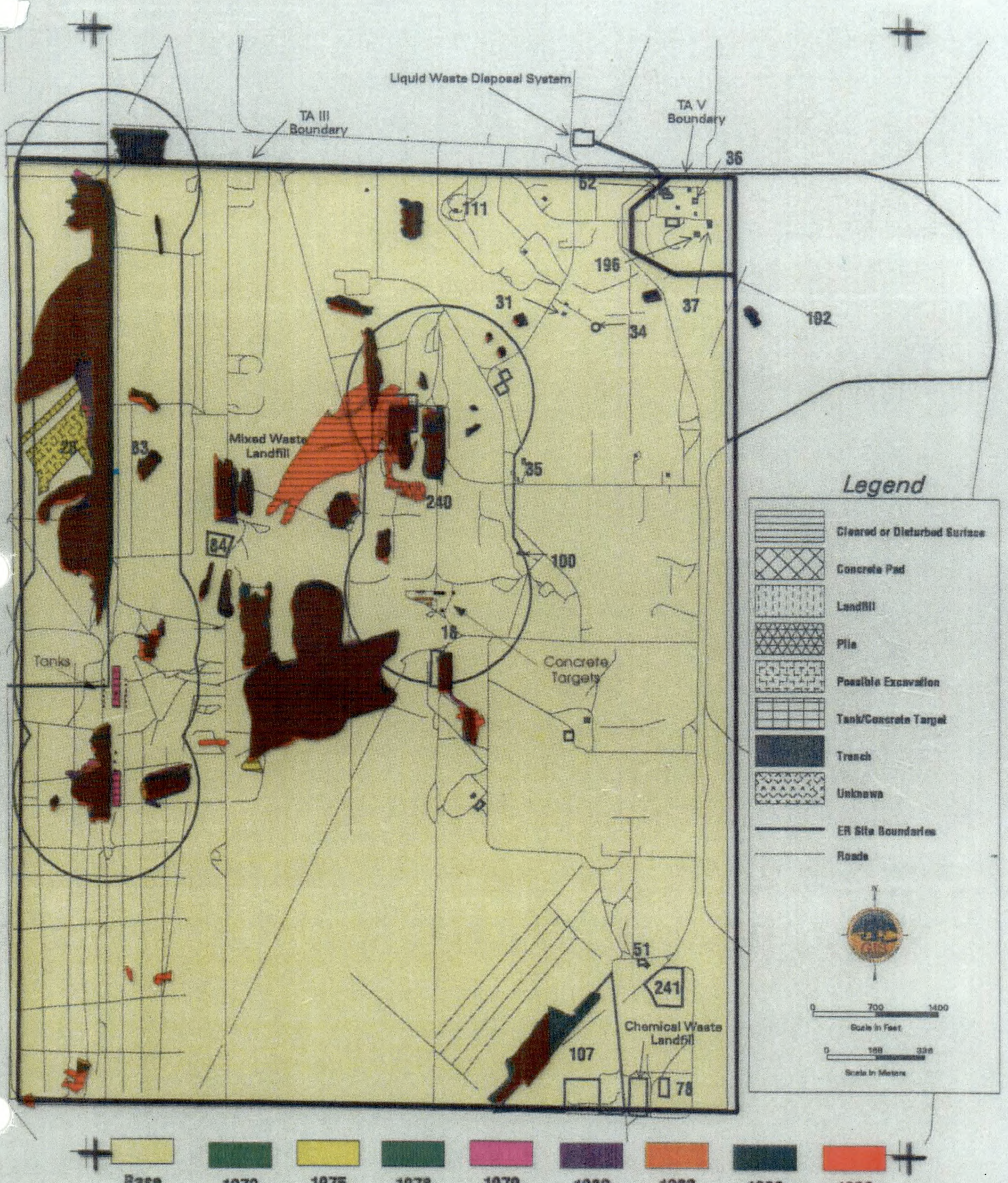


Plate 1. Aerial Photography Interpretation in Technical Areas III and V.

NOD

Sandia National Laboratories
Environmental Restoration Project

Comment Responses

Notice of Deficiency July 31, 1997
Results of the Technical Area III and V RCRA Facility Investigation
Submitted to EPA and NMED June 1996

The following are Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration (ER) Project responses to the Notice of Deficiency (NOD) comments (July 31, 1997) for the Technical Area III and V RCRA Facility Investigation. Prior to responding to the NOD, a meeting with representatives from the New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau (HRMB), Department of Energy (DOE) Oversight Bureau (OB), the DOE, and the SNL/NM ER Project was held on September 15, 1997 to provide an opportunity to discuss any questions concerning the comments and their responses. A list of attendees at the September 15 meeting is included in Attachment 1.

GENERAL DEFICIENCIES

Comment 1

Table 2-6. Upper Tolerance Limits for Target Analyte List Metals in Technical Areas III and V Soils, page 2-16, shows upper limits for barium, chromium, and silver which are higher than those proposed in SNL's Background Study report (March 1996). An explanation as to why the upper limits are higher must be provided.

Response to Comment 1

The Upper Tolerance Limits (UTLs) for the SNL/NM Background Study had not been calculated nor approved by the NMED or the USEPA by the time the TA-III/V data were being evaluated and the report written. To provide comparisons to background, a subset of the data from the SNL/NM Background Study was used to perform statistical analyses to obtain UTLs for TA-III/V. These calculations are described on pages 2-11 through 2-19 of the TA-III/V RFI report and in Appendix E. The SNL/NM Background Study reports background from five 'Super Groups', one of which is the Southwest Super Group that included background data from TA-III, TA-V, McCormick Ranch, and Thunder Range. The TA-III/V RFI report used a subset of the background data that included only TA-III and TA-V. Table 1 (Attachment 2) contains the TA-III/V RFI UTLs and the SNL/NM site-wide UTL. A comparison of the maximum values for each site indicates that very few samples (<10) that passed the TA-III/V UTLs exceeded the SNL/NM site-wide background values. This difference has not impacted the recommendations made in the TA-III/V RFI Report for any site. See Response to Comment 9 for a discussion of the comparison of soil analytical results to background values.

Comment 2

Appendices B, C, and D (on disk) do not contain the full data set. An explanation as to why and how the full data set was queried to create the abbreviated data files must be provided. The complete data set must be referenced and made available upon request.

Response to Comment 2

The complete data set was queried and results below the method detection limits (MDL) were removed to provide a much more manageable data set for assessment and evaluation purposes. The data in Appendices B, C, and D include all data except for nondetects (NDs). The complete data set (on electronic disk) is available through the ER Project.

Comment 3

Throughout the approved RCRA Facility Investigation (RFI) Work Plan, a commitment was made to conduct additional interviews with current or former employees who may have historical knowledge of site operations. However, the RFI Report does not mention whether these interviews were conducted. The results of any interviews that were conducted during the investigation must be discussed. If no additional interviews were conducted, this fact should be included and discussed.

Response to Comment 3

No additional interviews were conducted with former employees who may have knowledge of past site operations. Efforts were made to contact former employees, however, these were unsuccessful. Interviews with current employees provided no additional useful historical information for any of the sites. Current employees did provide logistical coordination for the field investigations.

Comment 4

The aerial photographs reviewed during the RFI were dated from 1973 to 1990. Any older aerial photographs which are available must be identified and discussed.

Response to Comment 4

The ER Project has compiled an index of available aerial photographs (dating back to the 1930s) of KAFB and SNL/NM from many sources. This index is available for review at the ER Project Office, however, no aerial photographs in this index encompass areas in TA-III and TA-V prior to 1973.

Comment 5

SNL continues to use analysis for total petroleum hydrocarbons (TPH) instead of analyses for specific constituents, such as benzene, toluene, and ethylbenzene. EPA Methods 8240, 8020, and unmodified 8015 must be used.

Response to Comment 5

This issue was addressed initially in the TA-III/V Work Plan Comment 14. Our response to the RFI Work Plan Comment 14 was that analytes would be selected based on process knowledge and site history wherever possible to avoid resampling. If laboratory determination of TPH were called for, a small number of verification samples using Method 8240 would be performed at several sites. If Method 8240 were used, then analysis with Method 8020 would be redundant. Analytes from Method 8015 were not expected to be present at any of the sites, and therefore, this analysis would not be performed.

The response to Comment 14 on the RFI Work Plan was approved by EPA Region VI. Verification samples using Method 8240 were done for ER Sites 36, 37, and 196 for some samples that had detectable TPH. Other sites that had petroleum hydrocarbons (ER Site 31 and 34) as COCs did not have elevated TPH in soil samples. Soil samples from those sites that solely had mineral oil leaks/spills (ER Site 35 and 18) were analyzed by Method 418.1. A chromatograph spectrum for the mineral oil associated with the mineral oil-impacted sites is included in Attachment 3. The MSDS for Diala AX™ oil is also included (Attachment 3). Submission of the MSDSs for the transformer and hydraulic oils (Diala AX™, Univolt™, Shell 61™, Regal™) typically used at these sites were included in the responses to the RFI Work Plan comments (November 1993) in Attachments 8 and 10. The chromatogram of Shell Diala AX™ oil used at SNL/NM ER Sites 31, 34, 35, 36, and 37 displays a "backbone" fingerprint typical of hydrocarbons/mineral oil. Peaks on the chromatogram were tentatively identified based on mass spectra and labeled with corresponding carbon mass fragments.

Comment 6

Groundwater data exist from SNL/NM monitoring wells located in and near Technical Area (TA) III and TA V. Steady and sporadic detection of trichloroethylene (TCE), elevated nitrate, toluene, total chrome and other contaminants have been documented in some of these wells. These well locations can potentially serve as up-gradient or down-gradient wells. A summary table of these monitoring wells/results and a map of well location must be included in the RFI report.

Response to Comment 6:

Results indicate quite conclusively that the ER sites investigated within the scope of the TA-III/V RFI report are not the source of TCE (or other contaminants found in monitoring wells at TA-V). None of these sites has been found to impact underlying groundwater.

The SNL/NM ER Project is continuing to investigate groundwater at TA-V as a separate issue. A summary table of analytical results of groundwater sampling and a map showing well locations will be included as part of the information provided concerning the investigation of groundwater at TA-V.

Comment 7

At all sites having oil-contaminated soils (e.g. Environmental Restoration (ER) Site 18), soils with TPH exceeding 100 ppm should be excavated and treated/disposed of in accordance with New Mexico Environment Department (NMED) Underground Storage Tank (UST) Regulations.

Response to Comment 7

Comment 7 appears to be contradictory to Comment 10 (please refer to Comment 10). During the September 15 meeting, the ER Project requested regulatory guidance on soils contaminated with mineral oil. Mineral oil is not a RCRA-regulated hazardous substance. The cleanup standards for petroleum hydrocarbons in the New Mexico Underground Storage Tank regulations (20NMAC5) were used for lack of any other regulatory guidelines, even though mineral oil in soil was due to spills at several sites and the UST regulations are not applicable. Additionally, as further clarification regarding the application of UST regulations 20 NMAC5.1C states that "20 NMAC 5 Parts 2 through 14 do not apply to any of the following types of UST systems: 1. Wastewater treatment tanks; 2. Sumps; 3. UST systems containing radioactive waste; 4. Electrical equipment; 5. Hydraulic lift tanks; and 6. any UST system with a capacity of 110 gallons of less." The HERMES and PROTO USTs were used to contain transformer oil for electrical equipment and, therefore, should be exempt from UST regulations. SNL/NM agrees that this issue is not resolved at this time and that further discussions with NMED may be appropriate for sites containing mineral oil as a COC.

At the September 15 meeting, clarification was requested of NMED on cleanup standards for hydrocarbon contaminated soils. The ER Project has understood that the New Mexico UST regulations do not require excavation and treatment/disposal of soil with TPH exceeding 100 ppm under certain hydrogeologic conditions. The UST Soil/Water Sampling & Disposal Guidelines issued by the NMED (revised April 1995) state that "Soils which are not highly contaminated (saturated) and are located greater than fifty feet (50) above the seasonal high static water table do not need to be remediated." This was confirmed with a letter, dated October 8, 1997 to Robert Dinwiddie from Gerard Schoeppner of the UST Bureau (provided by Stephanie Kruse to Sharissa Young).

In conclusion, SNL/NM believes that according to the UST regulations soils contaminated with TPH greater than 100 ppm do not require excavation and disposal/treatment if groundwater is greater than 50 feet below the depth of contamination. Even so, mineral oil is not a RCRA regulated hazardous substance and may be exempt from UST regulations because the USTs containing mineral oil were used as part of a system for electrical equipment. Again, SNL/NM encourages further discussion with NMED on this issue.

Comment 8

At this time, a background well southwest of TA-V, a potentially down-gradient well north of TA-V, and another well west of the abandoned KAFB-10 production well have been drilled. The wells southwest and north of the technical area should be useful for establishing background conditions and in characterizing the solvent and NO3 plumes underlying parts of TA-V, respectively. The well west of KAFB-10 is considered to be of limited value. The KAFB-10 production well should be replaced with a monitoring well to evaluated the potential contribution of ER Site 36 (and/or other ER sites) to the TA III & V groundwater contamination problem.

Response to Comment 8

As discussed during the September 15 meeting, the investigation of the groundwater in the vicinity of TA-V will be addressed separately from the ER sites within the TA-III/V RFI report. Results indicate that ER Site 36 has not impacted groundwater.

Comment 9

In the RFI Workplan Comment Responses (March 1993), General Comment No. 3 of the Notice of Deficiency (NOD) states that

> *Field sampling must extend horizontally and vertically until no subsequent increase in contaminant levels is likely to occur. A minimum of two (2) "clean" samples are required to verify delineation. These samples should be at or below the background levels previously approved by the EPA for each constituent.*

Following the requirement above, subsurface samples must be obtained where results from surface sampling exceed proposed upper tolerance limits (UTLs) or 95th percentiles. These results must be compared to approved UTLs or 95th percentiles to determine the vertical extent of contamination.

Response to Comment 9

As discussed in the September 15 meeting, the SNL/NM ER Project has followed a risk-based corrective action process. As discussed in the RFI Work Plan Response to Comment 1 "SNL/NM understands the need for, and use of, action levels, background data, and developing health and environmental criteria in determining the need for a CMS. Action levels will be used in the course of this RFI as a guide to help with decision making. Background data also will be collected and risk-based decision making will be employed as well." At all the sites addressed within the TA-III/V RFI report, results have been compared with background and action levels. Concentrations in soils have been well below risk-based soil action levels. At ER Site 78, chromium was found in the surface verification samples (39.7 mg/kg) at above the TA-III/V UTL (26.2 mg/kg) but well below the proposed RCRA Subpart S action level (400 mg/kg). By employing ~~the~~ a risk-based decision making during the RFI process, additional sampling for chromium was determined to be unnecessary.

General Comment 9 is repeated for specific sites within the Notice of Deficiency (comments 12, 15, and 22). Specific reasons for varying from the field sampling protocol discussed in the Work Plan are provided in the responses to those site-specific comments.

Specific Deficiencies

XIX. ER Site 196, TA-V: Building 6597 Cistern

Comment 30

Section 21.1, Field Investigation Protocols. The last sentence of Subsection 21.1.2.2. Sludge Thickness Determination, p. 21-1, seems to be missing a few words. Sandia should clarify this sentence.

Response to Comment 30

The sentence reads "This refusal was attributed to the concrete base then believed to exist." This sentence means that refusal of the auger was attributed at the time of drilling to contact with the concrete base of the cistern. It was subsequently found that the cistern did not have a concrete base.

Comment 31

Section 21.2, Field Investigation Results. Subsection 21.2.2, Nature and extent of contamination, page 21-6, states that "The vertical extent of TPH contamination was not *adequately determined in Boreholes D1 or D2." Total depth for boreholes D1 and D2 was 13 and 12 ft, respectively. TPH concentration was found to be 4,300 ppm at the bottom of D1 and 40,000 ppm at the bottom of D2. In both boreholes, the concentration was increasing downward. Additional sampling and analysis for TPH, VOCs, and SVOCs are necessary to define the extent of the waste oil plume and to locate potential VOCs. As potential sources of groundwater contamination, the oil saturated sludge and soil should be removed and disposed of appropriately.*

Also, the Logic Flow Diagram for this site indicates that sampling will continue until TPH is no longer detected. Thus, the RFI Work Plan has not been fully implemented at this site.

Response to Comment 31

SNL/NM agrees that the RFI Work Plan was not fully implemented at Site 196. The reasons for deviations from the Work Plan are provided in this response. As indicated in the RFI Report, the boreholes were advanced as far as possible (to equipment refusal) in the bottom of the cistern. Although elevated TPH was found, none of the samples collected from the boreholes contained elevated VOC levels, as determined by 8240 analysis. The geometry of the cistern (i.e., 25 feet of free space above the cistern floor with a 3-foot lip above TA-V ground level) precluded drilling within it, and an angled borehole did not appear feasible, given the depth of the concrete collar and the space restraints near the facility. Thus, the RFI Work Plan for the site was implemented as fully as feasible.

SNL/NM does not believe that the cistern poses a threat to groundwater for two reasons: 1) the mineral oil used in the cistern does not contain any hazardous constituents as manufactured (see Response to Comment 7 and Attachment 3), and 2) the extent of impact is not believed to reach groundwater, given the fact that the neighboring site, Site 36 (HERMES) was impacted by much greater volumes of oil, and the oil has been demonstrated to cease approximately 300 feet above groundwater. SNL/NM does not believe additional sampling is warranted, based on these reasons and on those listed in Responses 5, 7, and 32. However, SNL/NM agrees that further discussion is needed to resolve Comment 31 and is looking forward to resolving issues regarding this site. Topics of discussion should include a determination of regulatory guidelines on mineral oil (the primary COC at the Site 196) and its byproducts.

See also Responses 5, 7, and 32.

Comment 32

Site 196 may be similar to Site 36 (HERMES Oil Spill), where VOC contamination did not begin to appear in the soil above a depth of 25 to 75 ft, but increased below that to a depth of approximately 200 ft. At the HERMES site, Sandia (8-13) has suggested that mineral oil may be a source of secondary contamination. "The origin of most of the VOCs is postulated to be bacterial fermentation of the mineral oil." For these reasons, deeper subsurface samples must be collected for VOC and SVOC analysis at Site 196. (Besides defining the *extent of primary and secondary contamination at Site 196, these samples may provide information of value to the groundwater investigation beneath TA-V.)*

Response to Comment 32

Site 196 is not believed to be similar to Site 36. Upon removal of the USTs at Site 36, the soils exhibited high concentrations of TPH below the removed tanks. Elevated VOC levels were not seen during subsequent drilling until a depth of 25 feet at Site 36 becasuse the UST excavation was backfilled with clean soil upon completion of the tank removal activity. Thus, the soil encountered during drilling from grade to the bottom of the excavation (approximately 25 feet) was backfill material that contained neither TPH nor VOCs.

Furthermore, although VOCs were present in Site 36 soils and are believed to be the result of bacterial fermentation of the mineral oil, the highest concentrations of VOCs seen in those soils were far below the RCRA Subpart S levels. It should be noted here that the RCRA Subpart S action levels apply to sites slated for future residential land use and are, thus, very conservative; Sites 36 and 196 are both slated for industrial land use. The highest VOC concentration was 12 mg/kg acetone from 36-BH-01 (in the middle of the tank excavation, the point of greatest impact); the RCRA Subpart S action level for acetone is 8,000 mg/kg, more than 600 times the highest concentration seen at the HERMES site.

In addition, the TPH and VOCs at Site 36 were co-located; the samples that contained the highest TPH concentrations also contained the highest VOC concentrations. No such correlation was seen at Site 196 where no VOC concentrations were noted in any of the soil samples collected. As noted in Response to Comment 31, if the levels of TPH at Site 36 did not impact groundwater (they ceased at a depth of 200 feet, approximately 300 feet above groundwater), it is unlikely that the levels noted at Site 196 (which was impacted by a much smaller volume of oil than Site 36) will impact groundwater.

Please refer to Response to Comment 7, also.

NOD

Sandia National Laboratories
Albuquerque, New Mexico
July 1998

Environmental Restoration Project
Responses to NMED 2nd Notice of Deficiency on the Technical Areas III and V RCRA Facility Investigation
Dated June 1996

INTRODUCTION

This document responds to comments received in a letter from the State of New Mexico Environment Department (NMED) to the U.S. Department of Energy (DOE) (Dinwiddie, March 27, 1998) documenting the review of the 2nd Notice of Deficiency on the Technical Areas III and V RCRA Facility Investigation submitted in June 1996.

This response document provides NMED comments repeated in **bold** by comment number in the same order as provided in the call for response to comments. The DOE/Sandia National Laboratories response is written in normal font style on a separate line under "Response."
Responses to general technical comments begin on page 3 and responses to specific technical comments begin on page 7. Additional supporting information for the specific comments is included as attachments to this section.

TABLE OF CONTENTS

RESPONSES TO THE 2ND NOTICE OF DEFICIENCY: RESULTS OF THE TECHNICAL AREA III AND V RCRA FACILITY INVESTIGATION

GENERAL COMMENTS

1. **The TA-III/V background study has not been approved by the New Mexico Environment Department (NMED).**

   Background concentrations have now been approved for that portion of Kirtland Air Force Base (KAFB) which includes OU 1306. These are the background concentrations that should be used by the U. S. Department of Energy (DOE)/Sandia National Laboratories (SNL) to determine whether there has been a release of contaminants to the environment.

   See also General Deficiency 7.

   Response: The DOE/SNL are aware that the background values used in the Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) report were not approved by the New Mexico Environment Department (NMED) and that there are some differences between the Technical Area (TA)-III/V RFI background values and the approved background concentrations. We apologize if this information was not conveyed more clearly in our response to the first notice of deficiency (NOD) comments. The RFI report was submitted in June 1996 while the background soil investigation was still underway. The background soil concentrations, approved by the NMED in September of 1997, included the same data set used in the June 1996 RFI report, as well as data from a broader area. Thus some minor differences in concentrations for the 95th upper tolerance limit (UTL) occurred.

   A comparison of analytical results for soils to the approved background soil concentrations is included with this submittal. The results of this comparison are contained within Attachments for the applicable environmental restoration (ER) sites. See also Response to General Deficiency 7.

   To avoid unnecessary sampling, risk-based assessments using conservative values (i.e., highest concentration values) can provide an indication of whether the site poses a human health risk or ecorisk.

2. **DOE/SNL Response to Comment 2.**

   In cases where individual environmental restoration (ER) sites have been proposed for No Further Action (NFA), the complete data set (hard copy form) must be submitted.

While summary tables listing only detected constituents are useful for review purposes, they provide only part of the information needed to fully evaluate a NFA proposal. To complete the data package, additional tables must be submitted listing all of the various constituents that were analyzed for and their method detection limits.

Please note that J-coded data must be treated as detected constituents.

Response: Data tables, including J-coded data, nondetections, and the method detection limits (MDL) are provided in this submittal within the attachments associated with specific sites (see the Sandia National Laboratories/New Mexico [SNL/NM] responses to Specific Comments for Enclosures A and B). The RFI Report did present the J-coded data for all the ER sites. Results of laboratory quality assurance (QA) and quality control (QC) samples are not contained within the Environmental Restoration Data Management System database and therefore, copies from the laboratory reports are attached following the specific comments for the ER sites.

3. **DOE/SNL Response to Comment 5.**

The Hazardous and Radioactive Materials Bureau (HRMB) does not generally accept TPH analyses for the purpose of site characterization. Although TPH analyses are useful for screening purposes, in most cases, DOE/SNL must also determine whether there has been a release of hazardous constituents at sites that are contaminated with TPH.

Methods 8240 and 8270 are the "standard" methods employed to characterize a site with respect to volatile and semi-volatile organic compounds (VOC's and SVOC's).

Response: Field screening (Hanby) and laboratory analyses for Total Petroleum Hydrocarbons (TPH) were the proposed methods described in the U.S. Environmental Protection Agency (EPA)- and NMED-approved TAIII/V Work Plan. These methods were performed at the majority of ER sites addressed in the TA-III/V RFI report. TPH was selected because of the type of hydrocarbons identified as constituents of concern (COC), specifically mineral oil and transformer oil. Because of the lack of volatile and semivolatile constituents in these types of oil, TPH was selected as the best method for characterizing sites impacted by oil spills and leaks. If additional sampling is required at specific sites, EPA Methods 8260 and 8270 will be used for detection of volatile organic compounds (VOC) and semivolatile organic compounds (SVOC). EPA Method 8260 (capillary column method) is fungible with Method 8240 (packed column method) although EPA Method 8260 is now the preferred method because it provides better resolution, selectivity, and sensitivity (SW 846).

4. **DOE/SNL Response to Comment 6.**

Additional site characterization is needed at some sites before a definitive determination can be made that there has been no impact to ground water. The requested ground-water data and map must be provided to the NMED.

The investigation of ground-water contamination at TA-V will be linked to the source (or sources) of contamination.

Response: The issue of a groundwater investigation at TA-V is more thoroughly addressed in the DOE transmittal letter to these 2nd NOD responses. In summary, existing data on the hydrogeologic conditions (including potential sources) at TA-V will be reviewed, analyzed, and summarized in a report to the NMED. Maps and cross-sections will be included in the data report. The expected date for submittal of this report is mid-December 1998.

5. **DOE/SNL Response to Comment 7.**

The reference to ER Site 18 is a mistake.

The NMED Underground Storage Tank (UST) Bureau will be consulted on a site-by-site basis to determine whether NMED UST regulations apply. In most cases, DOE/SNL will be required to provide proof (through sampling and analysis) that hazardous constituents have not been released to the environment.

Response: The DOE/SNL are interested in establishing who will consult with the NMED Underground Storage Tank (UST) Bureau on a site-by-site basis. With the exception of the High Energy Megavolt Electron Source (HERMES) site (ER Site 36), there are no other ER sites under investigation within the TA-III/V RFI that are former USTs. Transformer oil was spilled on the ground surface at several TA-III/V ER sites. These sites have been shown to contain no hazardous constituents (regulatory levels) with the exception of polychlorinated biphenyls (PCB) at ER Site 18. Please refer to the DOE/SNL responses to the site-specific comments for additional discussion on the potential for hazardous constituents to be released to the environment at oil-contaminated sites.

6. **DOE/SNL Response to Comment 8.**

The new well located west of the former position of KAFB-10 (now abandoned) was drilled at an unacceptable location (too far from LWDS-MW1). DOE/SNL was made aware of this situation prior to the drilling of this new well.

A monitor well must be drilled near the former location of KAFB-10 to evaluate the nature and concentration of contaminants in the ground water.

Response: DOE/SNL will review the existing data, perform some additional studies if prudent, and present the results to the NMED before installing new wells at TA-V. Proposed locations of new wells, if any, and the rationale for these wells will be presented in a TA-V data report. Also see response to General Deficiency 4.

7. **DOE/SNL Response to Comment 9.**

Additional site characterization may be required in cases where the concentration of a Constituent of Concern (COC) lies between the 95th UTL (or 95th percentile) and the proposed Subpart S Action Level for that constituent.

Response: In general, risk assessments can be performed with available data as the logical first step to evaluate whether concentrations of COCs at a site pose a threat to human health and environment. The SNL/NM risk assessment team will evaluate the TA-III/V ER sites under consideration in the near future. The risk assessment process has evolved over the past several years to include evaluating the risk to the ecosystem (or representatives of the ecosystem, i.e., deer mouse). The risk assessment will evaluate whether constituents with concentrations exceeding the maximum background levels (MBL) established by the NMED are of concern. Additional sampling and analysis potentially could be required to provide input to the risk assessments. DOE/SNL will provide the results of the risk assessments to the NMED.

ER Site 196, TA-V: Building 6597 Cistern

1. **DOE/SNL Response to Comment 31**

The presence of "minor" VOC concentrations in both soil samples (on-site laboratory) and soil-gas samples indicates that hazardous constituents were released to the environment. The extent of contamination has not been determined. Contamination at the site is a potential threat to ground water.

Contaminants detected at the site include TPH, TCE, 1,1,1-TCA, benzene, toluene, methylene chloride, copper, lead, and zinc. This site may be the source or one of the sources of the TCE contamination seen in ground water at TA-V.

Additional site characterization, including the collection and analysis of soil samples from deep boreholes, is required.

Response: SNL/DOE will conduct further investigation of the Building 6597 Cistern to characterize the vertical extent of contamination.

2. **DOE/SNL Response to Comment 32**

This response relies on the assumption that only small quantities of waste transformer oil were discharged into the cistern (5 gal per week, page 21-1, paragraph 1). However, HRMB questions why such a large cistern (a seepage pit 20-ft deep by 25-ft diameter) and associated piping was constructed to discharge such small quantities of waste oil.

Response: There are no interviews that provide information on the NMED's question regarding the size of the cistern. However, the cistern has the capacity to contain 73,400 gallons of transformer oil. The cistern was probably constructed to hold the bulk of transformer oil should an emergency occur that would necessitate rapid evacuation of the oil from the PROTO I facility. SNL/DOE will provide any additional information on the construction of the cistern should further details become available.

Additionally, as mentioned in the above comment, "minor" VOC concentrations in both soil samples and soil-gas samples were detected by the on-site laboratory. DOE/SNL cannot dismiss these on-site laboratory results simply because they are less favorable than the off-site results.

Response: SNL/DOE is not dismissing the on-site laboratory analyses, however, the reported amounts were very low for the VOCs detected (see Attachment 196-1) and as NMED/HRMB is aware, false positives are common for VOCs because of laboratory contaminants.

2. **See additional concern for ER Site 196 in Enclosure B.**

Enclosure B
Additional Concerns

ER Site 196, TA-V: Building 6597 Cistern

1 **DOE/SNL must provide the complete data set (hard copy form), including the analytical results for all QA/QC samples.**

Response: The analytical data for ER Site 196, including QA/QC data, is provided in Attachment 196-1.

Attachment 196-1

Laboratory Analytical Results for ER Site 196
Laboratory QA/QC – copied from laboratory reports

ER Site 196 RFI Analytical Results; PCBs (EPA Method 8080)

ER Sample ID	Sample Number	Sample Type	Sample Depth (Feet)	Analyte	Analytical Method	Units	Amount Detected	QC Flag	Material Description
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1016	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1221	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1232	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1242	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1248	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1254	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130410	F	0	Aroclor 1260	8080	ug/kg	<33	U	WASTE
TA3/5-196-CISTERN	SNL0130407	F	0	TPH	3550/418	mg/kg	60500		WASTE

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Actinium-227	pCi/g	<1.82	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Actinium-228	pCi/g	.615		0.165	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Americium-241	pCi/g	<.208	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Antimony-124	pCi/g	<.0309	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Antimony-125	pCi/g	<.0795	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Antimony-126	pCi/g	<.032	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Argon-41	pCi/g	<.0647	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Barium-133	pCi/g	<.043	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Barium-140	pCi/g	<.0994	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Beryllium-7	pCi/g	3.67		0.558	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Bismuth-207	pCi/g	<.0356	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Bismuth-212	pCi/g	.505		0.308	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Bismuth-214	pCi/g	.648		0.111	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cadmium-109	pCi/g	<1.21	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cerium-139	pCi/g	<.0333	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cerium-144	pCi/g	<.241	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cesium-134	pCi/g	<.0284	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cesium-137	pCi/g	.147		0.0493	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Chromium-51	pCi/g	<.248	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cobalt-56	pCi/g	<.0492	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cobalt-57	pCi/g	<.0309	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cobalt-58	pCi/g	<.0361	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Cobalt-60	pCi/g	<.0345	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Copper-64	pCi/g	<9.6	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Europium-152	pCi/g	<.0932	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Europium-154	pCi/g	<.129	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Europium-155	pCi/g	<.154	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Gadolinium-153	pCi/g	<.0962	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Indium-115M	pCi/g	<.0761	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Iodine-125	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Iodine-129	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Iodine-131	pCi/g	<.0271	U	999.9999	196	SOIL

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Iridium-192	pCi/g	<.0309	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Iron-59	pCi/g	<.0659	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Lanthanum-140	pCi/g	<.0233	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Lead-210	pCi/g	6.02		4.26	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Lead-212	pCi/g	.591		0.0744	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Lead-214	pCi/g	.674		0.131	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Manganese-54	pCi/g	<.037	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Manganese-56	pCi/g	<.0776	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Mercury-203	pCi/g	<.033	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Neptunium-237	pCi/g	<.313	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Niobium-95	pCi/g	<.114	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Plutonium-239	pCi/g	<487	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Potassium-40	pCi/g	13		1.08	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Protactinium-231	pCi/g	<1.37	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Protactinium-233	pCi/g	<.0633	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Radium-226	pCi/g	2.03		0.94	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Radium-228	pCi/g	.682		0.182	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Ruthenium-103	pCi/g	<.028	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Ruthenium-106	pCi/g	<.229	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Scandium-46	pCi/g	<.0266	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Silver-110	pCi/g	<.0281	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Sodium-22	pCi/g	<.0449	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Sodium-24	pCi/g	<.0295	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Strontium-85	pCi/g	<.0286	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Tantalum-182	pCi/g	<.244	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Tellurium-123M	pCi/g	<.0311	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thallium-201	pCi/g	<.278	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thallium-208	pCi/g	.592		0.148	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thorium-227	pCi/g	<.249	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thorium-228	pCi/g	.589		0.0741	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thorium-229	pCi/g	<.132	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thorium-231	pCi/g	<.599	U	999.9999	196	SOIL

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thorium-232	pCi/g	.682		0.182	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Thorium-234	pCi/g	<.85	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Tin-113	pCi/g	<.0333	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Uranium-234	pCi/g	<20	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Uranium-235	pCi/g	<.0661	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Uranium-238	pCi/g	<.847	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	enon-133,-133M	pCi/g	<.161	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Yttrium-88	pCi/g	<.0342	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Zinc-65	pCi/g	<.0823	U	999.9999	196	SOIL
TA3/5-196-SS-B1	SNL0130687	F	10-OCT-94	0	Zirconium-95	pCi/g	<.0537	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Actinium-227	pCi/g	<1.33	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Actinium-228	pCi/g	.608		0.118	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Americium-241	pCi/g	<.16	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Antimony-124	pCi/g	<.0207	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Antimony-125	pCi/g	<.0563	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Antimony-126	pCi/g	<.0166	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Argon-41	pCi/g	<.0647	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Barium-133	pCi/g	<.0285	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Barium-140	pCi/g	<.0668	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Beryllium-7	pCi/g	1.6		0.287	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Bismuth-207	pCi/g	<.026	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Bismuth-212	pCi/g	.53		0.241	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Bismuth-214	pCi/g	.6		0.0849	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cerium-139	pCi/g	<.023	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cerium-144	pCi/g	<.171	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cesium-134	pCi/g	<.0186	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cesium-137	pCi/g	.0797		0.029	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Chromium-51	pCi/g	<.192	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cobalt-56	pCi/g	<.0342	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cobalt-57	pCi/g	<.0221	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cobalt-58	pCi/g	<.0205	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Cobalt-60	pCi/g	<.0304	U	999.9999	196	SOIL

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Copper-64	pCi/g	<7.94	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Europium-152	pCi/g	<.0667	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Europium-154	pCi/g	<.0813	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Europium-155	pCi/g	<.109	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Gadolinium-153	pCi/g	<.0671	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Indium-115M	pCi/g	<.0659	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Iodine-125	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Iodine-129	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Iodine-131	pCi/g	<.0205	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Iridium-192	pCi/g	<.0224	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Iron-59	pCi/g	<.0454	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Lanthanum-140	pCi/g	<.0136	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Lead-210	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Lead-212	pCi/g	.671		0.0543	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Lead-214	pCi/g	.608		0.0841	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Manganese-54	pCi/g	<.0295	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Manganese-56	pCi/g	<.07	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Mercury-203	pCi/g	<.0242	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Neptunium-237	pCi/g	<.226	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Niobium-95	pCi/g	<.0813	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Plutonium-239	pCi/g	<340	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Potassium-40	pCi/g	13.3		0.861	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Protactinium-231	pCi/g	<.844	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Protactinium-233	pCi/g	<.0425	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Radium-224	pCi/g	1.7		0.926	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Radium-226	pCi/g	1.67		0.739	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Radium-228	pCi/g	.674		0.131	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Ruthenium-103	pCi/g	<.0174	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Ruthenium-106	pCi/g	<.155	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Scandium-46	pCi/g	<.0238	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Silver-110	pCi/g	<.0211	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Sodium-22	pCi/g	<.0273	U	999.9999	196	SOIL

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Sodium-24	pCi/g	<.0258	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Strontium-85	pCi/g	<.021	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Tantalum-182	pCi/g	<.147	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Tellurium-123M	pCi/g	<.0229	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thallium-201	pCi/g	<.186	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thallium-208	pCi/g	.557		0.131	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thorium-227	pCi/g	<.173	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thorium-228	pCi/g	.668		0.0541	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thorium-229	pCi/g	<.0932	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thorium-231	pCi/g	<.449	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thorium-232	pCi/g	.674		0.131	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Thorium-234	pCi/g	1.85		0.637	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Tin-113	pCi/g	<.0267	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Uranium-234	pCi/g	<13.5	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Uranium-235	pCi/g	<.048	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Uranium-238	pCi/g	1.85		0.635	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	enon-133,-133M	pCi/g	<.105	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Yttrium-88	pCi/g	<.0235	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Zinc-65	pCi/g	<.0612	U	999.9999	196	SOIL
TA3/5-196-SS-B2	SNL0130688	F	10-OCT-94	0	Zirconium-95	pCi/g	<.0398	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Actinium-227	pCi/g	<2.04	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Actinium-228	pCi/g	.756		0.212	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Americium-241	pCi/g	<.224	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Antimony-124	pCi/g	<.0291	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Antimony-125	pCi/g	<.0744	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Antimony-126	pCi/g	<.0289	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Argon-41	pCi/g	<.163	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Barium-133	pCi/g	<.0395	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Barium-140	pCi/g	<.104	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Beryllium-7	pCi/g	2.72		0.487	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Bismuth-207	pCi/g	<.0412	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Bismuth-212	pCi/g	.84		0.384	196	SOIL

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Bismuth-214	pCi/g	.548		0.104	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cadmium-109	pCi/g	<1.15	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cerium-139	pCi/g	<.0325	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cerium-144	pCi/g	<.251	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cesium-134	pCi/g	<.0309	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cesium-137	pCi/g	.0974		0.0568	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Chromium-51	pCi/g	<.261	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cobalt-56	pCi/g	<.0581	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cobalt-57	pCi/g	<.0331	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cobalt-58	pCi/g	<.033	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Cobalt-60	pCi/g	<.0491	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Copper-64	pCi/g	<12	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Europium-152	pCi/g	<.0996	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Europium-154	pCi/g	<.119	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Europium-155	pCi/g	<.147	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Gadolinium-153	pCi/g	<.0981	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Indium-115M	pCi/g	<.112	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Iodine-125	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Iodine-129	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Iodine-131	pCi/g	<.0311	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Iridium-192	pCi/g	<.0316	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Iron-59	pCi/g	<.0583	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Lanthanum-140	pCi/g	<.0325	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Lead-210	pCi/g	<0	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Lead-212	pCi/g	.654		0.0773	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Lead-214	pCi/g	.575		0.136	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Manganese-54	pCi/g	<.0332	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Manganese-56	pCi/g	<.159	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Mercury-203	pCi/g	<.0341	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Neptunium-237	pCi/g	<.308	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Niobium-95	pCi/g	<.115	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Plutonium-239	pCi/g	<476	U	999.9999	196	SOIL

ER Site 196 RFI Analytical Results; Gamma Spectroscopy

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Units	Amount Detected	QC Flag	Uncertainty (+/-)	ER Site	Material Description
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Potassium-40	pCi/g	12		1.11	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Protactinium-231	pCi/g	<1.27	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Protactinium-233	pCi/g	<.0679	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Radium-224	pCi/g	1.1		1.11	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Radium-226	pCi/g	1.06		1.09	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Radium-228	pCi/g	.838		0.235	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Ruthenium-103	pCi/g	<.0301	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Ruthenium-106	pCi/g	<.236	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Scandium-46	pCi/g	<.0304	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Silver-110	pCi/g	<.0281	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Sodium-22	pCi/g	<.0326	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Sodium-24	pCi/g	<.0267	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Strontium-85	pCi/g	<.0272	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Tantalum-182	pCi/g	<.264	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Tellurium-123M	pCi/g	<.0327	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thallium-201	pCi/g	<.289	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thallium-208	pCi/g	.523		0.172	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thorium-227	pCi/g	<.239	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thorium-228	pCi/g	.651		0.077	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thorium-229	pCi/g	<.139	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thorium-231	pCi/g	<.602	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thorium-232	pCi/g	.838		0.235	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Thorium-234	pCi/g	<.859	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Tin-113	pCi/g	<.0417	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Uranium-234	pCi/g	<18.5	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Uranium-235	pCi/g	<.0654	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Uranium-238	pCi/g	<.856	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	enon-133,-133M	pCi/g	<.172	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Yttrium-88	pCi/g	<.037	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Zinc-65	pCi/g	<.0674	U	999.9999	196	SOIL
TA3/5-196-SS-B3	SNL0130689	F	10-OCT-94	0	Zirconium-95	pCi/g	<.0637	U	999.9999	196	SOIL

ER Site 196 RFI Analytical Results for Soil Samples; Metals (EPA Method 6010)

ER Sample ID	Sample Number	Sample Type	Sample Date	Sample Depth (Feet)	Analyte	Analytical Method	Units	Amount Detected	QC Flag	Material Description
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Antimony	6010	mg/kg	<6	U	WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Arsenic	6010	mg/kg	.56	J	WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Barium	6010	mg/kg	87.3		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Beryllium	6010	mg/kg	.25		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Cadmium	6010	mg/kg	2.5		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Calcium	6010	mg/kg	14700		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Chromium	6010	mg/kg	14.8		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Cobalt	6010	mg/kg	5.8		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Copper	6010	mg/kg	213		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Iron	6010	mg/kg	8750		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Lead	6010	mg/kg	180		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Magnesium	6010	mg/kg	2640		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Manganese	6010	mg/kg	111		WASTE
TA3/5-196-CISTERN	SNL0130409	F	27-JUN-94	0	Mercury	7471	mg/kg	<.1	U	WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Nickel	6010	mg/kg	17.8		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Potassium	6010	mg/kg	859		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Selenium	6010	mg/kg	<.5	U	WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Silver	6010	mg/kg	2.9		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Sodium	6010	mg/kg	144	J	WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Thallium	6010	mg/kg	<1	U	WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Vanadium	6010	mg/kg	13.8		WASTE
TA3/5-196-CISTERN	SNL0130408	F	27-JUN-94	0	Zinc	6010	mg/kg	458	B	WASTE
TA3/5-196-RO-1	030375-01	F	23-MAY-95		Lead	T-6010	mg/L	<.1	U	SOIL
TA3/5-196-RO-2	030675-01	F	23-MAY-95		Lead	T-6010	mg/L	<.25	U	SOIL

Sandia National Laboratories SNL/NM 016480

SNL/NM 016479

01-SCL (12-93)

ENVIRONMENTAL PROGRAMS
SAMPLE COLLECTION LOG

SCL- 00624

AR/COC No.: AR/COC- 00350

PAGE 1 OF 1

GENERAL INFORMATION

DATE: 6-27-94 WEATHER: CLEAR 80-90

SAMPLING PROCEDURE REFERENCE: TA 3/5 RFI SAP

PURPOSE OF SAMPLING: PHASE I RFI

SAMPLING INFORMATION

ON-SITE CONTACT: PAULA SLAVIN ORG. 7582 PHONE 848-0334

AREA: TA 5 LOCATION: SITE 196 - Bldg 6597 CISTERN

SAMPLE DESCRIPTION

MATRIX: ☐ GAS ☐ LIQUID ☑ SLUDGE ☐ SOLID ☐ WATER ☐ OIL ☐ SOIL ☐ HAZ WASTE ☐ OTHER

COLLECTED FROM: ☐ DRUM ☑ TANK ☐ SURFACE WATER ☐ SOIL ☐ WASTE WATER ☐ GROUND WATER ☐ OTHER CISTERN

Sample Number - Fraction (SNL/NM)	Time	LOCATION	COMMENTS	Sample Type Grab/Comp.	QC Sample (Y/N)	VOC (8240)	PCBs (8080)	TPH (418.1)	TAL METALS (6010/7000)
016479-1	1035	SITE 196 - CISTERN	soil sediment, oil odor, DK Brown,	G	N	X			
016479-2	1035	↓ ↓	oilly SAND	G	N		X	X	X
016480-1	1045	N/A	TRIP BLANK HAS AIR BUBBLE WATER MATRIX	NA	Y	X			
		LAST LINE							

PROJECT

PROJECT NAME: TA 3/5 - SITE 196 CASE NUMBER: 3617.300 PROJECT CONTACT: PAULA SLAVIN ORG. 7582 PHONE 848-0334

ADDITIONAL INFORMATION: (Log Book Ref. #)

PROJECT No: 301455.152.02

SAMPLE TEAM MEMBERS

	NAME	SIGNATURE	INIT	COMPANY/ORGANIZATION
1.	Tim Jackson	Tim Jackson	TJ	IT CORP
2.	NELSON CAPITAN	[signature]	NC	SNL/NM 7584
3.				

SAMPLE TRACKING

SAMPLE DISTRIBUTION: ENSECO/EMAL

DATE SHIPPED (MM-DD-YY): 6/27/94

TRANSPORTED BY: A44337

DATA ENTERED (MM-DD-YY): 6/29/94

SPECIAL HANDLING:

BY:

*NOTE: Any additional sampling information must be recorded in an SNL-Issued Log Book or SCL Continuation Form with a Reference No. entered in this space.

WHITE - To Sample Management Office PINK- Originator

☐ TO BE COMPLETED BY SMO

Sandia National Laboratories SNL/NM 016477

ENVIRONMENTAL PROGRAMS SAMPLE COLLECTION LOG

SCL- 00621

01-SCL (12-93)

AR/COC No.: AR/COC- ~~00347~~ 00350

PAGE 1 OF 1

GENERAL INFORMATION

DATE: 6-27-94 WEATHER: CLEAR 80-90

SAMPLING PROCEDURE REFERENCE: TA 3/5 RFI SAP

PURPOSE OF SAMPLING: PHASE I RFI

SAMPLING INFORMATION: ON-SITE CONTACT: PAULA SLAVIN; ORG. 7582; PHONE 848-0334; AREA TA 3; LOCATION SITE 241 - SALAGE YARD

SAMPLE DESCRIPTION

MATRIX: ☐ GAS ☐ LIQUID ☐ SLUDGE ☐ SOLID ☐ WATER ☐ OIL ☑ SOIL ☐ HAZ WASTE ☐ OTHER

COLLECTED FROM: ☐ DRUM ☐ TANK ☐ SURFACE WATER ☑ SOIL ☐ WASTE WATER ☐ GROUND WATER ☐ OTHER

Sample Number - Fraction NC/NM	Time	LOCATION	COMMENTS	Sample Type Grab/Comp.	QC Sample (Y/N)	ANALYSES: Explosive Residue (8330)
016476-1	0925	241-SS-02	SURFACE SAMPLE	G	N	X
016477-1	0926	↓ ↓ -10	↓	G	N	X
016478-1	0927	↓ ↓ -15	↓	G	N	X
		LAST LINE				

PROJECT — PROJECT NAME: TA 3/5 - SITE 241; CASE NUMBER: 3617.300; PROJECT CONTACT: PAULA SLAVIN; ORG. 7582; PHONE 848-0334

ADDITIONAL INFORMATION: RESAMPLE FOR EXPLOSIVE RESIDUE

(Log Book Ref. #) PROJECT NO: 301455.152.02

SAMPLE TEAM MEMBERS

	NAME	SIGNATURE	INIT	COMPANY/ORGANIZATION
1.	Tim Jackson	Tim Jackson	TJ	IT CORP
2.	NELSON CAPITAN	Nel Cap	NC	SNL/NM 7584
3.				

SAMPLE TRACKING

SAMPLE DISTRIBUTION: ENSECO/RMAL

DATE SHIPPED (MM-DD-YY): 6-27-94

TRANSPORTED BY: A44337

DATA ENTERED (MM-DD-YY):

SPECIAL HANDLING:

BY:

*NOTE: Any additional sampling information must be recorded in an SNL-Issued Log Book or SCL Continuation Form with a Reference No. entered in this space.

☐ TO BE COMPLETED BY SMO

WHITE - To Sample Management Office PINK- Originator

Enseco

RECEIVED
AUG 02 1994
SNL/SMO

July 29, 1994

Mr. Jim Fish
c/o Ms. Katherine M. Becker
Sandia National Laboratory SMO
Organization 7576, Mail Stop 1305
BDM Building
2301 Buena Vista SE
Albuquerque, NM 87106

Dear Mr. Fish:

Enclosed is the report for three soil samples, two sludge samples and one aqueous sample received at Quanterra Environmental Services, Denver (formerly Enseco-Rocky Mountain Analytical Laboratory) on June 28, 1994. Included with the report is a quality control summary.

Please call if you have any questions.

Sincerely,

Ellen La Riviere

Ellen La Riviere
Program Administrator

EL
Enclosures

Quanterra #036545

DATA REVIEWED
By: Buissont Date: 8/20/94
Checked: ____________________
Approved: ____________________

Enseco
4955 Yarrow Street
Arvada, Colorado 80002

ANALYTICAL RESULTS

FOR

SANDIA NATIONAL LABORATORY

QUANTERRA ENVIRONMENTAL SERVICES, DENVER

PROJECT NUMBER 036545

JULY 29, 1994

Enseco

Reviewed by: Ellen La Riviere

Ellen La Riviere

Enseco
4955 Yarrow Street
Arvada, Colorado 80002

I. OVERVIEW

On June 28, 1994, Quanterra Environmental Services, Denver (formerly Enseco-Rocky Mountain Analytical Laboratory) received three soil samples, two sludge samples and one aqueous sample from Sandia National Laboratory.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

I. Overview
II. Sample Description Information/Analytical Test Requests
III. Analytical Results
IV. Quality Control Report

"J" values have been reported for the volatiles, semivolatiles, and metals analyses. A "J" value indicates an estimated value. For Methods 8240 and 8270 a "J" value is where the mass spectra data indicate the presence of a compound which meets identification criteria; however, the result is less than the reporting limit but greater than the method detection limit (MDL). For metals analyses "J" values are reported for those analytes which lie between the instrument detection limit (IDL) and the Quanterra reporting limit. Analytes which were not detected at or below the reporting limit are reported as "ND" and do not have "J" flags. Because "J values" may represent false positive concentrations, care should be used when interpreting these data.

Organic Data Review

The explosives analyses were performed at Quanterra Environmental Services located in West Sacramento, California.

Quanterra sample 036545-0005-SA had low Method 8080 decachlorobiphenyl surrogate recovery due to matrix interferences.

Metals Data Review

The Method 6010 QC lot 20 JUL 94-9D shows zinc preparation blank contamination. Because the concentration of zinc detected in Quanterra sample 036545-0005-SA was greater than ten times the concentration detected in the blank, no further action was required and the data was accepted.

Wet Chemistry Data Review

Each sample was analyzed to achieve the lowest possible reporting limits within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For diluted samples, the reporting limits have been adjusted relative to the dilution required. Quanterra sample 036545-0005-SA was analyzed at a dilution for total petroleum hydrocarbon analysis due to the concentration of the target analyte present in the sample.

II. SAMPLE DESCRIPTION INFORMATION/ANALYTICAL TEST REQUESTS

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Quanterra Environmental Services, Denver is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Sandia National Laboratory

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
036545-0001-SA	SNL/NM016476-1	SOIL	27 JUN 94	09:25	28 JUN 94
036545-0002-SA	SNL/NM016477-1	SOIL	27 JUN 94	09:26	28 JUN 94
036545-0003-SA	SNL/NM016478-1	SOIL	27 JUN 94	09:27	28 JUN 94
036545-0004-SA	SNL/NM016479-1	WASTE	27 JUN 94	10:35	28 JUN 94
036545-0005-SA	SNL/NM016479-2	WASTE	27 JUN 94	10:35	28 JUN 94
036545-0006-TB	SNL/NM016480-1	AQUEOUS	27 JUN 94	10:45	28 JUN 94

ANALYTICAL TEST REQUESTS
for
Sandia National Laboratory

Lab ID: 036545	Group Code	Analysis Description	Custom Test?
0001 - 0003	A	Explosives by HPLC - Low Level	N
		Prep - Explosives by HPLC - Low Level	N
0004	B	TCL Volatile Organics	Y
		Prep - Prelim. GC Screen for Volatile Organics	N
0005	C	Prep - PCBs by GC	N
		TAL Metals done by ICP	N
		Prep - Total Metals, ICP	N
		ICP Metals (Total) by Trace ICP	Y
		PCBs	N
		Mercury, Cold Vapor AA	N
		Prep - Mercury, Cold Vapor AA	N
		Total Petroleum Hydrocarbons (TPH), IR	N
0006	D	Volatile Organics	Y
		Target Compound List (TCL)	Y
		Screen - Volatile Organics	N

III. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization date is the date when the project was defined by the client such that laboratory work could begin. The date prepared is typically the date an extraction or digestion was initiated. For volatile organic compounds in water, the date prepared is the date the screening of the sample was performed.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Quanterra reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e., no correction is made for moisture content.

IV. QUALITY CONTROL REPORT

Quanterra laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data;

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix;

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench; and

4) provide a standard set of reportables which assures the client of the quality of his data.

Quanterra's QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with surrogate compounds appropriate to the method being used. In cases where no surrogate is available, (e.g., metals or conventional analyses) a single DCS serves as the control sample. An SCS is prepared for each sample lot for which the DCS pair are not analyzed. The recovery of the SCS is charted in exactly the same manner as described for the DCS, and provides a daily check on the performance of the method.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\%\ \text{Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\left|\text{Measured Concentration DCS1} - \text{Measured Concentration DCS2}\right|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

⁻C LOT ASSIGNMENT REPORT
olatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
036545-0004-SA	SOIL	8240-S	08 JUL 94-A	08 JUL 94-A
036545-0006-TB	AQUEOUS	624-A	08 JUL 94-L	08 JUL 94-L

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Category: 8240-S
Matrix: SOIL
QC Lot: 08 JUL 94-A
Concentration Units: ug/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	5000	4320	4810	4560	91	44-148	11	17
Trichloroethene	5000	4790	4960	4880	98	71-134	3.5	13
Benzene	5000	4810	5190	5000	100	64-128	7.6	12
Toluene	5000	4600	4770	4680	94	66-123	3.6	13
Chlorobenzene	5000	4700	5040	4870	97	74-131	7.0	12

Category: 624-A
Matrix: AQUEOUS
QC Lot: 08 JUL 94-L
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
1,1-Dichloroethene	50.0	45.7	41.7	43.7	87	74-124	9.2	17
Trichloroethene	50.0	45.7	42.8	44.2	89	77-119	6.6	13
Benzene	50.0	43.9	41.0	42.4	85	80-117	6.8	12
Toluene	50.0	42.0	40.5	41.2	83	80-119	3.6	[illegible]
Chlorobenzene	50.0	44.2	41.2	42.7	85	81-120	7.0	[illegible]

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 8240-S Matrix: SOIL QC Lot: 08 JUL 94-A QC Run: 08 JUL 94-A Concentration Units: ug/kg				
1,2-Dichloroethane-d4	5000	5200	104	70-121
4-Bromofluorobenzene	5000	4650	93	77-121
Toluene-d8	5000	5030	101	81-117
Category: 624-A Matrix: AQUEOUS QC Lot: 08 JUL 94-L QC Run: 08 JUL 94-L Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	46.4	93	85-111
4-Bromofluorobenzene	50.0	49.4	99	86-110
Toluene-d8	50.0	48.7	97	91-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 8240-TCL-W
Matrix: WASTE
QC Lot: 08 JUL 94-A QC Run: 08 JUL 94-A

Analyte	Result	Units	Reporting Limit	
Chloromethane	ND	mg/kg	1.0	
Bromomethane	ND	mg/kg	1.0	
Vinyl chloride	ND	mg/kg	1.0	
Chloroethane	ND	mg/kg	1.0	
Methylene chloride	0.26	mg/kg	0.50	J
Acetone	ND	mg/kg	1.0	
Carbon disulfide	ND	mg/kg	0.50	
1,1-Dichloroethene	ND	mg/kg	0.50	
1,1-Dichloroethane	ND	mg/kg	0.50	
1,2-Dichloroethene (cis/trans)	ND	mg/kg	0.50	
Chloroform	ND	mg/kg	0.50	
1,2-Dichloroethane	ND	mg/kg	0.50	
2-Butanone	ND	mg/kg	1.0	
1,1,1-Trichloroethane	ND	mg/kg	0.50	
Carbon tetrachloride	ND	mg/kg	0.50	
Vinyl acetate	ND	mg/kg	1.0	
Bromodichloromethane	ND	mg/kg	0.50	
1,2-Dichloropropane	ND	mg/kg	0.50	
cis-1,3-Dichloropropene	ND	mg/kg	0.50	
Trichloroethene	ND	mg/kg	0.50	
Dibromochloromethane	ND	mg/kg	0.50	
1,1,2-Trichloroethane	ND	mg/kg	0.50	
Benzene	ND	mg/kg	0.50	
trans-1,3-Dichloropropene	ND	mg/kg	0.50	
Bromoform	ND	mg/kg	0.50	
4-Methyl-2-pentanone	ND	mg/kg	1.0	
2-Hexanone	ND	mg/kg	1.0	
1,1,2,2-Tetrachloroethane	ND	mg/kg	0.50	
Tetrachloroethene	ND	mg/kg	0.50	
Toluene	ND	mg/kg	0.50	
Chlorobenzene	ND	mg/kg	0.50	
Ethylbenzene	ND	mg/kg	0.50	
Styrene	ND	mg/kg	0.50	
Xylenes (total)	ND	mg/kg	0.50	
Dichlorodifluoromethane	ND	mg/kg	0.50	
Trichlorofluoromethane	ND	mg/kg	2.0	
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	mg/kg	0.50	

J = Result is detected below the reporting limit or is an estimated concentration.

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METHOD BLANK REPORT
Volatile Organics by GC/MS (cont.)

Test: 8240CP-TCL-AP
Matrix: AQUEOUS
QC Lot: 08 JUL 94-L   QC Run: 08 JUL 94-L

Analyte	Result	Units	Reporting Limit	
Acetone	ND	ug/L	10	
Benzene	ND	ug/L	5.0	
Bromodichloromethane	ND	ug/L	5.0	
Bromoform	ND	ug/L	5.0	
Bromomethane	ND	ug/L	10	
2-Butanone (MEK)	ND	ug/L	10	
Carbon disulfide	ND	ug/L	5.0	
Carbon tetrachloride	ND	ug/L	5.0	
Chlorobenzene	ND	ug/L	5.0	
Chloroethane	ND	ug/L	10	
Chloroform	ND	ug/L	5.0	
Chloromethane	ND	ug/L	10	
Dibromochloromethane	ND	ug/L	5.0	
1,1-Dichloroethane	ND	ug/L	5.0	
1,2-Dichloroethane	ND	ug/L	5.0	
1,1-Dichloroethene	ND	ug/L	5.0	
1,2-Dichloroethene (total)	ND	ug/L	5.0	
1,2-Dichloropropane	ND	ug/L	5.0	
cis-1,3-Dichloropropene	ND	ug/L	5.0	
trans-1,3-Dichloropropene	ND	ug/L	5.0	
Ethylbenzene	ND	ug/L	5.0	
2-Hexanone	ND	ug/L	10	
Methylene chloride	2.5	ug/L	5.0	J
4-Methyl-2-pentanone (MIBK)	ND	ug/L	10	
Styrene	ND	ug/L	5.0	
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0	
Tetrachloroethene	ND	ug/L	5.0	
Toluene	ND	ug/L	5.0	
1,1,1-Trichloroethane	ND	ug/L	5.0	
1,1,2-Trichloroethane	ND	ug/L	5.0	
Trichloroethene	ND	ug/L	5.0	
Vinyl acetate	ND	ug/L	10	
Vinyl chloride	ND	ug/L	10	
Xylenes (total)	ND	ug/L	5.0	
Dichlorodifluoromethane	ND	ug/L	20	
Trichlorofluoromethane	ND	ug/L	5.0	
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	ug/L	5.0	

J = Result is detected below the reporting limit or is an estimated concentration.

Enseco

QC LOT ASSIGNMENT REPORT
Organics by Chromatography

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
036545-0001-SA	SOIL	8330-LL-S	06 JUL 94-7A	06 JUL 94-7A
036545-0002-SA	SOIL	8330-LL-S	06 JUL 94-7A	06 JUL 94-7A
036545-0003-SA	SOIL	8330-LL-S	06 JUL 94-7A	06 JUL 94-7A

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DUPLICATE CONTROL SAMPLE REPORT
Organics by Chromatography

Category: 8330-LL-S
Matrix: SOIL
QC Lot: 06 JUL 94-7A
Concentration Units: ug/g

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
HMX	1.00	0.894	0.940	0.917	92	82-153	5.0	10
RDX	1.00	0.835	0.873	0.854	85	62-176	4.4	17
1,3,5-Trinitrobenzene	1.00	0.686	0.724	0.705	71	60-149	5.4	19
1,3-Dinitrobenzene	1.00	0.867	0.900	0.884	88	73-145	3.7	10
Tetryl	1.00	0.282	0.287	0.284	28	1-115	1.8	50
Nitrobenzene	1.00	0.882	0.887	0.884	88	73-135	0.6	10
2,4,6-Trinitrotoluene	1.00	0.965	0.993	0.979	98	1-160	2.9	15
4-Amino-2,6-dinitrotoluene	1.00	0.954	0.963	0.958	96	84-181	0.9	22
2-Amino-4,6-dinitrotoluene	1.00	0.927	0.957	0.942	94	82-140	3.2	14
2,6-Dinitrotoluene	1.00	0.851	0.868	0.860	86	85-120	2.0	10
2,4-Dinitrotoluene	1.00	0.967	0.995	0.981	98	78-133	2.9	10
2-Nitrotoluene	1.00	0.928	0.909	0.918	92	81-126	2.1	10
4-Nitrotoluene	1.00	0.913	0.875	0.894	89	79-125	4.3	10
3-Nitrotoluene	1.00	0.851	0.851	0.851	85	78-131	0.0	10

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Organics by Chromatography

Test: 8330-COE-LL-S
Matrix: SOIL
QC Lot: 06 JUL 94-7A QC Run: 06 JUL 94-7A

Analyte	Result	Units	Reporting Limit
HMX	ND	ug/g	2.2
RDX	ND	ug/g	1.0
1,3,5-Trinitrobenzene	ND	ug/g	0.25
1,3-Dinitrobenzene	ND	ug/g	0.25
Tetryl	ND	ug/g	0.25
Nitrobenzene	ND	ug/g	0.65
2,4,6-Trinitrotoluene	ND	ug/g	0.26
4-Amino-2,6-dinitrotoluene	ND	ug/g	0.25
2-Amino-4,6-dinitrotoluene	ND	ug/g	0.25
2,6-Dinitrotoluene	ND	ug/g	0.25
2,4-Dinitrotoluene	ND	ug/g	0.26
2-Nitrotoluene	ND	ug/g	0.25
4-Nitrotoluene	ND	ug/g	0.25
3-Nitrotoluene	ND	ug/g	0.25

Enseco

QC LOT ASSIGNMENT REPORT
emivolatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
036545-0005-SA	SOIL	PCB-S	30 JUN 94-N1	30 JUN 94-N1

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: PCB-S Matrix: SOIL QC Lot: 30 JUN 94-N1 Concentration Units: ug/kg								
Aroclor 1254	33.3	34.2	29.1	31.6	95	49-130	16	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Semivolatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8080-PCB-SAN-S			
Matrix: WASTE			
QC Lot: 30 JUN 94-N1 QC Run: 30 JUN 94-N1			
Aroclor 1016	ND	ug/kg	33
Aroclor 1221	ND	ug/kg	33
Aroclor 1232	ND	ug/kg	33
Aroclor 1242	ND	ug/kg	33
Aroclor 1248	ND	ug/kg	33
Aroclor 1254	ND	ug/kg	33
Aroclor 1260	ND	ug/kg	33

Enseco

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
036545-0005-SA	SOIL	ICP-S	20 JUL 94-9D	20 JUL 94-9D
036545-0005-SA	SOIL	ICP-TRA-S	20 JUL 94-9D	20 JUL 94-9D
036545-0005-SA	SOIL	HG-CVAA-S	20 JUL 94-9A	20 JUL 94-9A

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Category: ICP-S
Matrix: SOIL
QC Lot: 20 JUL 94-9D
Concentration Units: mg/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Aluminum	200	189	191	190	95	80-120	1.3	20
Antimony	50	49.7	51.5	50.6	101	80-120	3.7	20
Arsenic	50	46.4	47.4	46.9	94	80-120	2.3	20
Barium	200	189	190	189	95	80-120	0.4	20
Beryllium	5.0	4.93	5.02	4.97	99	80-120	1.8	20
Cadmium	5.0	4.59	4.72	4.66	93	80-120	2.7	20
Calcium	10000	9560	9630	9600	96	80-120	0.8	20
Chromium	20	19.6	19.4	19.5	98	80-120	1.0	20
Cobalt	50	48.7	48.7	48.7	97	80-120	0.0	20
Copper	25	24.3	25.0	24.6	99	80-120	2.6	20
Iron	100	90.4	90.9	90.7	91	80-120	0.6	20
Lead	50	47.6	46.9	47.2	94	80-120	1.5	20
Magnesium	5000	4850	4920	4890	98	80-120	1.3	20
Manganese	50	48.8	49.3	49.1	98	80-120	1.0	20
Nickel	50	47.1	47.5	47.3	95	80-120	0.8	20
Potassium	5000	4440	4540	4490	90	80-120	2.2	20
ilver	5	4.74	4.82	4.78	96	80-120	1.8	20
odium	10000	9830	9990	9910	99	80-120	1.6	20
Vanadium	50	46.3	46.6	46.5	93	80-120	0.5	20
Zinc	50	46.3	47.4	46.9	94	80-120	2.3	20

Category: ICP-TRA-S
Matrix: SOIL
QC Lot: 20 JUL 94-9D
Concentration Units: mg/kg

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Antimony	50.0	53.4	54.4	53.9	108	80-120	1.8	20
Arsenic	50.0	51.8	52.6	52.2	104	80-120	1.6	20
Cadmium	5.00	5.79	5.89	5.84	117	80-120	1.8	20
Lead	50.0	55.7	57.1	56.4	113	80-120	2.4	20
Selenium	50.0	48.7	49.0	48.8	98	80-120	0.5	20
Thallium	50.0	57.4	58.2	57.8	116	80-120	1.4	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: HG-CVAA-S Matrix: SOIL QC Lot: 20 JUL 94-9A Concentration Units: mg/kg								
Mercury	0.50	0.484	0.431	0.457	91	75-125	11	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Metals Analysis and Preparation

Test: ICP-TAL-W
Matrix: WASTE
QC Lot: 20 JUL 94-9D QC Run: 20 JUL 94-9D

Analyte	Result	Units	Reporting Limit
Aluminum	ND	mg/kg	10.0
Antimony	ND	mg/kg	6.0
Barium	ND	mg/kg	1.0
Beryllium	ND	mg/kg	0.20
Cadmium	ND	mg/kg	0.50
Calcium	ND	mg/kg	20.0
Chromium	ND	mg/kg	1.0
Cobalt	ND	mg/kg	1.0
Copper	ND	mg/kg	2.0
Iron	ND	mg/kg	10.0
Magnesium	ND	mg/kg	20.0
Manganese	ND	mg/kg	1.0
Nickel	ND	mg/kg	4.0
Potassium	ND	mg/kg	500
Silver	ND	mg/kg	1.0
Sodium	ND	mg/kg	500
Vanadium	ND	mg/kg	1.0
Zinc	2.7	mg/kg	2.0

Test: ICP-TRACE-W
Matrix: WASTE
QC Lot: 20 JUL 94-9D QC Run: 20 JUL 94-9D

Analyte	Result	Units	Reporting Limit
Arsenic	ND	mg/kg	1.0
Lead	ND	mg/kg	0.30
Selenium	ND	mg/kg	0.50
Thallium	ND	mg/kg	1.0

Test: HG-CVAA-S
Matrix: WASTE
QC Lot: 20 JUL 94-9A QC Run: 20 JUL 94-9A

Analyte	Result	Units	Reporting Limit
Mercury	ND	mg/kg	0.10

Enseco

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
036545-0005-SA	SOIL	TPH-IR-S	06 JUL 94-6A	06 JUL 94-6A

Enseco

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: TPH-IR-S Matrix: SOIL QC Lot: 06 JUL 94-6A Concentration Units: mg/kg								
Total Petroleum Hydrocarbons	1450	1390	1410	1400	97	75-123	1.1	17

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TPH-IR-W			
Matrix: WASTE			
QC Lot: 06 JUL 94-6A QC Run: 06 JUL 94-6A			
Total Petroleum Hydrocarbons	ND	mg/kg	20.0

RSI

U.S. Department of Energy
Albuquerque Operations Office
Kirtland Area Office
P.O. Box 5400
Albuquerque, NM 87185-5400

NOV 06 2000

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. John Kieling, Manager
RCRA Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2044 Galisteo Street
P.O. Box 26110
Santa Fe, NM 87505-2100

Dear Mr. Kieling:

Enclosed is one of two NMED copies of the Department of Energy (DOE) and Sandia National Laboratories/New Mexico (SNL/NM) response to NMED's Request for Supplemental Information (RSI) on the Responses to the 2nd Notice of Deficiency (NOD) on the Technical Areas III and V Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) With Specific Comments on the Solid Waste Management Unit (SWMU) 36.

The response includes cross-sections and a volume estimate of the mineral oil plume, complete data tables, a risk assessment, and discussions on remedial options for SWMU 36. The response also includes a summary of the negotiations with NMED on nine other SWMUs within Technical Areas (TAs) 3 and 5. These negotiations were based on the additional information and/or investigation requested in the 2nd NOD received from NMED on the RFI report for TAs 3 and 5 originally submitted in June 1996.

NOV 06 2000 MJ Brenda (compliance data base item)

If you have any questions, please contact John Gould at (505) 845-6089.

Sincerely,

George K. Laskan

Michael J. Zamorski
for Area Manager

Enclosure

cc w/enclosure:
D. Bourne, AL, ERD
J. Parker, NMED-OB
R. Kennett, NMED-OB
W. Moats, NMED-HWB (via Certified Mail)
D. Neleigh, EPA, Region 6 (2 copies-via Certified Mail)

cc w/o enclosure:
J. Cormier, KAO/AIP
F. Nimick, SNL, MS 1087
S, Collins, SNL, MS 1087
A. Lai, SNL, MS 1087
J. Bearzi, NMED-HWB
S. Dinwiddie, NMED-HWB

NOV 7 2000

Sandia National Laboratories
Albuquerque, New Mexico
November 2000

Environmental Restoration Project
Responses to NMED Request for Supplemental Information on Responses to 2nd Notice of Deficiency on the Technical Areas III and V RCRA Facility Investigation Dated June 1996

INTRODUCTION

This document responds to comments received in a letter from the State of New Mexico Environment Department (NMED) to the U.S. Department of Energy (DOE) and Sandia National Laboratories/New Mexico (SNL/NM) (NMED May 2000) documenting the review responses for 21 Solid Waste Management Units (SWMUs) included in a July 1998 2nd Notice of Deficiency (NOD) on the Results of the Technical Areas (TAs) III and V Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI).

The following 10 SWMUs from Operable Unit (OU) 1306 are included in this Request for Supplemental Information (RSI) response package:

- OU 1306
  - SWMU 18, Concrete Pad
  - SWMU 26, Long Sled Track Burial Site
  - SWMU 35, Vibration Facility Oil Spill
  - SWMU 36, HERMES Oil Spill
  - SWMU 78, Gas Cylinder Disposal Pit
  - SWMU 100, Building 6620 HE Drain/Sump

- SWMU 107, Explosives Test Area
- SWMU 111, Building 6715 Sump/Drain
- SWMU 196, Building 6597 Cistern
- SWMU 241, Storage Yard

This response document is organized on the first level by the type of comment (general or specific) and on the second level by SWMU number. Each OU section restates the NMED comments (in **bold** font) in the same order in which they were provided in the RSI. Following each comment, the word "Response" introduces the reply (in normal font style) of the DOE/SNL/NM. Responses to general comments begin on page 4. Responses to site-specific comments for SWMU 36 begin on page 8. Additional supporting information for the site-specific comments is included in the attachments to this RSI. Changes to previously submitted text, tables, or figures are labeled "Revised." Newly submitted information (including text, tables, and figures) is labeled "Supplemental."

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General Comments

SWMU 196, Building 6597 Cistern

This site requires additional information and/or investigation.

Response: The RFI report indicated trace levels of VOCs in the soil gas and soil samples as well as elevated petroleum hydrocarbons and some metals. The vertical extent of contamination could not be determined because of the difficult drilling conditions at this site. NMED/HWB requested that further investigation take place, including the collection and analysis of soil samples from deep boreholes to characterize the vertical extent of contamination. Because of the difficulty of drilling within the cistern, NMED/HWB agreed to the drilling of one vertical borehole along the outside of the cistern and an angled borehole to go beneath the cistern for site characterization. In 1999, two such boreholes were advanced at the site down to approximately 90 linear feet in the angled borehole and 100 feet bgs in the vertical borehole. In the vertical borehole, elevated total petroleum hydrocarbons (TPH) values were found from 25 to 35 feet bgs but quickly decreased to approximately 100 parts per million (ppm) from 35 to 100 feet bgs. Elevated TPH values were found throughout the angled borehole with the highest value (25,500 ppm) at 75 linear ft. No sample recovery was possible at 90 feet, leaving the vertical extent of the oil plume undetermined. The data for VOCs, SVOCs, and PCBs were rejected during data validation because of matrix interference from the oil contamination. The information was relayed to NMED/HWB at a meeting. It was agreed that the next course of action would be to solve the matrix interference problem with VOC, SVOC, and PCB analyses and to install a deeper borehole to establish the vertical extent of contamination and complete the site characterization. Because of budget constraints, the additional work for this site is currently scheduled for completion in FY 2003.

SWMU 241, Storage Yard

This site requires additional information and/or investigation.

Response: Negotiations with the NMED/HWB regarding this site were conducted in FY 1999, and an NFA addendum report summarizing the work that resulted from these negotiations is currently in preparation.

RSI

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

NOV 1 2 2004

CERTIFIED MAIL--RETURN RECEIPT REQUESTED

Mr. James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East, Building 1
Santa Fe, NM 87505

Dear Mr. Bearzi:

On behalf of the Department of Energy (DOE) and Sandia Corporation, DOE is submitting additional information to complete responses to the New Mexico Environment Department (NMED) for the Solid Waste Management Units (SWMUs) identified below:

OU 1303, SWMUs 1 and 3: This submittal documents the final backfilling of the Voluntary Corrective Measure excavation and provides a risk assessment. It is an addendum to the No Further Action (NFA) proposal of September 1997 and provides additional information in response to the three NMED Requests for Supplemental Information (RSIs) of January, June, and December 1999.

OU 1306, SWMU 78: This submittal completes the response to the NMED RSI of May 2000. It includes results of additional sampling, a geophysical survey, an NFA proposal, and a risk assessment.

OU 1306, SWMU 196: This submittal completes the response to the NMED RSI of May 2000. It includes the results of additional sampling, an NFA proposal, and a risk assessment.

OU 1309, SWMU 45: This submittal completes the response to the three NMED RSIs of January, June, and December 1999. It provides results of the additional requested fieldwork and evaluates newly identified information that was not available at the time of the initial response in September1999. It also includes a risk assessment.

OU 1309, SWMU 46: This submittal completes the response to the NMED Notice of Deficiency of October 1999 and provides the final results for the Voluntary Corrective Action (VCA) conducted at the site in 2003. In addition to the results of the VCA, it includes a risk assessment.

Review and analyses of all relevant data for these SWMUs indicate that concentrations of constituents of concern are lower than applicable risk assessment action levels. Based upon confirmatory sampling data, constituents of concern that could have been released from each site to the environment pose an acceptable level of risk under current and projected land use. Therefore, a determination of Corrective Action Complete without controls is recommended for all these SWMUs.

If you have any questions regarding this submittal, please contact John Gould of my staff at (505) 845-6089.

Sincerely,

Patty Wagner
Manager

Enclosures

cc w/enclosures:
W. Moats, NMED (Via Certified Mail)
M. Gardipe, DOE/SC/ERD
C. Voorhees, NMED-OB, Santa Fe
D. Bierley, NMED-OB

cc w/o enclosures:
L. King, EPA Region 6 (Via Certified Mail)
F. Nimick, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
C. Chocas, SNL, MS 1120
J. Copland, SNL, MS 1087
D. Miller, SNL, MS 1088
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
A. Blumberg, SNL, MS 0141

Sandia National Laboratories/New Mexico
Environmental Restoration Project

SUPPLEMENTAL RESPONSE AND PROPOSAL FOR NO FURTHER ACTION SOLID WASTE MANAGEMENT UNIT 196, BUILDING 6597 CISTERN

October 2004

United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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LIST OF ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

AEN	American Environmental Network
amsl	above mean sea level
AOP	Administrative Operating Procedure
AR/COC	Analysis Request/Chain of Custody
bgs	below ground surface
COC	constituent of concern
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERCL	Environmental Restoration Chemical Laboratory
FIP	Field Implementation Plan
g	gram
HI	hazard index
kg	kilogram
L	liter
µg	microgram
mg	milligrams
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
PCB	polychlorinated biphenyl
pCi	picocuries
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPD	relative percent difference
RSI	Request for Supplemental Information
SNL/NM	Sandia National Laboratories/New Mexico
STL	Severn Trent Laboratories
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TAL	Target Analyte List
TEDE	total effective dose equivalent
TOP	Technical Operating Procedure
TPH	total petroleum hydrocarbons
VOC	volatile organic compound
XRF	x-ray fluorescence
yr	year

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1.0 INTRODUCTION

This supplemental response document is submitted to address concerns raised by the New Mexico Environment Department (NMED) Hazardous Waste Bureau regarding the Sandia National Laboratories/New Mexico (SNL/NM) proposal for no further action (NFA) for Solid Waste Management Unit (SWMU) 196, the Building 6597 Cistern (referred to as the Cistern). The NFA proposal is included in the Operable Unit 1306 Technical Areas (TAs)-III/V Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) report (SNL/NM June 1996). The NFA proposal summarized the 1994 and 1996 soil sampling activities and results. Table 1.1-1 presents the chronology of events for SWMU 196.

After review of the TA-III/V RFI report, the NMED issued a Notice of Deficiency (NOD) (Garcia July 1997), which included specific comments on SWMU 196. The SNL/NM Environmental Restoration (ER) Project responses were submitted in October 1997 (SNL/NM October 1997). A second NOD was issued by the NMED in March 1998 (Garcia March 1998). Following the submittal of the SNL/NM ER Project response (SNL/NM July 1998) to the NMED's second NOD, several meetings were held between SNL/NM and NMED personnel to reach an agreement on additional characterization required for sites included in the TA-III/V RFI report. These meetings resulted in an agreement for SNL/NM ER personnel to advance two boreholes at SWMU 196 and collect soil samples in order to define the vertical extent of contamination. A Field Implementation Plan (FIP) was developed to detail the drilling and sampling activities (SNL/NM August 1999). Due to drilling limitations and problems that occurred with the analytical results, the 1999 investigation was deemed incomplete by SNL/NM (see Section 1.2.2). The NMED issued a Request for Supplemental Information (RSI) stating that further investigation was needed at SWMU 196 (Moats May 2000); SNL/NM responded that the requested investigation would be conducted (SNL/NM November 2000). Discussions with the NMED resulted in a FIP (SNL/NM May 2003) that presented a sampling and analysis plan and defined the remaining scope of work to support an NFA decision for SWMU 196 (Langkopf March 2003). Table 1.1-2 provides a summary of the NMED NODs and SNL/NM ER Project comment responses.

1.1 Site Description and Operational History

SWMU 196, the Building 6597 Cistern, is located in TA-V at SNL/NM within the boundaries of Kirtland Air Force Base (Figures 1.1-1 and 1.1-2). SWMU 196 encompasses approximately 1,600 square feet (0.037 acres), consisting of the Cistern and a 6-foot-high chain link fence, and is surrounded by a gravel lot.

The area is located on the broad pediment that gently slopes west toward the Rio Grande. The topography at TA-V is nearly flat with elevations ranging from approximately 5,450 feet above mean sea level (amsl) on the eastern side to 5,425 feet amsl on the western side. The annual precipitation for the area, measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). During most rainfall events, rainfall quickly infiltrates the soil at TA-V; however, virtually all of the moisture subsequently undergoes evapotranspiration.

Based upon data from the 13 groundwater monitoring wells at TA-V, the regional groundwater aquifer is approximately 500 feet below ground surface (bgs) (SNL/NM April 2004). The closest

Table 1.1-1
Chronology of Events
SWMU 196

Date	Event	Document Reference
Late 1970s	PROTO I Facility and associated tanks were built. Building 6597 Cistern was part of the PROTO I system.	U.S. Environmental Protection Agency, (EPA) 1987. "Final RCRA Facility Assessment Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico," prepared by A.T. Kearney, Inc. and Harding Lawson Associates, Albuquerque, New Mexico.
1987	EPA identifies Building 6597 Cistern as part of the PROTO 1 facility.	
September 1987	Findings for the PROTO 1 are uncertain; additional investigation is required.	Sandia National Laboratories/New Mexico (SNL/NM) 1987. "Comprehensive Environmental Assessment and Response Program Phase 1," DOE, ES&H Division (draft), Sandia National Laboratories, Albuquerque, New Mexico.
1989	PROTO 1 facility is closed and releases to the Building 6597 Cistern cease.	NA
1992	Building 6597 Cistern is recommended for designation as ER Site 196.	Williamson, L.J. (GRAM, Incorporated), June 1992. Memorandum (unpublished) to W.B. Cox, "Designation of New ER Site #196, Building 6597 Cistern in Technical Area 5."
March 1993	Sampling plans for characterization at SWMU 196 are documented.	Sandia National Laboratories/New Mexico (SNL/NM) March 1993. "TA-III/V RCRA Facility Investigation Work Plan," Sandia National Laboratories, Albuquerque, New Mexico.
1994	Initial grab soil sample is collected from the bottom of the Cistern.	Sandia National Laboratories/New Mexico (SNL/NM) February 1996. "Site Specific Sampling and Analysis Plan, ER Site 196–Building 6597 Cistern Technical Area V," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.
1996	Soil sampling is conducted in the bottom of the Cistern.	
1996	SNL/NM submits NFA Proposal for SWMU 196.	Sandia National Laboratories/New Mexico (SNL/NM) June 1996. "Results of the Technical Area III and V RCRA Facility Investigation," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.
July 1997	NMED issues NOD (See Table 1.1-2).	Garcia, B. (New Mexico Environment Department), July 1997. "Notice of Deficiency: Results of the Technical Areas III and V RCRA Facility Investigation," Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico. July 31, 1997.
October 1997	SNL/NM submits Comment Responses to NOD (See Table 1.1-2).	Sandia National Laboratories/New Mexico (SNL/NM), October 1997. "Comment Responses to the Notice of Deficiency dated July 31, 1997 on the Results of the Technical Areas III and V RCRA Facility Investigation Submitted to EPA and NMED, June 1996," Environmental Restoration Project, Sandia National Laboratories/New Mexico.

Table 1.1-1 (Concluded)
Chronology of Events
SWMU 196

Date	Event	Document Reference
March 1998	NMED issues 2nd NOD (See Table 1.1-2).	Garcia, B. (New Mexico Environment Department), March 1998. "2nd Notice of Deficiency: Results of the Technical Areas III and V RCRA Facility Investigation," Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico. March 27, 1998.
July 1998	SNL/NM submits Comment Responses to 2nd NOD (See Table 1.1-2).	Sandia National Laboratories/New Mexico (SNL/NM), July 1998. "Responses to the 2nd Notice of Deficiency on the Results of the Technical Areas III and V RCRA Facility Investigation Dated June 1996," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.
August/ September 1999	Borehole drilling and soil sample collection	Results are detailed in this supplemental response.
May 2000	NMED issues RSI (See Table 1.1-2).	Moats, W. (New Mexico Environment Department), May 2000. "Request for Supplemental Information: DOE/SNL Environmental Restoration Project, Responses to NMED 2nd Notice of Deficiency on the Technical Areas III and V RCRA Facility Investigation, Dated June 1996," Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico. May 5, 2000.
November 2000	SNL/NM submits Comment Responses to RSI (See Table 1.1-2).	Sandia National Laboratories/New Mexico (SNL/NM), November 2000. "Responses to NMED Request for Supplemental Information on Responses to 2nd Notice of Deficiency on the Results of the Technical Areas III and V RCRA Facility Investigation Submitted to EPA and NMED, June 1996," Sandia National Laboratories, Albuquerque, New Mexico.
March 2003	SNL/NM and NMED meet to discuss remaining characterization requirements at SWMU 196.	Langkopf, B. (Sandia National Laboratories/New Mexico), March 2003. Memorandum to SWMU 196 file (unpublished), "Remaining Characterization at SWMU 196, Building 6597 Cistern within TA-V."
May 2003	SNL/NM prepares sampling and analysis plan (FIP) for additional information to support an NFA decision.	Sandia National Laboratories/New Mexico (SNL/NM), May 2003. "Field Implementation Plan (FIP) for Solid Waste Management Unit (SWMU) 196, Building 6597 Cistern, Technical Area V," Sandia National Laboratories, Albuquerque, New Mexico
June 2003	Borehole drilling and confirmatory soil sampling are conducted.	Results are detailed in this supplemental response.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
FIP = Field Implementation Plan.
NA = Not applicable.
NFA = No further action.
NMED = New Mexico Environment Department.
NOD = Notice of Deficiency.
RCRA = Resource Conservation and Recovery Act.
RSI = Request for Supplemental Information.
SNL/NM = Sandia National Laboratories/ New Mexico.
SWMU = Solid Waste Management Unit.
TA = Technical Area.

Table 1.1-2
Notices of Deficiency and Responses Summary
SWMU 196

Document Reference	Document Summary
NOD Garcia (New Mexico Environment Department), July 1997. "Notice of Deficiency: Results of the Technical Areas III and V RCRA Facility Investigation," Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico. July 31, 1997.	NMED stated: The vertical extent of contamination has not been adequately determined. Waste oil and sludge in the bottom of the Cistern should be removed, as it is a potential source of contamination. The FIP states that sampling will continue until TPH is no longer detected, thus the RFI Work Plan has not been fully implemented at this site.
Comment Responses to NMED NOD Sandia National Laboratories/New Mexico (SNL/NM), October 1997. "Comment Responses to the Notice of Deficiency dated July 31, 1997, on the Results of the Technical Areas III and V RCRA Facility Investigation Submitted to EPA and NMED, June 1996," Environmental Restoration Project, Sandia National Laboratories, Albuquerque, New Mexico.	DOE/SNL response: The FIP was implemented to the degree feasible but was limited due to drilling conditions. DOE/SNL does not believe that the Cistern poses a threat to groundwater for two reasons: 1) the mineral oil used in the facility does not contain hazardous constituents as manufactured, and 2) the extent of impact is not believed to reach groundwater based on results of nearby oil releases at SWMU 37.
2nd NOD Garcia, B. (New Mexico Environment Department), March 1998. "2nd Notice of Deficiency: Results of the Technical Areas III and V RCRA Facility Investigation," Hazardous and Radioactive Materials Bureau, New Mexico Environment Department, Santa Fe, New Mexico. March 27, 1998.	NMED stated: The extent of contamination has not been determined. Contamination at the site is a potential threat to groundwater. Additional characterization via soil samples from deep boreholes is required. NMED questions why such a large cistern was needed to discharge the stated 5 gallons per week. Additional Concerns: • DOE/SNL must provide a complete data set including quality assurance/quality control data.
Comment Responses to NMED 2nd NOD Sandia National Laboratories/New Mexico (SNL/NM), July 1998. "Responses to the 2nd Notice of Deficiency on the Results of the Technical Areas III and V RCRA Facility Investigation Dated June 1996," Environmental Restoration Project, Sandia National Laboratories/New Mexico.	DOE/SNL response: Additional site characterization will be preformed to define the vertical extent of contamination. There is no available information on the NMED's question regarding the size of the Cistern. Additional Concerns response: • DOE/SNL supplied the analytical data including the quality assurance/quality control data.
RSI Moats, W. (New Mexico Environment Department), May 2000. "Request for Supplemental Information: DOE/SNL Environmental Restoration Project, Responses to NMED 2nd Notice of Deficiency on the Technical Areas III and V RCRA Facility Investigation, Dated June 1996," Hazardous and Radioactive Waste Bureau, New Mexico Environment Department, Santa Fe, New Mexico. May 5, 2000	NMED stated: This site requires additional information and/or characterization.

Refer to footnotes at end of table.

Table 1.1-2 (Concluded)
Notices of Deficiency and Responses Summary
SWMU 196

Document Reference	Document Summary
Comment Responses to NMED RSI Sandia National Laboratories/New Mexico (SNL/NM), November 2000. "Responses to NMED Request for Supplemental Information on Responses to 2nd Notice of Deficiency on the Results of the Technical Areas III and V RCRA Facility Investigation Submitted to EPA and NMED, June 1996," Sandia National Laboratories, Albuquerque, New Mexico.	DOE/SNL response: In 1999, 2 boreholes were drilled at the site and soil samples were collected in the boreholes. Due to matrix interference from the oil contamination, the VOC and SVOC data were rejected in the data validation process. Further investigation is needed in order to comply with the NMED requirements.

DOE = U.S. Department of Energy.
EPA = U.S. Environmental Protection Agency.
FIP = Field Implementation Plan.
NMED = New Mexico Environment Department.
NOD = Notice of Deficiency.
RCRA = Resource Conservation and Recovery Act.
RFI = RCRA Facility Investigation.
RSI = Request for Supplemental Information.
SNL = Sandia National Laboratories.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TPH = Total petroleum hydrocarbon(s).
VOC = Volatile organic compound.

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SNL EGIS DEPT 6133 DAHelfrich GIS MAP-ID = 040736 nmloc_dh.aml 08-SEP-2004

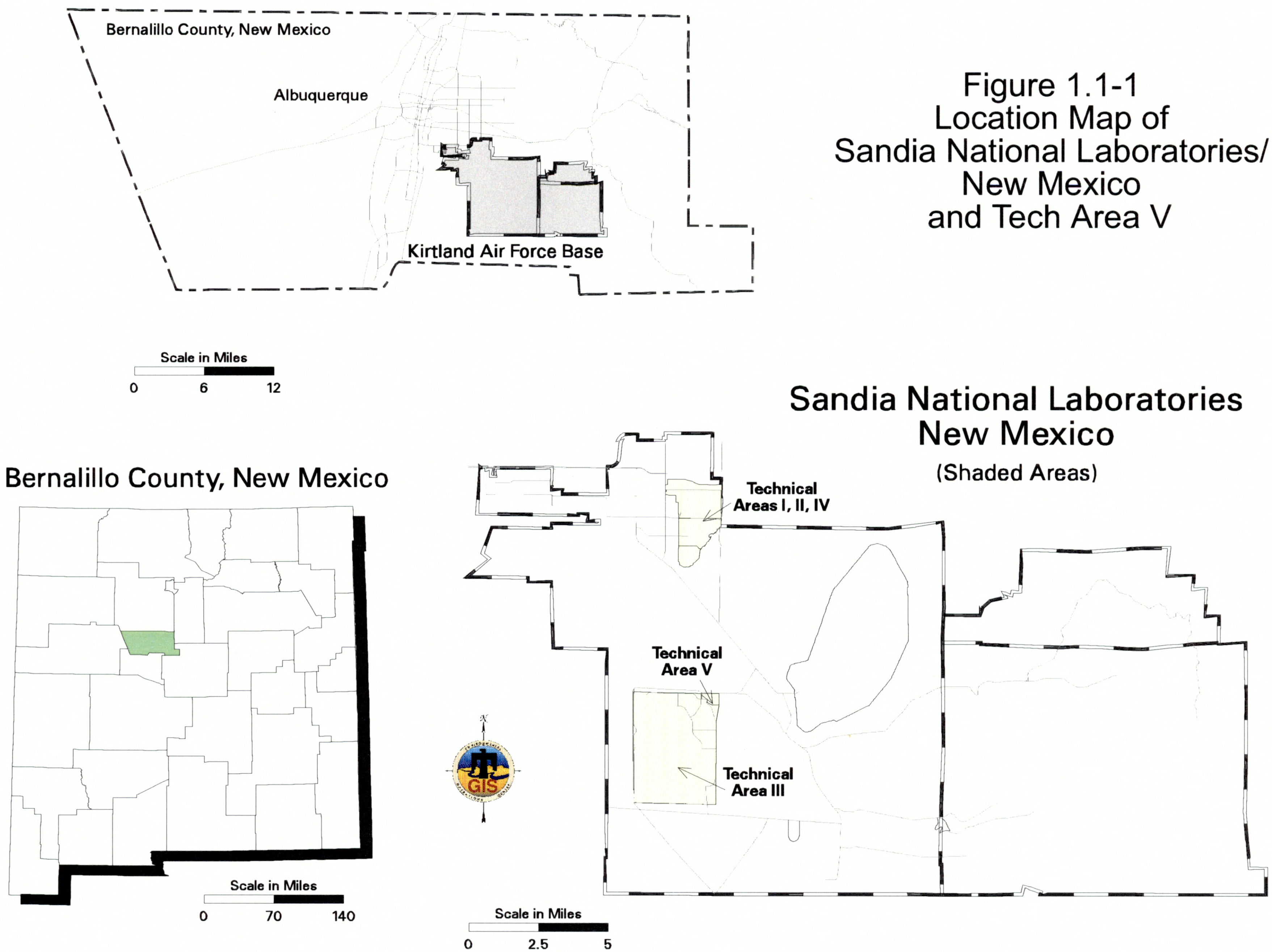
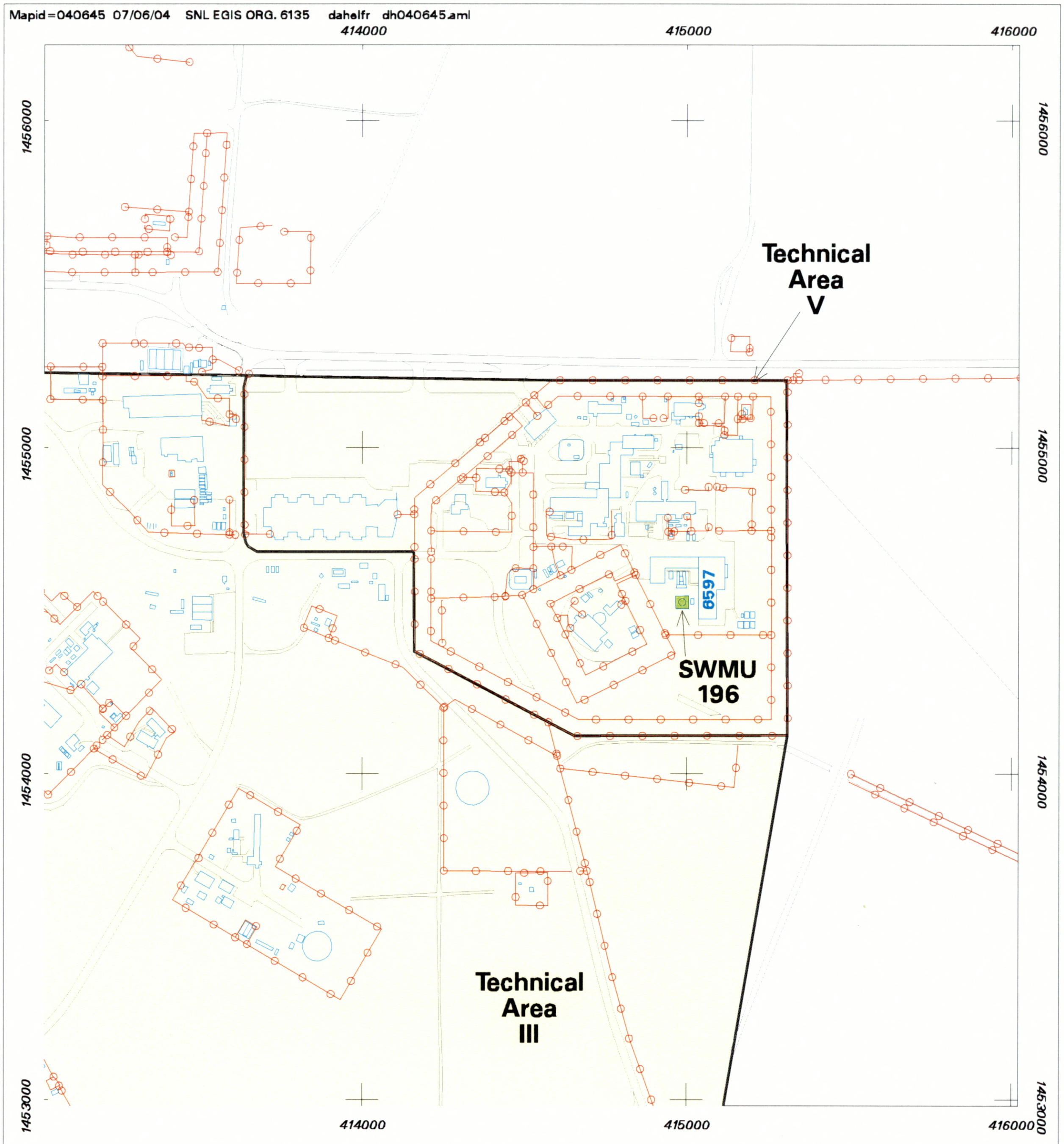


Figure 1.1-1
Location Map of
Sandia National Laboratories/
New Mexico
and Tech Area V

840857.02110000 A7

Mapid=040645 07/06/04 SNL EGIS ORG. 6135 dahelfr dh040645.aml



Legend

SWMU 196

Fence

Paved and Unpaved Road

Building / Structure

Technical Area

Figure 1.1-2
Location of TA-V and SWMU 196

0 250 500
Scale in Feet

0 60 120
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.02110000 A3

groundwater monitoring well, also the closest downgradient well, is TAV-MW1, located approximately 600 feet to the northwest of SWMU 196.

TA-V is a secured research and testing area that has been operating since the 1960s. The facilities include large electron beam accelerators, research reactors, an intense gamma irradiation facility, and a hot-cell facility.

The Cistern at SWMU 196 is a 25-foot-diameter, vertically oriented, concrete cylinder that extends approximately 22 feet bgs with an unlined earthen bottom. The perimeter wall of the Cistern extends about 3 feet above the ground surface. The Cistern is located in the central portion of TA-V, approximately 37 feet west of Building 6597, which previously housed the PROTO 1 facility, which was used to test radiation effects on weapon components.

From 1978 to 1989, the Cistern received insulating oil and wash water from PROTO 1. The Cistern also served as an emergency catch basin for the series of underground storage tanks (SWMU 37) previously connected to PROTO 1. The PROTO 1 facility used Univolt™, a petroleum-based, electrical insulating oil manufactured by the Exxon Corporation that contained no polychlorinated biphenyl (PCB), metal, or radionuclide additives. Personnel interviews state that occasional, small quantities of insulating oil containing wash water (and possibly Freon™) were discharged into the Cistern. No records were maintained of discharges to the Cistern. No discharges have occurred at the Cistern since 1989 when the PROTO 1 facility was closed. The Cistern was not connected to any surface water collection systems.

Constituents of concern (COCs) for the site have been identified as total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), RCRA metals, and PCBs.

1.2 Previous Investigations

Results of investigations conducted in 1994 through 1996 for SWMU 196 were presented in the 1996 RFI report (SNL/NM June 1996) and are also summarized in this report. In 1999, two boreholes were advanced at the site, and soil samples were collected. This investigation was deemed incomplete by ER personnel and the results are summarized in this report.

1.2.1 RFI Sampling Activities

Soil samples collected in 1994 through 1996 as part of the RFI are summarized in Table 1.2-1. The investigation included laboratory analysis of soil samples collected from the bottom of the Cistern using various sampling methods, as well as samples collected from around the top of the Cistern (at ground level) for background characterization. These site-specific background values are not used for comparison in this report; NMED-approved background values (Dinwiddie September 1997) are used in this report. Analysis Request/Chain of Custody (AR/COC) forms for these samples are provided as Attachment A.

An initial grab sample was collected in June 1994. The sampling location labeled "G" (for grab sample) is shown on Figure 1.2-1, and this RFI sample is also identified as "Site 196-Cistern." The sample was collected from the bottom of the Cistern using hand-auger methods and was

Table 1.2-1
SWMU 196 Sample Summary and Analytical Suites
1994–1996

Record Number[a]	Date	Sample Location	Sample Location Rationale	Sample Matrix	Laboratory	Analytical Suites (EPA Method[b]) [with number of samples]
00350	06-17-94	Site 196-Cistern (G)	Characterize soil at bottom of Cistern	Soil w/oil odor Sludge/soil	Enseco/RMAL	VOCs (EPA Method 8240) [1] TPH (EPA Method 418.1) [1] PCBs (EPA Method 8080) [1] TAL Metals (EPA Method 6010) [1]
00897	10-10-94	196-SS-B1 196-SS-B2 196-SS-B3	Background characterization	Soil	SNL/NM RPSD	Radionuclides by Gamma Spectroscopy [3]
02948	04-25-95	0196-B1-C 0196-B2-C	Waste characterization[c]	Sludge composite[c]	LAL	Tritium, Isotopic Uranium [2]
02591		0196-B1-C 0196-B2-C			SNL/NM RPSD	Radionuclides by Gamma Spectroscopy [2]
03572	05-02-95	TA5-196-A1 (0, 0(Dup), 0.5, 1, 1.5, 2.0, 2.5, 3.0 ft bgs)	Characterize soil from 0 to 3 ft in the bottom of the Cistern	Soil	SNL/NM ERCL	XRF–Chromium, Copper, Lead, Zinc [8]
		TA5-196-A2 (0, 0.5, 1, 1.5, 2.0, 2.5, 3.0 ft bgs)				XRF–Chromium, Copper, Lead, Zinc [7]
		TA5-196-A3 (0, 0.5, 1, 1.5, 2.0, 2.5, 3.0 ft bgs)				XRF–Chromium, Copper, Lead, Zinc [7]
03659	05-23-95	196-RO-1 196-RO-2	Waste from roll-off bin	Soil (composite)	Quanterra	TCLP Lead [2]
509079		030375 030675	Waste from roll-off bin	Soil (composite)	SNL/NM ERCL	XRF–Chromium, Copper, Lead, Zinc [2]
04513	03-26-96	TA3/5-196-D1-008 TA3/5-196-D1-009	Characterize soil from depths of 0 to 13 ft below the bottom of Cistern	Soil	AEN	VOCs (EPA Method 8240) [2] TPH (EPA Method 418.1) [2]
04427	03-27-96	TA3/5-196-D1-13 TA3/5-196-D2-000 TA3/5-196-D2-001 TA3/5-196-D2-005 TA3/5-196-D2-007 TA3/5-196-D2-011 TA3/5-196-D2-011DUP TA3/5-196-D2-012 TA3/5-196-D3-002 TA3/5-196-D3-003 TA3/5-196-D3-004				VOCs (EPA Method 8240) [11] TPH (EPA Method 418.1) [11]

Refer to footnotes at end of table.

Table 1.2-1 (Concluded)
SWMU 196 Sample Summary and Analytical Suites
1994–1996

[a]Analysis request/chain-of-custody record.
[b]EPA November 1986.
[c]These samples were identified as waste characterization and sludge composite when it was believed that the soil in the bottom of the Cistern consisted of a thin layer of sludge and soil on a concrete bottom, and that this material would be removed and handled as waste. This was not the case, and the soil collected for these samples was actually native soil, as the Cistern does not have a concrete bottom.

AEN	= American Environmental Network.
bgs	= Below ground surface.
DUP	= Duplicate sample.
EPA	= U.S. Environmental Protection Agency.
ERCL	= Environmental Restoration Chemistry Laboratory.
ft	= Foot (feet).
G	= Grab sample.
LAL	= Lockheed Analytical Laboratory.
PCB	= Polychlorinated biphenyl.
RMAL	= Rocky Mountain Analytical Laboratory.
RO	= Roll-off bin.
RPSD	= Radiation Protection Sample Diagnostics.
SNL/NM	= Sandia National Laboratories/New Mexico.
SS	= Subsurface soil sample.
SWMU	= Solid Waste Management Unit.
TA	= Technical Area.
TAL	= Target Analyte List.
TCLP	= Toxicity Characteristic Leaching Procedure.
TPH	= Total petroleum hydrocarbon(s).
VOC	= Volatile organic compound.
XRF	= X-ray fluorescence.

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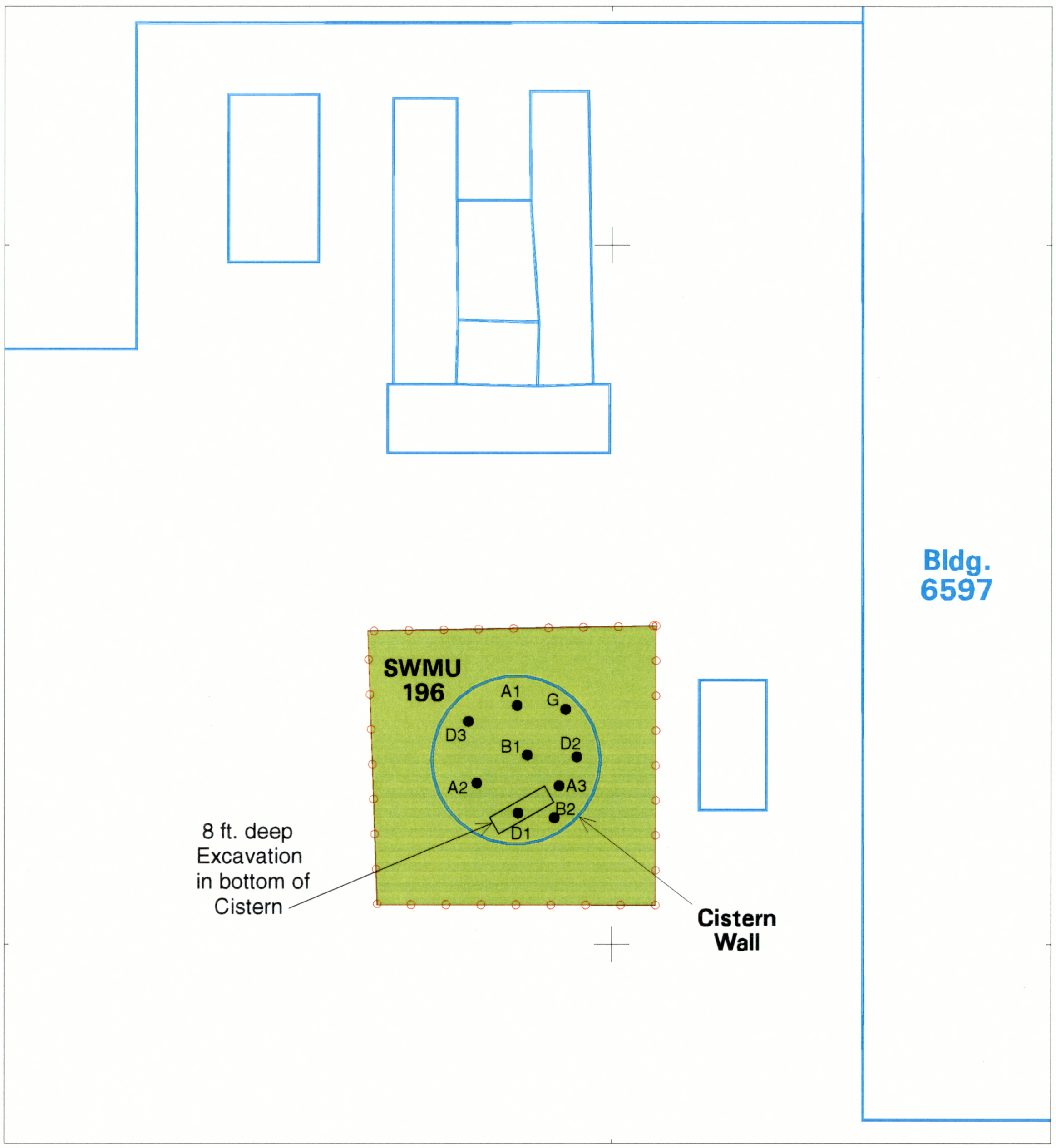

Legend

Sample Location
G = Grab
A = Metals Profile
B = Radionuclides
D = TPH/VOC Profile

Fence

Building / Structure

SWMU 196

Excavation

Figure 1.2-1
SWMU 196
Location of Soil Samples,
TA-V, 1994 - 1996

0 12.5 25
Scale in Feet

0 3 6
Scale in Meters

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submitted to an off-site laboratory for analyses for VOCs, PCBs, TPH, and Target Analyte List (TAL) metals. In October 1994, three samples (196-SS-B1 through B3) were collected for radionuclide analyses from the ground surface near the Cistern perimeter and used for background characterization (not shown on Figure 1.2-1).

In April 1995, two composite soil samples (0196-B1-C and B2-C) were collected from the bottom of the Cistern. These samples were identified as waste characterization and sludge composite when it was believed that the soil in the bottom of the Cistern consisted of a thin layer of sludge and soil on a concrete bottom, and that this material would be removed and handled as waste. This was not the case, and the soil collected for these samples was actually native soil, as the Cistern does not have a concrete bottom. Therefore, these samples were used for characterization of the native soil in the bottom of the Cistern in the 1996 RFI. The sample locations are labeled as B1 and B2 on Figure 1.2-1. These samples were submitted to the SNL/NM Radiation Protection Sample Diagnostics Laboratory for analyses of radionuclides by gamma spectroscopy. Sample splits were also sent to an off-site laboratory, Lockheed Analytical Laboratory, for analyses for tritium and isotopic uranium.

In May 1995, soil samples were collected at three hand-auger locations (A1 through A3), shown on Figure 1.2-1, at various depths in the bottom of the Cistern. Soil samples were collected from the surface and at half-foot increments to a total depth of 3 feet below the Cistern bottom. These samples were identified as field-screening samples and were submitted to the SNL/NM Environmental Restoration Chemical Laboratory (ERCL) for selected metals analyses by x-ray fluorescence (XRF).

Also in May 1995, two composite samples (196-RO-1 and RO-2) were collected for waste characterization from roll-off bins. The soil was placed into the bins during the sampling activities. These samples were submitted to Quanterra Laboratory for analyses for Toxicity Characteristic Leaching Procedure lead. Two sample splits (030375 and 030675 on Table 1.2-1) were also sent to ERCL for analyses of chromium, copper, lead, and zinc by XRF.

In March 1996, soil samples were collected at three hand-auger locations (D1 through D3 on Figure 1.2-1) in the subsurface below the Cistern bottom. A trench was excavated in the bottom of the Cistern to a depth of approximately 8 feet. Auger hole D1 was advanced in the bottom of the trench to a depth of 5 feet (for a total of 13 feet below the bottom surface). Auger holes D2 and D3 were driven to total depths 13 and 5 feet, respectively, below the bottom of the Cistern. These soil samples were submitted to an off-site laboratory (American Environmental Network [AEN]) for analyses of VOCs and TPH.

The samples used for soil characterization in the 1996 RFI consisted of the initial grab sample (Site 196-Cistern), the sample series A1-A3, B1-C, B2-C, and D1 through D3. The RO series samples were used for waste characterization. The 196-SS-B1 through B3 series were used for background characterization. Results of the soil characterization samples and detection limits used in the 1996 RFI are provided in Tables 1.2-2 through 1.2-11. The results for soil samples A1 through A3 (XRF field-screening samples) were used in the 1996 RFI; however, these sample results are discussed, but not carried forward in this report.

No detectable values of any VOCs were reported in the soil samples, although the VOC, 2-hexanone, was detected in the aqueous trip blank (associated with the June 1994 sample) at 0.49 J micrograms (μg)/liter (L) with a detection limit of 10 μg/L. Tables 1.2-2 and 1.2-3 provide the analytical detection limits for the 1994 and 1996 soil sampling events, respectively. No PCBs were detected in the June 1994 grab sample; Table 1.2-4 lists the PCB analytical detection limits.

Table 1.2-2
Summary of VOC Analytical Detection Limits
June 1994
(Off-Site Laboratory)

Analyte	Method Detection Limit (mg/kg)
Acetone	1
Benzene	0.5
Bromodichloromethane	0.5
Bromoform	0.5
Bromomethane	1
2-Butanone	1
Carbon disulfide	0.5
Carbon tetrachloride	0.5
Chlorobenzene	0.5
Chloroethane	1
Chloroform	0.5
Chloromethane	1
Dibromochloromethane	0.5
Dichlorodifluoromethane	2
1,1-Dichloroethane	0.5
1,2-Dichloroethane	0.5
1,1-Dichloroethene	0.5
1,2-Dichloroethene	0.5
1,2-Dichloropropane	0.5
cis-1,3-Dichloropropene	0.5
trans-1,3-Dichloropropene	0.5
Ethylbenzene	0.5
2-Hexanone	1
4-Methyl-2-pentanone	1
Methylene chloride	0.5
Styrene	0.5
1,1,2,2-Tetrachloroethane	0.5
Tetrachloroethene	0.5
Toluene	0.5
1,1,1-Trichloroethane	0.5
1,1,2-Trichloroethane	0.5
Trichloroethene	0.5
Trichlorofluoromethane	0.5
2,2-trifluoroethane, 1,1,2-Trichloro-1	0.5
Vinyl acetate	1
Vinyl chloride	1
Xylene	0.5

mg/kg = Milligram(s) per kilogram.
VOC = Volatile organic compound.

Table 1.2-3
Summary of VOC Analytical Detection Limits
March 1996
(Off-Site Laboratory)

Analyte	Method Detection Limit (mg/kg)
Acetone	0.5
Benzene	0.05
Bromodichloromethane	0.05
Bromoform	0.05
Bromomethane	0.2
2-Butanone	0.5
Carbon disulfide	0.1
Carbon tetrachloride	0.05
Chlorobenzene	0.05
Chloroethane	0.1
2-Chloroethyl vinyl ether	0.5
Chloroform	0.05
Chloromethane	0.2
Dibromochloromethane	0.05
1,2-Dibromoethane	0.05
1,2-Dichlorobenzene	0.1
1,3-Dichlorobenzene	0.1
1,4-Dichlorobenzene	0.1
Dichlorodifluoromethane	0.2
1,1-Dichloroethane	0.05
1,2-Dichloroethane	0.1
trans-1,2-Dichloroethene	0.05
1,1-Dichloroethene	0.05
cis-1,2-Dichloroethene	0.05
1,2-Dichloropropane	0.05
cis-1,3-Dichloropropene	0.05
trans-1,3-Dichloropropene	0.05
Ethylbenzene	0.05
2-Hexanone	0.5
Iodomethane	0.5
4-Methyl-2-pentanone	0.5
Methylene chloride	0.05
Styrene	0.05
1,1,2,2-Tetrachloroethane	0.1
Tetrachloroethene	0.1
Toluene	0.05
1,1,1-Trichloroethane	0.05
1,1,2-Trichloroethane	0.05
Trichloroethene	0.1
Trichlorofluoromethane	0.05
Vinyl acetate	0.5
Vinyl chloride	0.05
Xylene	0.1

mg/kg = Milligram(s) per kilogram.
VOC = Volatile organic compound.

Table 1.2-4
Summary of PCB Analytical Detection Limits
June 1994
(Off-Site Laboratory)

Analyte	Method Detection Limit (µg/kg)
Aroclor-1016	33
Aroclor-1221	33
Aroclor-1232	33
Aroclor-1242	33
Aroclor-1248	33
Aroclor-1254	33
Aroclor-1260	33

µg/kg = Microgram(s) per kilogram.
PCB = Polychlorinated biphenyl.

Table 1.2-5
SWMU 196 Confirmatory Soil Sampling Summary
TPH Compound Analytical Results
June 1994
(Off-Site Laboratory)

Sample Attributes			TPH (EPA Method 418[a]) (mg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	TPH
00350	Site-196-CISTERN	0	60,500

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
TPH = Total petroleum hydrocarbon(s).

Table 1.2-6
SWMU 196 Confirmatory Soil Sampling Summary
TPH Compound Analytical Results
March 1996
(Off-Site Laboratory)

Sample Attributes			TPH (EPA Method 418.1[a]) (mg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	TPH
4513	TA3/5-196-D1-008	8	29,000
4513	TA3/5-196-D1-009	9	15,000
4427	TA3/5-196-D1-013	13	4,300
4427	TA3/5-196-D2-001	1	19,000
4427	TA3/5-196-D2-005	5	7,800
4427	TA3/5-196-D2-007	7	7,200
4427	TA3/5-196-D2-011	11	23,000
4427	TA3/5-196-D2-011-DUP	11	21,000
4427	TA3/5-196-D2-012	12	40,000
4427	TA3/5-196-D3-002	2	35
4427	TA3/5-196-D3-004	4	ND (20)

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
D = Location designation.
DUP = Duplicate sample.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
mg/kg = Milligram(s) per kilogram.
ND ( ) = Not detected above the method detection limit, shown in parentheses.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TPH = Total petroleum hydrocarbon(s).

Table 1.2-7
Summary of TPH Analytical Detection Limits
(Off-Site Laboratory)

Analyte	June 1994 Method Detection Limit (mg/kg)	March 1996 Method Detection Limit (mg/kg)
TPH	2,000	20

mg/kg = Milligram(s) per kilogram.
TPH = Total petroleum hydrocarbon(s).

Table 1.2-8
SWMU 196 Confirmatory Soil Sampling Summary
Selected Metals Analytical Results
June 1994
(Off-Site Laboratory)

Sample Attributes			Metals (EPA Method 6010/7471[a]) (mg/kg)										
Record Number[b]	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver
00350	Site-196-CISTERN	0	0.56 J (1)	87.3	0.25	**2.5**	14.8	**213**	**180**	ND (0.1)	**17.8**	ND (0.5)	**2.9**
Background Concentration[c]			4.4	214	0.65	0.9	15.9	15.4	21.4	<0.1	11.5	<1	<1

Note: Values in **bold** exceed background soil concentrations.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Dinwiddie September 1997, Southwest Area Supergroup.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is less than the method detection limit, shown in parentheses.
mg/kg = Milligram(s) per kilogram.
ND ( ) = Not detected above the method detection limit, shown in parentheses.
SWMU = Solid Waste Management Unit.

Table 1.2-9
Summary of Metals Analytical Detection Limits
June 1994
(Off-Site Laboratory)

Analyte	Method Detection Limit (mg/kg)
Aluminum	10
Antimony	6
Arsenic	1
Barium	1
Beryllium	0.2
Cadmium	0.5
Calcium	20
Chromium	1
Cobalt	1
Copper	2
Iron	10
Lead	0.3
Magnesium	20
Manganese	1
Mercury	0.1
Nickel	4
Potassium	500
Selenium	0.5
Silver	1
Sodium	500
Thallium	1
Vanadium	1
Zinc	2

mg/kg = Milligram(s) per kilogram.

Table 1.2-10
Summary of Tritium and Isotopic Uranium Analytical Results
April 1995
(Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 906.0 and HASL 300[a])(pCi/g)							
Record Number[b]	ER Sample ID	Sample Depth (ft)	Tritium Result	Tritium Error[c]	Uranium-233 Result	Uranium-233 Error[c]	Uranium-235 Result	Uranium-235 Error[c]	Uranium-238 Result	Uranium-238 Error[c]
02948	0196-B1-C	4	**ND (98)**[d]	160	0.89	0.16	**0.167**	0.065	0.82	0.15
02948	0196-B2-C	4	**ND (96)**[d]	160	0.88	0.16	0.085	0.049	0.73	0.15
Background Activity[e,f]			0.021	--	NC	--	0.16	--	1.4	--

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Elevated critical level due to short count time.
[e]Dinwiddie September 1997, Southwest Area Supergroup.
[f]Tharp February 1999.
C = Composite.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
HASL = Health and Safety Laboratory.
ID = Identification.
NC = Not calculated.
ND ( ) = Not detected above the critical level, shown in parentheses.
pCi/g = Picocurie(s) per gram.
-- = Error not calculated.

Table 1.2-11
Summary of Gamma Spectroscopy Analytical Results
April 1995
(On-Site Laboratory)

Sample Attributes			Activity (EPA Method 901.1[a])(pCi/g)							
			Cesium-137		Thorium-232		Uranium-235		Uranium-238	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Result	Error[c]	Result	Error[c]	Result	Error[c]	Result	Error[c]
02591	0196-B1-C	4	ND (0.0382)	--	0.624	0.188	**ND (0.314)**	--	**ND (4.8)**	--
02591	0196-B2-C	4	ND (0.0377)	--	0.533	0.176	**ND (0.315)**	--	**ND (4.76)**	--
Background Activity[d]			0.079	--	1.01	--	0.16	--	1.4	--

Note: Values in **bold** exceed background soil activities.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Dinwiddie September 1997, Southwest Area Supergroup.
C = Composite.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
ND ( ) = Not detected above the minimum detectable activity, shown in parentheses.
ND ( ) = Not detected, but the minimum detectable activity (shown in parentheses) exceeds background activity.
pCi/g = Picocurie(s) per gram.
-- = Error not calculated.

Detectable values of TPH were reported in both the 1994 and 1996 soil samples (Tables 1.2-5 and 1.2-6). The sample, Site 196-Cistern, had a TPH value of 60,500 milligrams (mg)/kilogram (kg). Results from the 1996 samples ranged from not detected to 40,000 mg/kg for the samples collected at 4 and 12 feet bgs in boreholes D3 and D2, respectively. TPH analytical detection limits for the 1994 and 1996 samples are provided in Table 1.2-7.

Metals analyses for the sample, Site 196-Cistern, included TAL metals; the results for the RCRA metals plus beryllium are provided in Table 1.2-8. Also included in Table 1.2-8 are metals that exceeded approved background values (copper and nickel). Detected values of cadmium (2.5 mg/kg), lead (180 mg/kg), and silver (2.9 mg/kg) exceeded the NMED-approved background values (Dinwiddie September 1997). Detected values of arsenic, barium, beryllium, and chromium did not exceed the corresponding background values. No detectable values of mercury or selenium were reported. Analytical detection limits for the metals analyses are provided in Table 1.2-9.

The XRF analyses for the field-screening samples, A1 through A3, revealed elevated levels of copper, lead, and zinc, as well as low levels of chromium. These results were used in the 1996 RFI as characterization samples. The results for these samples will not be carried forward in this assessment as they were designated field-screening samples and were analyzed at the on-site laboratory (ERCL) by XRF, a method reliable for field-screening purposes only. Metals analyses for samples collected in later investigations were considered appropriate for site characterization purposes.

Tritium analyses revealed no detectable activity for the B1-C and B2-C soil samples (Table 1.2-10). These same samples were also analyzed for uranium-233, -235, and -238 at the off-site laboratory. There was detectable activity in both samples for uranium-233. One sample exceeded the background activity (0.16 picoCuries [pCi] per gram [g]) for uranium-235 at 0.167 pCi/g. Detected activities of uranium-238 did not exceed background activities.

The B1-C and B2-C samples were also analyzed for radionuclides by gamma spectroscopy. The results for these samples revealed no detectable activity for cesium-137 and detectable activity for thorium-232 that did not exceed background activity (Table 1.2-11). The results for uranium-235 and -238 were nondetections. The minimum detectable activity for these two radionuclides exceeds the corresponding background activity.

1.2.2 1999 Borehole Investigation

Following the submittal of the 1996 RFI, the NOD issued by the NMED stated that additional soil characterization was needed to define the vertical extent of contamination at SWMU 196. Due to the need for increased depth of soil samples, a hollow-stem auger drilling rig was employed to place one vertical borehole as close as possible to the Cistern wall and one angled borehole to encounter soil beneath the Cistern (Figure 1.2-2). It was not feasible to drill the boreholes from within the interior of the Cistern. An FIP was prepared detailing the drilling and sampling activities (SNL/NM August 1999).

The first attempt at drilling an angled borehole (BH1) was unsuccessful at obtaining soil samples beneath the Cistern. BH1 was drilled approximately 23 feet southwest of the Cistern wall, was set at approximately 37 degrees from vertical, and was advanced to the northeast. No samples were recovered in this borehole due to auger deflection preventing the advancement of

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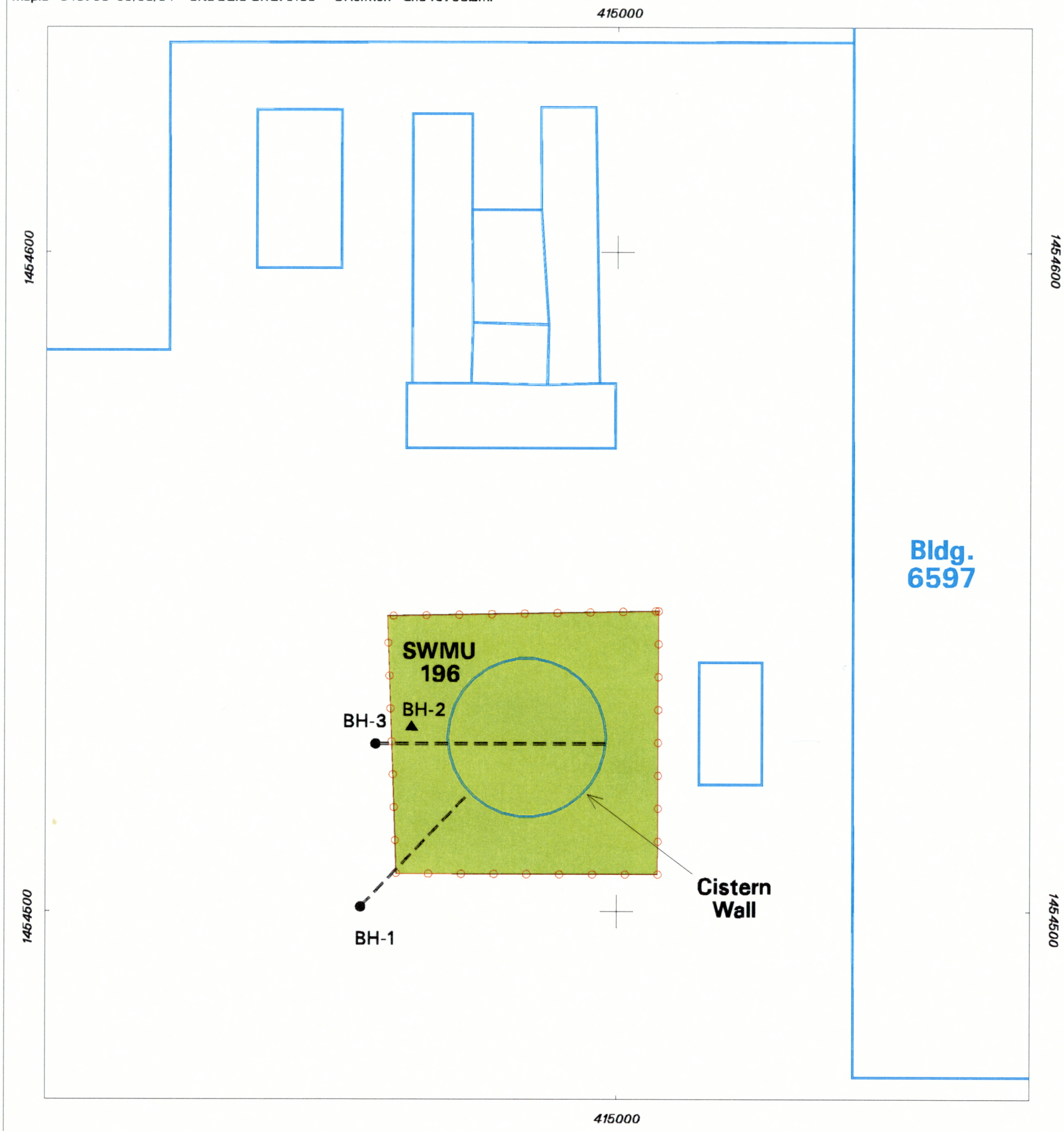

Legend

BH-1 Approximate Borehole Location with Trace of Angled Borehole

BH-2 Approximate Vertical Borehole Location

Fence

Building / Structure

SWMU 196

Figure 1.2-2
SWMU 196
Locations of Boreholes, TA-V, 1999

0 12.5 25
Scale in Feet

0 3 6
Scale in Meters

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the sampling equipment into the augers. Borehole BH1 was abandoned at 56 linear feet and plugged.

A vertical borehole (BH2) was located approximately 5 feet west of the Cistern wall. Soil samples were collected with a split-spoon sampler beginning at 25 feet bgs and continuing at approximately 5- to 10-foot intervals to a total depth of 100 feet bgs. Twelve soil samples plus one soil duplicate were collected from borehole BH2.

A second angled borehole (BH3) was located approximately 10 feet west of the Cistern, was set at approximately 19 degrees from vertical, and was advanced to the east. A total of seven soil samples and one soil duplicate from 14 to 75 linear feet along the borehole were collected. Auger refusal at 90 linear feet along the borehole prevented further advancement.

All soil samples from the 1999 drilling activities were sent to an off-site laboratory (General Engineering Laboratories, Inc.) for analyses for VOCs, SVOCs, TPH, and RCRA metals plus beryllium. PCBs were eliminated from the analyses list because no PCBs were detected in the earlier investigation; this was verbally approved by the NMED. Table 1.2-12 provides a summary of the soil samples collected. Tables 1.2-13 through 1.2-18 provide the results and detection limits of the 1999 sampling event, and AR/COC forms are provided as Attachment B.

As shown in Table 1.2-13, the VOC analyses revealed detectable levels of carbon disulfide, ethylbenzene, methylene chloride, toluene, and xylene from boreholes BH2 and BH3. The sample from BH3 at 75 feet bgs (i.e., the sample from the bottom of the borehole) had rejected (R qualified) data for carbon disulfide, ethylbenzene, toluene, and xylene due to matrix interference. Data for the entire VOC suite for samples 196-BH3-99-19-SS, 196-BH3-99-40-SS, 196-BH3-99-40-SD, and 196-BH3-99-65-SS were also R qualified and rejected due to matrix interference. All other samples from boreholes BH2 and BH3 did not have detectable concentrations of VOCs.

No SVOCs were detected in any of the soil samples from boreholes BH2 and BH3, although numerous samples from both boreholes had R-qualified data for many of the SVOC constituents. Method detection limits for VOCs are provided in Table 1.2-15.

TPH results revealed detectable levels in both boreholes, ranging from 10.9 J to 5,220 mg/kg in borehole BH2 and 1,970 to 25,500 mg/kg in BH3. Results and method detection limits for TPH are provided in Table 1.2-16.

Metals analyses revealed detectable levels of arsenic, barium, beryllium, chromium, lead, mercury, selenium, and silver (Table 1.2-17). Two samples (196-BH3-99-14-SS and 196-BH3-99-40-SD) had barium results that exceeded the background value of 214 mg/kg (Dinwiddie September 1997) at 278 and 286 mg/kg, respectively. All other samples were below the corresponding background values for metals. Method detection limits for metals are provided in Table 1.2-18.

The 1999 drilling investigation was deemed incomplete by the ER Project due to difficulties with matrix interference causing rejected data, as well as not achieving a depth that defined the vertical extent of contamination. Further discussion with the NMED resulted in a second SWMU 196 FIP that detailed drilling a single borehole and conducting sampling activities to complete subsurface investigations at SWMU 196 (SNL/NM May 2003).

Table 1.2-12
Confirmatory Soil Sample Summary and Analytical Suites for SWMU 196
August–September 1999
(Off-Site Laboratory)

Sample Attributes				Analytical Suites			
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 418.1[b])	RCRA Metals, Beryllium (EPA Method 6010/7000[b])
Borehole BH2							
602756	196-BH2-99-25-SS	Subsurface sample from 25 ft bgs	08-31-99	1	--	--	--
	196-BH2-99-30-SS	Subsurface sample from 30 ft bgs		1	--	--	--
	196-BH2-99-35-SS	Subsurface sample from 35 ft bgs		1	--	--	--
	196-BH2-99-35-SD	Subsurface sample duplicate from 35 ft bgs		1	--	--	--
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs	09-01-99	1	--	--	--
	196-BH2-99-45-SS	Subsurface sample from 45 ft bgs		1	--	--	--
	196-BH2-99-50-SS	Subsurface sample from 50 ft bgs		1	--	--	--
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs		1	--	--	--
	196-BH2-99-60-SS	Subsurface sample from 60 ft bgs		1	--	--	--
	196-BH2-99-70-SS	Subsurface sample from 70 ft bgs		1	--	--	--
	196-BH2-99-80-SS	Subsurface sample from 80 ft bgs		1	--	--	--
	196-BH2-99-90-SS	Subsurface sample from 90 ft bgs		1	--	--	--
	196-BH2-99-100-SS	Subsurface sample from 100 ft bgs		1	--	--	--
602812	196-BH2-99-25-SS	Subsurface sample from 25 ft bgs	08-31-99	--	1	1	1
	196-BH2-99-30-SS	Subsurface sample from 30 ft bgs		--	1	1	1
	196-BH2-99-35-SS	Subsurface sample from 35 ft bgs		--	1	1	1
	196-BH2-99-35-SD	Subsurface sample duplicate from 35 ft bgs		--	1	1	1
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs	09-01-99	--	1	1	1
	196-BH2-99-45-SS	Subsurface sample from 45 ft bgs		--	1	1	1
	196-BH2-99-50-SS	Subsurface sample from 50 ft bgs		--	1	1	1
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs		--	1	1	1
	196-BH2-99-60-SS	Subsurface sample from 60 ft bgs		--	1	1	1
	196-BH2-99-70-SS	Subsurface sample from 70 ft bgs	09-01-99	--	1	1	1
	196-BH2-99-80-SS	Subsurface sample from 80 ft bgs		--	1	1	1
	196-BH2-99-90-SS	Subsurface sample from 90 ft bgs		--	1	1	1
	196-BH2-99-100-SS	Subsurface sample from 100 ft bgs		--	1	1	1

Refer to footnotes at end of table.

Table 1.2-12 (Concluded)
Confirmatory Soil Sample Summary and Analytical Suites for SWMU 196
August–September 1999
(Off-Site Laboratory)

Sample Attributes				Analytical Suites			
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 418.1[b])	RCRA Metals, Beryllium (EPA Method 6010/7000[b])
Borehole BH3							
602811	196-BH3-99-14-SS	Subsurface sample from 14 ft bgs	09-02-99	--	1	1	1
	196-BH3-99-19-SS	Subsurface sample from 19 ft bgs		--	1	1	1
	196-BH3-99-24-SS	Subsurface sample from 24 ft bgs		--	1	1	1
	196-BH3-99-28-SS	Subsurface sample from 28 ft bgs		--	1	1	1
	196-BH3-99-40-SS	Subsurface sample from 40 ft bgs		--	1	1	1
	196-BH3-99-40-SD	Subsurface sample duplicate from 40 ft bgs		--	1	1	1
	196-BH3-99-65-SS	Subsurface sample from 65 ft bgs		--	1	1	1
	196-BH3-99-75-SS	Subsurface sample from 75 ft bgs		--	1	1	1
602813	196-BH3-99-14-SS	Subsurface sample from 14 ft bgs	09-02-99	1	--	--	--
	196-BH3-99-19-SS	Subsurface sample from 19 ft bgs		1	--	--	--
	196-BH3-99-24-SS	Subsurface sample from 24 ft bgs		1	--	--	--
	196-BH3-99-28-SS	Subsurface sample from 28 ft bgs		1	--	--	--
	196-BH3-99-40-SS	Subsurface sample from 40 ft bgs		1	--	--	--
	196-BH3-99-40-SD	Subsurface sample duplicate from 40 ft bgs		1	--	--	--
	196-BH3-99-65-SS	Subsurface sample from 65 ft bgs		1	--	--	--
	196-BH3-99-75-SS	Subsurface sample from 75 ft bgs		1	--	--	--
Quality Assurance/Quality Control Samples (aqueous matrix)							
602811	196-BH3-99-TB	09-02-99		1	--	--	--
602812	196-BH2-99-TB	09-01-99		1	--	--	--
	196-BH2-99-EB			--	1	1	1

[a]Analysis request/chain-of-custody record.
[b]EPA November 1986.

bgs	= Below ground surface.	SD	= Sample duplicate.
BH	= Borehole.	SS	= Soil sample.
EB	= Equipment blank.	SVOC	= Semivolatile organic compound.
EPA	= U.S. Environmental Protection Agency.	SWMU	= Solid Waste Management Unit.
ER	= Environmental Restoration.	TB	= Trip blank.
ft	= Foot (feet).	TPH	= Total petroleum hydrocarbon(s).
ID	= Identification.	VOC	= Volatile organic compound.
RCRA	= Resource Conservation and Recovery Act.	--	= Analysis not performed on sample.

Table 1.2-13
SWMU 196 Confirmatory Soil Sampling Summary, VOC Analytical Detections
August–September 1999
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260[a]) (µg/kg)				
Record Number[b]	ER Sample ID	Sample Depth (ft)[c]	Carbon disulfide	Ethylbenzene	Methylene chloride	Toluene	Xylene
602756	196-BH2-99-25-SS	25	ND (0.3 J)	**1.4 J**	ND (1.4 J)	**2.1 J**	**7 J**
602756	196-BH2-99-30-SS	30	ND (0.3)	**1.5**	ND (1.4)	**2.4**	**8.8**
602756	196-BH2-99-90-SS	90	ND (0.3)	**1.1**	ND (1.4)	**3**	**6**
602813	196-BH3-99-24-SS	24	**4.3 J (25)**	ND (0.3)	**9.1 J (25)**	ND (0.9)	ND (0.7)
602813	196-BH3-99-75-SS	75	ND (0.3) R	ND (0.3) R	**1.5 J (5)**	ND (0.9) R	ND (0.7) R
Quality Assurance/Quality Control Samples (µg/L)							
602812	196-BH1-99-TB	NA	ND (1.8)	ND (0.3)	**1.5 J (5)**	ND (0.5)	ND (1.1 J)
602812	196-BH1-99-EB	NA	ND (1.8)	ND (0.3)	**1.7 J (5)**	ND (0.5)	ND (1.1)
602812	196-BH2-99-EB	NA	ND (1.8)	ND (0.3)	**1.2 J (5)**	ND (0.5)	ND (1.1)
602812	196-BH2-99-TB	NA	ND (1.8)	ND (0.3)	**2.1 J (5)**	ND (0.5)	ND (1.1)
602811	196-BH3-99-TB	NA	ND (1.8)	ND (0.3)	ND (1.2)	ND (0.5 J)	ND (1.1)

Note: Values in **bold** represent detected VOCs.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Sample depth for vertical borehole BH2 is ft below ground surface. Sample depth for angled borehole BH3 is linear ft along borehole.

BH = Borehole.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J = Estimated value; see data validation report (Attachment D).
J ( ) = The reported value is greater than or equal to the method detection limit but is less than the reporting limit, shown in parentheses.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND( ) = Not detected above the method detection limit, shown in parentheses.
ND (J) = Not detected; uncertainty in the method detection limit shown in parentheses.
R = Rejected data, see data validation report (Attachment D).
SS = Soil sample.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
VOC = Volatile organic compound.

Table 1.2-14
VOC Analytical Method Detection Limits
EPA Method 8260[a]
SWMU 196 Confirmatory Soil Sampling
September 1999
(Off-Site Laboratory)

Analyte	Soil Sample MDLs (µg/kg)	Aqueous EB and TB Sample MDLs (µg/L)
Acetone	10.3	3.7
Benzene	0.5	0.3
Bromodichloromethane	0.1	0.4
Bromoform	0.3	0.4
Bromomethane	0.3	0.4
2-Butanone	3.2	5.9
Carbon disulfide	0.3	1.8
Carbon tetrachloride	0.5	0.2
Chlorobenzene	0.3	0.3
Chloroethane	0.3	0.3
Chloroform	0.1	0.7
Chloromethane	0.2	0.2
Dibromochloromethane	0.2	0.3
1,1-Dichloroethane	0.1	0.4
1,2-Dichloroethane	0.2	0.2
1,1-Dichloroethene	0.3	0.7
cis-1,2-Dichloroethene	0.1	0.7
trans-1,2-Dichloroethene	0.1	0.3
1,2-Dichloropropane	0.2	0.2
cis-1,3-Dichloropropene	0.2	0.3
trans-1,3-Dichloropropene	0.3	0.3
Ethylbenzene	0.3	0.3
2-Hexanone	2.8	3.2
Methylene chloride	1.4	1.2
4-Methyl-2-pentanone	3.1	1.6
Styrene	0.3	0.2
1,1,2,2-Tetrachloroethane	0.6	0.5
Tetrachloroethene	0.4	0.7
Toluene	0.9	0.5
1,1,1-Trichloroethane	0.1	0.2
1,1,2-Trichloroethane	0.3	0.4
Trichloroethene	0.3	0.6
Vinyl acetate	2.1	1.8
Vinyl chloride	0.4	0.4
Xylene	0.7	1.1

[a]EPA November 1986.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
VOC = Volatile organic compound.

Table 1.2-15
SVOC Analytical Method Detection Limits
EPA Method 8270[a]
SWMU 196 Confirmatory Soil Sampling
September 1999
(Off-Site Laboratory)

Analyte	Record Number 602811 Soil Sample MDL (µg/kg)	Record Number 602812 Soil Sample MDL (µg/kg)	Record Number 602812 Aqueous Sample MDL (µg/L)
Acenaphthene	15,800	160	2.2
Acenaphthylene	14,500	147	1.3
Anthracene	8,550	86.7	2.3
Benzo(a)anthracene	6,580	66.7	2.8
Benzo(a)pyrene	7,240	73.3	2
Benzo(b)fluoranthene	14,100	143	4.7
Benzo(g,h,i)perylene	7,890	80	2.5
Benzo(k)fluoranthene	13,200	133	2.6
4-Bromophenyl phenyl ether	11,500	117	0.03
Butylbenzyl phthalate	8,880	90	3.7
Carbazole	15,100	153	2.4
4-Chloro-3-methylphenol	12,500	127	3.1
4-Chlorobenzenamine	15,100	153	1.5
bis(2-Chloroethoxy)methane	16,800	170	2.5
bis(2-Chloroethyl)ether	5,260	53.3	2
bis-Chloroisopropyl ether	10,200	103	0.61
2-Chloronaphthalene	17,100	173	2.4
2-Chlorophenol	15,500	157	2.1
4-Chlorophenyl phenyl ether	14,500	147	2.8
Chrysene	5,260	53.3	2.2
m,p-Cresol	15,100	153	1.8
o-Cresol	6,250	63.3	2.1
Dibenz[a,h]anthracene	8,220	83.3	2.2
Dibenzofuran	13,200	133	4.3
1,2-Dichlorobenzene	16,800	170	2.7
1,3-Dichlorobenzene	12,800	130	2.5
1,4-Dichlorobenzene	6,020	61	2.3
3,3'-Dichlorobenzidine	27,300	277	4.2
2,4-Dichlorphenol	17,400	177	1.4
Diethylphthalate	7,570	76.7	2.1
2,4-Dimethylphenol	10,900	110	6.1
Dimethylphthalate	10,900	110	2.1
Di-n-butyl phthalate	7,240	73.3	2.9
Dinitro-o-cresol	9,870	100	0.67
2,4-Dinitrophenol	36,200	367	7.9
2,4-Dinitrotoluene	11,500	117	1.4
2,6-Dinitrotoluene	13,800	140	1.14
Di-n-octyl phthalate	17,100	173	4.2

Refer to footnotes at end of table.

Table 1.2-15 (Concluded)
SVOC Analytical Method Detection Limits
EPA Method 8270[a]
SWMU 196 Confirmatory Soil Sampling
September 1999
(Off-Site Laboratory)

Analyte	Record Number 602811 Soil Sample MDL (µg/kg)	Record Number 602812 Soil Sample MDL (µg/kg)	Record Number 602812 Aqueous Sample MDL (µg/L)
1,2-Diphenylhydrazine	5,590	56.7	2.3
bis(2-Ethylhexyl) phthalate	29,600	300	3.7
Fluoranthene	6,580	66.7	3.1
Fluorene	11,200	113	2.1
Hexachlorobenzene	6,910	70	2.9
Hexachlorobutadiene	15,100	153	3.8
Hexachlorocyclopentadiene	19,100	193	4.4
Hexachloroethane	13,200	133	3.4
Indeno(1,2,3-cd)pyrene	7,890	80	3.4
Isophorone	14,500	147	2.6
2-Methylnaphthalene	20,100	203	3.2
Naphthalene	15,500	157	2
2-Nitroaniline	6,580	66.7	2.8
3-Nitroaniline	8,220	83.3	1.8
4-Nitroaniline	10,200	103	1.02
Nitrobenzene	13,200	133	3.3
2-Nitrophenol	17,800	180	2.92
4-Nitrophenol	10,900	110	3.5
n-Nitrosodiphenylamine	2,040	20.7	1.17
n-Nitrosodipropylamine	12,800	130	3.1
Pentachlorophenol	5,590	56.7	2.8
Phenanthrene	5,920	60	1.8
Phenol	5,590	56.7	0.8
Pyrene	7,240	73.3	2.5
1,2,4-Trichlorobenzene	18,400	187	2.4
2,4,5-Trichlorophenol	15,100	153	2.5
2,4,6-Trichlorophenol	7,570	76.7	0.96

[a]EPA November 1986.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.

Table 1.2-16
SWMU 196 Confirmatory Soil Sampling Summary
TPH Analytical Results
August–September 1999
(Off-Site Laboratory)

Record Number[b]	ER Sample ID	Date Sampled	Sample Depth (ft)[c]	TPH (EPA Method 418.1[a]) (mg/kg)	TPH Method Detection Limit (EPA Method 418.1[a]) (mg/kg)
Borehole BH2					
602812	196-BH2-99-25-SS	08-31-99	25	5,220	495
602812	196-BH2-99-30-SS	08-31-99	30	1,170	99
602812	196-BH2-99-35-SD	08-31-99	35	26.4 J	9.9
602812	196-BH2-99-35-SS	08-31-99	35	95.1	9.9
602812	196-BH2-99-40-SS	09-01-99	40	32.4 J	9.9
602812	196-BH2-99-45-SS	09-01-99	45	96.3	9.9
602812	196-BH2-99-50-SS	09-01-99	50	141	9.9
602812	196-BH2-99-60-SS	09-01-99	60	122	9.9
602812	196-BH2-99-70-SS	09-01-99	70	10.9 J	9.9
602812	196-BH2-99-80-SS	09-01-99	80	12.5 J	9.9
602812	196-BH2-99-90-SS	09-01-99	90	75.8 J	9.9
602812	196-BH2-99-100-SS	09-01-99	100	48 J	9.9
Borehole BH3					
602811	196-BH3-99-14-SS	09-02-99	14	1,970	99
602811	196-BH3-99-19-SS	09-02-99	19	4,620	495
602811	196-BH3-99-24-SS	09-02-99	24	5,710	495
602811	196-BH3-99-28-SS	09-02-99	28	6,420	495
602811	196-BH3-99-40-SD	09-02-99	40	10,900	495
602811	196-BH3-99-40-SS	09-02-99	40	11,200	495
602811	196-BH3-99-65-SS	09-02-99	65	17,300	990
602811	196-BH3-99-75-SS	09-02-99	75	25,500	990
Quality Assurance/Quality Control Sample (mg/L)					
602812	196-BH2-99-EB	09-01-99	NA	ND	0.277

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Sample depth for vertical borehole BH2 is ft below ground surface. Sample depth for angled borehole BH3 is linear ft along borehole.

BH = Borehole.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J = Estimated concentration.
mg/kg = Milligrams(s) per kilogram.
mg/L = Milligrams(s) per liter.
NA = Not applicable.
ND = Not detected.
SD = Sample duplicate.
SS = Soil sample.
SWMU = Solid Waste Management Unit.
TPH = Total petroleum hydrocarbon(s).

Table 1.2-17
SWMU 196 Confirmatory Soil Sampling Summary
RCRA Metals Analytical Results
August–September 1999
(Off-Site Laboratory)

Sample Attributes				Metals (EPA 6010/7000[a]) (mg/kg)								
Record Number[b]	ER Sample ID	Sample Date	Sample Depth (ft)[c]	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Borehole BH2												
602812	196-BH2-99-25-SS	08-31-99	25	3.32	50.5 J	0.252 J (0.5)	ND (0.038)	7.3	4.65	ND (0.00211)	ND (0.27)	0.32 J
602812	196-BH2-99-30-SS	08-31-99	30	2.73 J	174 J	0.317 J (0.485)	ND (0.0369)	9.77	3.13	ND (0.00202)	ND (0.262)	0.435 J
602812	196-BH2-99-35-SD	08-31-99	35	2.77 J	105 J	0.281 J (0.459)	ND (0.0349)	6.7	4.01	0.00614 J	ND (0.248)	0.41 J
602812	196-BH2-99-35-SS	08-31-99	35	2.07 J	111 J	0.218 J (0.485)	ND (0.0369)	4.94	3.4	0.0126 J	ND (0.262)	0.346 J
602812	196-BH2-99-40-SS	09-01-99	40	2.72 J	79.6 J	0.253 J (0.495)	ND (0.0376)	6.21	4.31	0.00548 J	ND (0.267)	0.361 J
602812	196-BH2-99-45-SS	09-01-99	45	2.15 J	54.6 J	0.261 J (0.463)	ND (0.0352)	9.83	3.3	ND (0.00195)	ND (0.25)	0.221 J
602812	196-BH2-99-50-SS	09-01-99	50	2.04 J	28.9 J	0.243 J (0.463)	ND (0.0352)	5.41	2.89	ND (0.00213)	ND (0.25)	0.324 J
602812	196-BH2-99-60-SS	09-01-99	60	2.44 J	61.5 J	0.273 J (0.467)	ND (0.0355)	7.38	3.35	0.00276 J	ND (0.252)	0.291 J
602812	196-BH2-99-70-SS	09-01-99	70	2.02 J	24.5 J	0.233 J (0.481)	ND (0.0365)	7.42	2.75	0.00533 J	ND (0.26)	0.438 J
602812	196-BH2-99-80-SS	09-01-99	80	2.43 J	63.1 J	0.212 J (0.49)	ND (0.0373)	10.7	3.75	ND (0.00199)	ND (0.265)	0.394 J
602812	196-BH2-99-90-SS	09-01-99	90	3.27 J	193 J	0.314 J (0.495)	ND (0.0376)	8.34	5.73	0.0022 J	ND (0.267)	0.455 J
602812	196-BH2-99-100-SS	09-01-99	100	3.37	90.8	0.381 J (0.463)	ND (0.0352)	12.9	5.62	0.00566 J	ND (0.25)	0.401 J
Borehole BH3												
602811	196-BH3-99-14-SS	09-02-99	14	3.64	**278**	0.448 J (0.459)	ND (0.0349)	8.72	6.57 J	0.00512 J	0.474	ND (0.055)
602811	196-BH3-99-19-SS	09-02-99	19	4.18	108	0.458 J (0467)	ND (0.0355)	9.29	6.56 J	0.00463 J	0.615	ND (0.0561)
602811	196-BH3-99-24-SS	09-02-99	24	2.24	84	0.292 J (0.485)	ND (0.0369)	14.1	4.75	ND (0.00178 J)	0.551 J	ND (0.0583)

Refer to footnotes at end of table.

Table 1.2-17 (Concluded)
SWMU 196 Confirmatory Soil Sampling Summary
RCRA Metals Analytical Results
August–September 1999
(Off-Site Laboratory)

Sample Attributes				Metals (EPA 6010/7000[a]) (mg/kg)								
Record Number[b]	ER Sample ID	Sample Date	Sample Depth (ft)[c]	Arsenic	Barium	Beryllium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
602811	196-BH3-99-28-SS	09-02-99	28	3.23	70.4	0.312 J (0.485)	ND (0.0369)	6.87	5.61	ND (0.00209 J)	0.517 J	ND (0.0583)
602811	196-BH3-99-40-SD	09-02-99	40	2.6	**286**	0.324 J (0.485)	ND (0.0369)	5.9	4.87	ND (0.00212 J)	0.402 J	ND (0.0583)
602811	196-BH3-99-40-SS	09-02-99	40	2.34	119	0.319 J (0.481)	ND (0.0365)	5.6	4.84	ND (0.00215 J)	0.564 J	ND (0.0577)
602811	196-BH3-99-65-SS	09-02-99	65	1.91	20.6	0.188 J (0.485)	ND (0.0369)	6.19	4.96	ND (0.00195 J)	0.384 J	ND (0.0583)
602811	196-BH3-99-75-SS	09-02-99	75	2.32	62.3	0.322 J (0.49)	ND (0.0373)	7.08	5.09	ND (0.00181 J)	0.405 J	ND (0.0588)
Background Concentration[d]				4.4	214	0.65	0.9	15.9	11.8	<0.1	<1	<1
Quality Assurance/Quality Control Samples (mg/L)												
602812	196-BH1-99-EB	08-31-99		ND (0.00451)	ND (0.00051)	ND (0.00026)	ND (0.00044)	ND (0.00056)	ND (0.00159)	ND (0.00004)	ND (0.00271)	ND (0.00073)
602812	196-BH2-99-EB	09-01-99		ND (0.00451)	ND (0.00051)	ND (0.00026)	ND (0.00044)	ND (0.00056)	ND (0.00159)	ND (0.00004)	ND (0.00271)	ND (0.00073)

Note: Values in **bold** exceed background soil concentrations.

[a]EPA November 1986.

[b]Analysis request/chain-of-custody record.

[c]Sample depth for vertical borehole BH2 is ft below ground surface. Sample depth for angled borehole BH3 is linear ft along borehole.

[d]Dinwiddie September 1997, Southwest Area Supergroup.

BH = Borehole.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J = Estimated value.
J ( ) = Estimated value less than the reporting limit shown in parentheses.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
ND ( ) = Not detected above the method detection limit, shown in parentheses.
ND (J) = Not detected, uncertainty in the detection limit shown in parentheses.
RCRA = Resource Conservation and Recovery Act.
SD = Soil sample duplicate.
SS = Subsurface soil sample.
SWMU = Solid Waste Management Unit.

Table 1.2-18
Metals Analytical Method Detection Limits
EPA Methods 6010/7000[a]
SWMU 196 Confirmatory Soil Sampling
August–September, 1999
(Off-Site Laboratory)

Analyte	Soil Sample MDL (mg/kg)	Aqueous EB Sample MDL (mg/L)
Arsenic	0.417–0.45	0.00451
Barium	0.0495–0.54	0.00051
Beryllium	0.022–0.024	0.00026
Cadmium	0.0349–0.038	0.00044
Chromium	0.0697–0.076	0.00056
Lead	0.144–0.157	0.00159
Mercury	0.00168–0.00222	0.00004
Selenium	0.248–0.27	0.00271
Silver	0.055–0.06	0.00073

[a]EPA November 1986.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
MDL = Method Detection Limit.
mg/kg = Milligrams(s) per kilogram.
mg/L = Milligrams(s) per liter.
SWMU = Solid Waste Management Unit.

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2.0 RESPONSES TO REQUEST FOR SUPPLEMENTAL INFORMATION DATED NOVEMBER 2000

The overall objective of the work detailed in the second FIP for SWMU 196 (SNL/NM May 2003) was to define the vertical extent of contamination as requested by the NMED and to acquire analytical data to support an NFA decision.

2.1 2003 Drilling Activities

In June 2003, a dual-wall percussion hammer drill rig was employed to drill one vertical borehole as close as possible to the outside of the Cistern wall. Located approximately 20 feet west of the Cistern, and in accordance with agreements reached with the NMED (Langkopf March 2003), the borehole was to be advanced until two consecutive, field-screened sample results showed less than 100 parts per million of TPH. Figure 2.1-1 provides the location of the borehole (BH4). Drilling activities were conducted from June 11 through June 13, 2003, and concluding with plugging and abandoning the borehole on June 14, 2003. Final depth of the borehole was 300 feet bgs.

2.2 Confirmatory Soil Sample Collection and Analysis

Confirmatory soil samples were collected as detailed in the FIP (SNL/NM May 2003). Collection of soil samples from the borehole began at 100 feet bgs and continued at 10-foot intervals to 150 feet bgs, as agreed upon. At 150 feet bgs, soil samples were collected every 10 feet and were to be field-screened for TPH by an immunoassay method. However, difficulties with the field-screening equipment prevented determination of TPH levels in the field. Instead, soil samples were collected and sent to a local off-site laboratory (Pinnacle Laboratories) that provided fast turnaround on sample results so that the drilling activities would not be delayed. These samples were analyzed by U.S. Environmental Protection Agency (EPA) Method 418.1 for TPH (EPA November 1986). Analytical results for the field-screening samples from Pinnacle are not used for site characterization in this RSI response. Soil samples were collected with a split-spoon sampler at the defined intervals. A split of all samples was also sent to Severn-Trent Laboratories (STL) following standard procedures. The samples are recorded on AR/COC Forms 606401 through 606407 and 606413 through 606415, as provided in Attachment C. Samples were submitted for analyses for VOCs (EPA Method 8260), SVOCs (EPA Method 8270), and TPH (EPA Method 8015 modified) and were used for site characterization purposes. Metals were eliminated from further consideration as the earlier investigations determined that metal contamination was limited to the uppermost 6 inches of the bottom of the Cistern.

The criteria used to determine borehole depth was based upon results of TPH analysis for the field-screening soil samples sent to Pinnacle Laboratories. The condition of two consecutive samples from the borehole with results of less than 100 mg/kg TPH by EPA Method 418.1 was used. This method is suitable for field-screening purposes only. The criteria for determining the vertical extent of contamination was based upon TPH analysis for the confirmatory soil samples sent to STL. The condition of two consecutive soil samples from the borehole with no detection of TPH by EPA Method 8015 modified was used. The TPH field-screening results indicated the presence of TPH at greater than 100 mg/kg in the soil sample collected from 260 feet bgs. The

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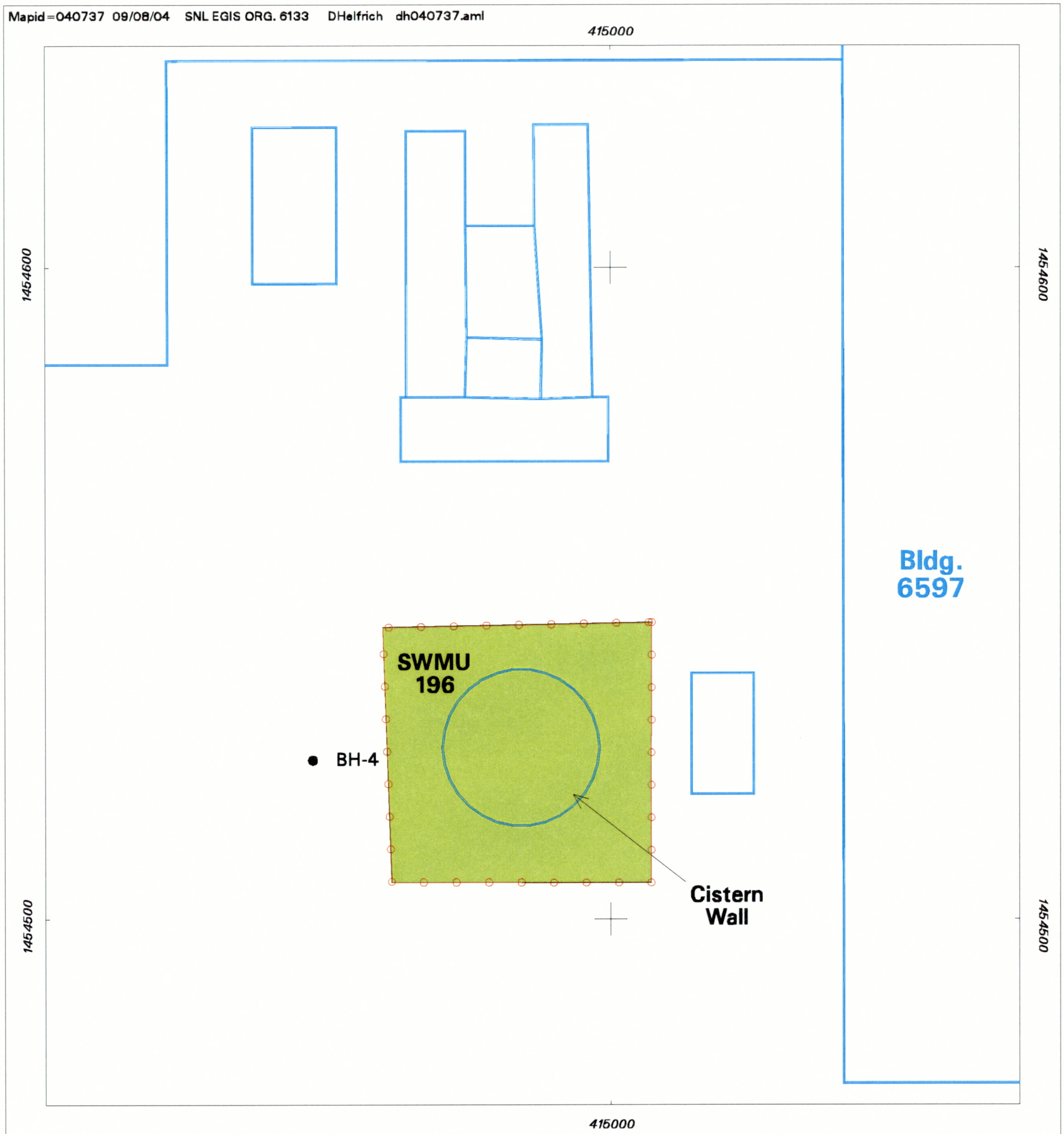

Legend

BH-4 Approximate Vertical Borehole Location

Fence

Building / Structure

SWMU 196

Figure 2.1-1
SWMU 196
Location of Borehole, TA-V, 2003

0 12.5 25
Scale in Feet

0 3 6
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.02110000 A10

results for the samples from 280 and 300 feet bgs were less than the field-screening criteria of 100 mg/kg. Thus, the total depth of the borehole was 300 feet bgs. The analysis of the confirmatory soil samples for TPH by EPA Method 8015 is discussed in Section 2.3.

Sixteen discrete soil samples and three soil sample duplicates were collected for laboratory analysis. Table 2.2-1 summarizes features for each sample, including sample identification, sample location rationale, and analytical suites.

Three equipment blanks were prepared at the site during the sampling event and were submitted for analysis. Three trip blanks accompanied the soil samples from the field and were submitted for VOC analysis.

2.3 Confirmatory Soil Sampling Analytical Results

Tables 2.3-1 through 2.3-4 provide the analytical results and method detection limits for the confirmatory soil sampling conducted at SWMU 196. Results of the quality assurance (QA)/quality control (QC) samples are also provided in Tables 2.3-1 through 2.3-4 and are discussed in Section 2.5.

VOCs

Table 2.3-1 provides the results for the VOC analyses for the soil samples, the soil duplicates, equipment blanks, and trip blanks. Ten VOCs were detected in the soil samples, and one VOC was detected in a trip blank. Most values are J qualified. Table 2.3-2 provides the VOC method detection limit values.

SVOCs

Table 2.3-3 provides the results of the SVOC analyses for the soil samples, soil duplicates, and equipment blanks. No SVOC samples were collected from the 220-foot interval due to insufficient sample volume recovery. SVOCs in the soil samples included one detection each of chrysene at 86 J µg/kg, diethylphthalate at 390 µg/kg, fluoranthene at 330 µg/kg, phenanthrene at 140 J µg/kg, pyrene at 220 J µg/kg, and multiple detections of bis(2 ethylhexyl) phthalate, most with a J qualification. The SVOC method detection limit values are presented in Table 2.3-4.

TPH

No TPH samples were collected from the 120-, 130-, 150-, and 220-foot intervals due to insufficient sample volume recovery. No TPH detections were reported in any of the confirmatory soil samples, soil duplicates, and equipment blanks. The TPH method detection limit value is 1.89 mg/kg (Table 2.3-5).

Table 2.2-1
SWMU 196 Borehole BH4 Confirmatory Soil Sample Summary and Analytical Suites
June 2003

Sample Attributes				Analytical Suites		
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 8015 Modified[b])
606401	TA3/5-196-C01-100-SS	Subsurface sample from 100 ft bgs	06-11-03	1	1	1
	TA3/5-196-C02-110-SS	Subsurface sample from 110 ft bgs		1	1	1
	TA3/5-196-C02-110-SD	Subsurface sample duplicate from 110 ft bgs		1	1	1
606402	TA3/5-196-C03-120-SS	Subsurface sample from 120 ft bgs	06-11-03	1	1	NR
	TA3/5-196-C04-130-SS	Subsurface sample from 130 ft bgs		1	1	NR
606403	TA3/5-196-C05-140-SS	Subsurface sample from 140 ft bgs	06-11-03	1	1	1
	TA3/5-196-C06-150-SS	Subsurface sample from 150 ft bgs		1	1	NR
606404	TA3/5-196-C07-160-SS	Subsurface sample from 160 ft bgs	06-11-03	1	1	1
	TA3/5-196-C07-160-SD	Subsurface sample duplicate from 160 ft bgs		1	1	1
606405	TA3/5-196-C09-180-SS	Subsurface sample from 180 ft bgs	06-12-03	1	1	1
	TA3/5-196-C10-190-SS	Subsurface sample from 190 ft bgs		1	1	1
606406	TA3/5-196-C11-200-SS	Subsurface sample from 200 ft bgs	06-12-03	1	1	1
	TA3/5-196-C11-200-SD	Subsurface sample duplicate from 200 ft bgs		1	1	1
	TA3/5-196-C12-210-SS	Subsurface sample from 210 ft bgs		1	1	1
606407	TA3/5-196-C13-220-SS	Subsurface sample from 220 ft bgs	06-12-03	1	NR	NR
	TA3/5-196-C14-230-SS	Subsurface sample from 230 ft bgs		1	1	1
606413	TA3/5-196-C17-260-SS	Subsurface sample from 260 ft bgs	06-13-03	1	1	1
606414	TA3/5-196-C19-280-SS	Subsurface sample from 280 ft bgs	06-13-03	1	1	1
606415	TA3/5-196-C21-300-SS	Subsurface sample from 300 ft bgs	06-13-03	1	1	1
Quality Assurance/Quality Control Samples (aqueous matrix)						
606404	TA3/5-190-0X-TB[c]	NA	06-11-03	1	NA	NA
	TA3/5-190-0X-EB[c]	NA		1	1	NA
606407	TA3/5-190-0X-TB[c]	NA	06-12-03	1	NA	NA
	TA3/5-190-0X-EB[c]	NA		1	1	NA

Refer to footnotes at end of table.

Table 2.2-1 (Concluded)
SWMU 196 Borehole BH4 Confirmatory Soil Sample Summary and Analytical Suites
June 2003

Sample Attributes				Analytical Suites		
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 8015 Modified[b])
606415	TA3/5-190-0X-TB[c]	NA	06-13-03	1	NA	NA
	TA3/5-190-0X-EB[c]	NA		1	1	NA

[a]Analysis request/chain-of-custody record.
[b]EPA November 1986.
[c]Nomenclature used for TB and EB samples was erroneous. 190 and 0X do not represent correct identifications.

bgs = Below ground surface.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
NA = Not applicable.
NR = No recovery; sample volume not sufficient for analysis.
SD = Soil sample duplicate.
SS = Subsurface soil sample.
SVOC = Semivolatile organic compound.
SWMU = Solid waste management unit.
TA = Technical area.
TB = Trip blank.
TPH = Total petroleum hydrocarbon(s).
VOC = Volatile organic compound.

Table 2.3-1
SWMU 196 Confirmatory Soil Sampling Summary, VOC Analytical Detections
June 2003
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260[a]) (µg/kg)									
Record Number[b]	ER Sample ID	Sample Depth (ft bgs)	1,1,1-Trichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	Chloro-methane	Methylene chloride	Tetrachloro-ethene	Toluene	Trichloro-ethene
606401	TA 3/5-196-C01-100-SS	100	**0.44 J (5)**	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5)	ND (0.2)	**0.67 J (5)**	ND (0.06)
606401	TA 3/5-196-C02-110-SS	110	ND (0.11 J)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5 J)	ND (0.2)	ND (0.59 J)	ND (0.06 J)
606401	TA 3/5-196-C02-110-SD	110	**0.43 J (5)**	ND (0.68)	ND (0.14)	ND (0.1)	**6 J**	ND (0.23)	ND (5)	ND (0.2)	ND (0.59)	ND (0.06)
606402	TA 3/5-196-C03-120-SS	120	**7.2**	**0.84 J (5)**	ND (0.14)	ND (0.1)	**10 J**	ND (0.23)	ND (11)	ND (0.2)	**0.66 J (5)**	**0.77 J (5)**
606402	TA 3/5-196-C04-130-SS	130	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	**15 J (20)**	ND (0.23)	**13**	ND (0.2)	ND (0.59)	ND (0.06)
606403	TA 3/5-196-C05-140-SS	140	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	**14 J (20)**	ND (0.23)	**13**	ND (0.2)	ND (0.59)	ND (0.06)
606403	TA 3/5-196-C06-150-SS	150	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	**26**	ND (0.23)	**11**	ND (0.2)	**1.2 J (5)**	ND (0.06)
606404	TA 3/5-196-C07-160-SS	160	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	**8 J**	ND (0.23)	ND (5)	ND (0.2)	ND (0.59)	ND (0.06)
606404	TA 3/5-196-C07-160-SD	160	**0.5 J (5)**	ND (0.68)	ND (0.14)	ND (0.1)	**7.2 J**	ND (0.23)	ND (5)	ND (0.2)	**2.2 J (5)**	ND (0.06)
606405	TA 3/5-196-C09-180-SS	180	ND (0.11)	ND (0.68)	**0.32 J (5)**	ND (0.1)	ND (1.11)	ND (0.23)	**3.5 J (5)**	ND (0.2)	ND (0.59)	ND (5)
606405	TA 3/5-196-C10-190-SS	190	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	**0.27 J (10)**	ND (2.64)	ND (0.2)	ND (0.59)	ND (0.06)
606406	TA 3/5-196-C11-200-SS	200	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5)	ND (0.2)	ND (0.59)	ND (5)
606406	TA 3/5-196-C11-200-SD	200	ND (0.11)	ND (0.68)	**0.24 J (5)**	ND (0.1)	ND (1.11)	ND (0.23)	ND (5)	ND (0.2)	ND (0.59)	ND (5)
606406	TA 3/5-196-C12-210-SS	210	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5)	**0.66 J (5)**	ND (0.59)	ND (5)
606414	TA 3/5-196-C19-280-SS	280	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5)	ND (0.2)	ND (0.59)	ND (0.06)
606415	TA 3/5-196-C21-300-SS	300	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5)	ND (0.2)	ND (0.59)	ND (0.06)

Refer to footnotes at end of table.

Table 2.3-1 (Concluded)
SWMU 196 Confirmatory Soil Sampling Summary, VOC Analytical Detections
June 2003
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260[a]) (µg/kg)									
Record Number[b]	ER Sample ID	Sample Depth (ft bgs)	1,1,1-Trichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	Chloro-methane	Methylene chloride	Tetrachloro-ethene	Toluene	Trichloro-ethene
Quality Assurance/Quality Control Samples (µg/L)												
606404	TA 3/5-196-0X-EB	NA	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (5.5)	ND (0.2)	ND (0.59)	ND (0.06)
606415	TA 3/5-196-0X-EB	NA	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (2.64)	ND (0.2)	ND (0.59)	ND (0.06)
606404	TA 3/5-196-0X-TB	NA	ND (0.11)	ND (0.68)	ND (0.14)	ND (0.1)	ND (1.11)	ND (0.23)	ND (6.1)	ND (0.2)	ND (0.59)	ND (0.06)
606415	TA 3/5-196-0X-TB	NA	ND (0.11)	ND (0.68)	ND (0.14)	**4.3 J (5)**	ND (1.11)	ND (0.23)	ND (2.64)	ND (0.2)	ND (0.59)	ND (0.06)

Note: Values in **bold** represent detected VOCs.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

0X	= Placeholder for depth designation in sample identification.
bgs	= Below ground surface.
EB	= Equipment blank.
EPA	= U.S. Environmental Protection Agency.
ER	= Environmental Restoration.
ft	= Foot (feet).
ID	= Identification.
J ( )	= The reported value is greater than or equal to the method detection limit but is less than the reporting limit, shown in parentheses.
J	= Estimated concentration.
µg/kg	= Microgram(s) per kilogram.
µg/L	= Microgram(s) per liter.
NA	= Not applicable.
ND (J)	= Not detected, uncertainty in the detection limit shown in parentheses.
ND ( )	= Not detected above the method detection limit, shown in parentheses.
SD	= Soil sample duplicate.
SS	= Subsurface soil sample.
SWMU	= Solid Waste Management Unit.
TA	= Technical Area.
TB	= Trip blank.
VOC	= Volatile organic compound.

Table 2.3-2
Summary of VOC Analytical Detection Limits
June 2003
(Off-Site Laboratory)

Analyte	Soil Sample MDLs (µg/kg)	Aqueous Sample MDLs (µg/L)
Acetone	1.3	1.3
Benzene	0.11	0.11
Bromodichloromethane	0.07	0.07
Bromoform	0.62	0.62
Bromomethane	0.89	0.89
2-Butanone	1.11	1.11
Carbon disulfide	0.27	0.27
Carbon tetrachloride	0.14	0.14
Chlorobenzene	0.12	0.12
Chloroethane	0.56	0.56
Chloroform	0.12	0.12
Chloromethane	0.23	0.23
Dibromochloromethane	0.59	0.59
1,1-Dichloroethane	0.21	0.21
1,2-Dichloroethane	0.14	0.14
1,1-Dichloroethene	0.68	0.68
1,2-Dichloroethene	0.61	0.61
1,2-Dichloropropane	0.1	0.1
cis-1,3-Dichloropropene	0.15	0.15
trans-1,3-Dichloropropene	0.53	0.53
Ethylbenzene	0.38	0.38
2-Hexanone	1.26	1.26
Methylene chloride	2.64	2.64
4-Methyl-2-pentanone	0.9	0.9
Styrene	0.2	0.2
1,1,2,2-Tetrachloroethane	0.73	0.73
Tetrachloroethene	0.2	0.2
Toluene	0.59	0.59
1,1,1-Trichloroethane	0.11	0.11
1,1,2-Trichloroethane	0.77	0.77
Trichloroethene	0.06	0.06
Vinyl chloride	0.64	0.64
Xylene	0.82	0.82

MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
VOC = Volatile organic compound.

Table 2.3-3
SWMU 196 Confirmatory Soil Sampling Summary, SVOC Analytical Detections
June 2003
(Off-Site Laboratory)

Sample Attributes			SVOCs (EPA Method 8270[a]) (µg/kg)					
Record Number[b]	ER Sample ID	Sample Depth (ft bgs)	Chrysene	Diethylphthalate	bis(2-Ethylhexyl) phthalate	Fluoranthene	Phenanthrene	Pyrene
606401	TA 3/5-196-C01-100-SS	100	**86 J (330)**	ND (40.86)	**430**	**330**	**140 J (330)**	**220 J (330)**
606401	TA 3/5-196-C02-110-SD	100	ND (14.35)	ND (40.86)	**130 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606401	TA 3/5-196-C02-110-SS	110	ND (14.35)	ND (40.86)	**140 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606402	TA 3/5-196-C03-120-SS	120	ND (14.35)	ND (40.86)	**270 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606402	TA 3/5-196-C04-130-SS	130	ND (14.35)	ND (40.86)	**110 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606403	TA 3/5-196-C05-140-SS	140	ND (14.35)	ND (40.86)	**75 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606403	TA 3/5-196-C06-150-SS	150	ND (14.35)	ND (40.86)	**180 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606404	TA 3/5-196-C07-160-SD	160	ND (14.35)	ND (40.86)	**68 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606404	TA 3/5-196-C07-160-SS	160	ND (14.35)	ND (40.86)	**110 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606405	TA 3/5-196-C09-180-SS	180	ND (14.35)	ND (40.86)	ND (34.13)	ND (22.99)	ND (16.21)	ND (22.22)
606405	TA 3/5-196-C10-190-SS	190	ND (14.35)	ND (40.86)	ND (34.13)	ND (22.99)	ND (16.21)	ND (22.22)
606406	TA 3/5-196-C11-200-SD	200	ND (14.35)	**390**	**69 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606406	TA 3/5-196-C11-200-SS	200	ND (14.35)	ND (40.86)	**69 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606406	TA 3/5-196-C12-210-SS	210	ND (14.35)	ND (40.86)	ND (34.13)	ND (22.99)	ND (16.21)	ND (22.22)
606414	TA 3/5-196-C19-280-SS	280	ND (14.35)	ND (40.86)	**120 J (330)**	ND (22.99)	ND (16.21)	ND (22.22)
606415	TA 3/5-196-C21-300-SS	300	ND (14.35)	ND (40.86)	ND (34.13)	ND (22.99)	ND (16.21)	ND (22.22)
Quality Assurance/Quality Control Samples (µg/L)								
606404	TA 3/5-196-0X-EB	NA	ND (0.6 J)	ND (0.24 J)	ND (10 J)	ND (0.44 J)	ND (0.4 J)	ND (0.46 J)
606415	TA 3/5-196-0X-EB	NA	ND (0.6)	ND (0.24)	ND (10)	ND (0.44)	ND (0.4)	ND (0.46)

Note: Values in **bold** represent detected SVOCs.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.

0X	= Placeholder for depth designation in sample identification.
bgs	= Below ground surface.
EB	= Equipment blank.
EPA	= U.S. Environmental Protection Agency.
ER	= Environmental Restoration.
ft	= Foot (feet).
ID	= Identification.
J ( )	= The reported value is greater than or equal to the method detection limit but is less than the reporting limit, shown in parentheses.
µg/kg	= Microgram(s) per kilogram.
µg/L	= Microgram(s) per liter.
NA	= Not applicable.
ND ( )	= Not detected above the method detection limit, shown in parentheses.
ND (J)	= Not detected; uncertainty in the detection limit shown in parentheses.
SS	= Subsurface soil sample.
SD	= Soil sample duplicate.
SVOC	= Semi volatile organic compound.
SWMU	= Solid Waste Management Unit.
TA	= Technical Area.

Table 2.3-4
Summary of SVOC Analytical Detection Limits
June 2003
(Off-Site Laboratory)

Analyte	Soil Sample MDL (µg/kg)	Aqueous Sample MDL (µg/L)
Acenaphthene	14.9	0.35
Acenaphthylene	16.42	0.34
Anthracene	17.84	0.39
Benzo(a)anthracene	22.9	0.47
Benzo(a)pyrene	19.38	1.1
Benzo(b)fluoranthene	38.49	0.83
Benzo(g,h,i)perylene	101.15	1.21
Benzo(k)fluoranthene	19.31	1.47
4-Bromophenyl phenyl ether	22.4	0.42
Butylbenzyl phthalate	25.99	0.55
Carbazole	20.2	0.42
4-Chloro-3-methylphenol	26.57	0.37
4-Chlorobenzenamine	30.52	1.09
Chlorobenzilate	8.22	0.3
bis(2-Chloroethoxy)methane	20.53	0.37
bis(2-Chloroethyl)ether	13.33	0.43
bis-Chloroisopropyl ether	15.25	0.27
2-Chloronaphthalene	15.55	0.28
2-Chlorophenol	13.72	0.25
4-Chlorophenyl phenyl ether	18.12	0.44
Chrysene	14.35	0.6
m-,p-Cresol	39.24	0.31
o-Cresol	19.42	0.24
Dibenz[a,h]anthracene	80.96	1.35
Dibenzofuran	22.31	0.36
1,2-Dichlorobenzene	12.06	0.28
1,3-Dichlorobenzene	11.57	0.29
1,4-Dichlorobenzene	13.69	0.41
3,3'-Dichlorobenzidine	22.95	1.33
2,4-Dichlorophenol	25.52	0.27
Diethylphthalate	40.86	0.24
2,4-Dimethylphenol	28.26	5.31
Dimethylphthalate	19.67	0.68
Di-n-butyl phthalate	27.85	0.47
Dinitro-o-cresol	61.95	0.53
2,4-Dinitrophenol	64.08	1.74
2,4-Dinitrotoluene	17.76	0.62
2,6-Dinitrotoluene	20.12	0.68
Di-n-octyl phthalate	141.71	5.12
bis(2-Ethylhexyl) phthalate	34.13	2.67
Fluoranthene	22.99	0.44
Fluorene	18.89	0.38
Hexachlorobenzene	17.76	0.47
Hexachlorobutadiene	12.27	0.41
Hexachlorocyclopentadiene	71.23	2.4

Refer to footnotes at end of table.

Table 2.3-4 (Concluded)
Summary of SVOC Analytical Detection Limits
June 2003
(Off-Site Laboratory)

Analyte	Soil Sample MDL (μg/kg)	Aqueous Sample MDL (μg/L)
Hexachloroethane	16.1	0.24
Indeno(1,2,3-cd)pyrene	17.05	1.24
Isophorone	18.34	0.23
2-Methylnaphthalene	14.85	0.37
Naphthalene	14.74	0.3
2-Nitroaniline	37.67	0.65
3-Nitroaniline	25.76	0.56
4-Nitroaniline	21.83	1.01
Nitrobenzene	17.98	0.34
2-Nitrophenol	19.47	0.64
4-Nitrophenol	42.19	0.81
n-Nitrosodiphenylamine	20.77	0.45
n-Nitrosodipropylamine	19.68	0.89
Pentachlorophenol	116.53	0.58
Phenanthrene	16.21	0.4
Phenol	87.16	0.26
Pyrene	22.22	0.46
1,2,4-Trichlorobenzene	17.29	0.42
2,4,5-Trichlorophenol	30.27	0.64
2,4,6-Trichlorophenol	31.3	0.44

MDL = Method detection limit.
μg/kg = Microgram(s) per kilogram.
μg/L = Microgram(s) per liter.
SVOC = Semivolatile organic compound.

Table 2.3-5
TPH Analytical Detection Limit
June 2003
(Off-Site Laboratory)

Analyte	Method Detection Limit (mg/kg)
TPH	1.89

mg/kg = Milligram(s) per kilogram.
TPH = Total petroleum hydrocarbon(s).

2.4 Quality Assurance/Quality Control Results

This section describes the data quality assessment results for the soil sample analyses at SWMU 196. The analytical results tables include the results for the QA/QC samples prepared for the confirmatory sampling event at SWMU 196.

One trip blank had a detection of the VOC 1,2-dichloropropane at 4.3 J μg/kg. No VOCs, SVOCs, or TPH were detected in the equipment blanks.

To assess the variability with the sampled matrix, three field duplicate samples were collected and analyzed. Relative percent differences (RPDs) can be calculated from the analyses of the sample and the duplicate. RPDs are not calculated for results because all the results were either nondetected or J qualified.

2.5 Data Validation

The 1994 and 1995 soil sample results were verified/validated by SNL/NM according to "Procedure for Validation of Chemical Measurement Data" Environmental Programs Department 7720, Procedure QA-11-01, Rev. 0, (SNL/NM October 1991) and "Verification and Validation of Chemical and Radiochemical Data" Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994). The AEN data set from 1996 as well as all the 1999 and 2003 data were validated according to "Data Validation Procedure for Chemical and Radiochemical Data," SNL/NM ER Project Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). Reviews confirmed that the data from the analytical laboratories are defensible and therefore acceptable for use in the NFA proposal, fulfilling the data quality objective requirements. Rejected data has been discussed, but not used for SWMU 196 site characterization purposes. Attachment D contains the data validation reports.

As noted in Sections 1.2.2 and 2.3, data for many samples have been J qualified (an estimated value). In addition, B qualified data, associated with blank contamination, have also been reported. VOC and SVOC data from 1999 were rejected in the data validation process due to matrix interference. Other than the rejected data, all data are usable, defensible, and appropriate for site characterization.

3.0 SITE CONCEPTUAL MODEL

The site conceptual model for SWMU 196 is based upon the COCs identified from operational history information and process knowledge. This section summarizes the nature and extent of contamination and the environmental fate of the COCs.

3.1 Nature and Extent of Contamination

The COCs for SWMU 196 include VOCs, SVOCs, metals, and radionuclides. Because the insulating oil was composed of petroleum hydrocarbons, VOCs and SVOCs were considered to be indicative of the presence of insulating oil. The insulating oil was not manufactured with metal, radionuclide, or PCB additives. Analyses for radionuclides and PCBs were performed as a measure of conservatism. The presence of elevated metals in the near subsurface soil of the Cistern may be attributable to corrosion of the PROTO piping system. Sections 1.0 and 2.0 of this RSI response summarize the SWMU 196 analytical results. The analytes selected and methods used are appropriate for characterizing the COCs and potential degradation products, if any, at SWMU 196.

Combining the results of the three investigations (1994 to 1996, 1999, and 2003), soil samples were collected from the surface to 13 feet bgs inside the Cistern to a maximum depth of 300 feet bgs near the Cistern in order to determine the nature and extent of contamination. Combined, these soil samples are considered to be representative of the native soil beneath and near the Cistern and are sufficient to determine the vertical extent of COCs.

Very low levels of VOCs and SVOCs were detected from 100 to 300 feet bgs during the 2003 investigation. No TPH was detected in any confirmatory soil samples. The vertical extent of contamination has therefore, been defined by these analyses. The NMED requirement for two consecutive nondetect TPH samples from the bottom of the borehole was achieved with the samples collected from 280 and 300 feet bgs. No VOCs or TPH were detected in the last two confirmatory soil samples from the borehole.

SWMU 196 is an inactive site and all primary sources of contamination have been eliminated. As a result, only secondary sources of COCs potentially remain in the soil in the form of adsorbed COCs. The COC migration in the soil is therefore predominantly dependent upon precipitation and occasional surface-water flow. The borehole data collected are adequate for characterizing the migration of COCs in the subsurface. Data available from TA-V monitoring wells (SNL/NM April 2004) are adequate for characterizing SWMU 196.

3.2 Environmental Fate and Transport

The primary releases of COCs at SWMU 196 were to the soil in the bottom of the 25-foot-diameter, 20-foot-deep Cistern resulting from disposal activities associated with Building 6597. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the area of the release point (the bottom of the Cistern) is small, none of these are considered to be of potential significance. Infiltration of precipitation is also considered to be low at SWMU 196, as virtually all of the moisture that enters the Cistern most likely evaporates. Because groundwater at this site is approximately 500 feet bgs (SNL/NM

April 2004), the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low. A depth of greater than 200 feet separates the area of the last detections of VOCs or SVOCs from the groundwater.

COCs at SMWU 196 are limited to organic constituents. The organic COCs (VOCs and SVOCs) at SWMU 196 may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation may occur; however, the arid environment may limit biological activity.

Wind, water, and biota are considered to be of low significance as potential transport mechanisms at this site. Significant leaching into the subsurface soil in unlikely, and leaching into the groundwater at this site is highly unlikely. The potential for transformation of COCs is low.

In summary, the design and execution of the confirmatory soil sampling for SWMU 196 was appropriate and adequate to determine the nature and extent of residual COCs in the subsurface soil at SWMU 196.

4.0 SITE ASSESSMENTS

The site assessments for SWMU 196 include a risk assessment analysis for human health and ecological risks as well as a surface-water assessment. This section provides a summary of the site assessment results.

4.1 Human Health and Ecological Risk Assessments

SWMU 196 has been recommended for an industrial land-use scenario (DOE et al. September 1995). Because soil at the site contains identified organic, inorganic, and radiological COCs either at levels above background or that have nonquantified background levels, it was necessary to perform a human health and ecological risk assessment for the site. Complete details of the human health and ecological risk assessments and uncertainties are provided in Attachment E.

The human health and ecological risk assessments concluded that SWMU 196 does not have the potential to adversely affect either human health or ecological receptors considering an industrial land-use scenario. Analytical data and modeling assumptions indicate that human health and ecological risks associated with SWMU 196 are acceptable for an industrial land-use scenario.

All acceptable data collected from SWMU 196 were used in the human health and ecological risk assessments. This included data from 1994 through 1996 for surface and subsurface soil samples (greater than 5 feet bgs) as well as data from 1999 and 2003 for subsurface soil samples.

4.1.1 Human Health Risk Assessment

The human health risk assessment process provides a quantitative evaluation of the potential adverse health effects from constituents in the soil at the site by calculating the hazard index (HI) and excess cancer risk for both industrial and residential land-use scenarios. Calculations for the nonradiological COCs show that for the industrial land-use scenario the HI (0.3) is significantly lower than the accepted numerical guidance from the EPA (1989). The estimated excess cancer risk is 3E-6. Thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.02 and the incremental excess cancer risk is 2.99E-6 for the industrial land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the industrial land-use scenario.

Using conservative assumptions and a reasonable maximum exposure approach to risk assessment, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (0.27) is also below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 6E-6. Thus, excess cancer risk is below the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.19 and the incremental excess cancer risk is 6.48E-6 for the residential land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the residential land-use scenario.

The incremental total effective dose equivalent (TEDE) and corresponding estimated cancer risk from the radiological COCs are much lower than EPA guidance values. The estimated TEDE is 1.2E-1 millirem (mrem)/year (yr) for the industrial land-use scenario, which is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997a). The corresponding incremental estimated cancer risk value is 1.0E-6 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional control is 4.3E-1 mrem/yr with an associated risk of 3.3E-6. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, SWMU 196 is eligible for unrestricted radiological release.

The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 4.1-1.

Table 4.1-1
Summation of Incremental Nonradiological and Radiological Risks from
SWMU 196, Building 6597 Cistern Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	2.99E-6	1.0E-6	4.0E-6
Residential	6.48E-6	3.3E-6	9.8E-6

SWMU = Solid Waste Management Unit.

Uncertainties associated with the calculations are considered small relative to the conservatism of this risk assessment analysis. Therefore, it is concluded that this site poses insignificant risk to human health under both the industrial and residential land-use scenarios.

4.1.2 Ecological Risk Assessment

An ecological assessment that corresponds with the procedures in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997b) also was performed as set forth by the NMED Risk-Based Decision Tree in the "RPMP [RCRA Permits Management Program] Document Requirement Guide" (NMED March 1998). An early step in the evaluation compared COC concentrations and identified potentially bioaccumulative constituents (see Attachment E). This methodology also required developing a site conceptual model and a food web model, as well as selecting ecological receptors, as presented in "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998). The risk assessment also includes the estimation of exposure and ecological risk.

Ecological risks associated with SWMU 196 were estimated through a risk assessment that incorporates site-specific information when available. Initial predictions of potential risk to plants from exposure to several metals were based upon maximum concentrations measured in soil samples, highly conservative plant toxicity benchmarks, and assumptions of high bioavailability. Actual risk to this receptor is expected to be low based upon more realistic exposure assumptions. Based upon this analysis, the potential for ecological risks associated with SWMU 196 is expected to be low.

4.2 Surface-Water Assessment

A surface-water assessment was conducted at SWMU 196 in August 2000. The surface-water assessment guidance was developed jointly by Los Alamos National Laboratory and the NMED Surface Water Quality Bureau. The assessment evaluated the potential for erosion from the site. SWMU 196 received a score of 17, indicating low erosion potential. The surface-water assessment report is included as Attachment F.

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5.0 NO FURTHER ACTION PROPOSAL

Field investigation data and the human health and ecological risk assessment analyses support the recommendation of NFA proposal for SWMU 196. The rationale includes the following

- The soil has been sampled for all potential COCs.
- No COCs are present in the soil at levels considered hazardous to human health for either an industrial or residential land-use scenario.
- None of the COCs warrant ecological concern after conservative exposure assumptions are analyzed.

Based upon this evidence, SWMU 196 is proposed for an NFA decision according to Criterion 5, which states, "the SWMU/AOC has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use" (NMED March 1998).

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Attachment A

ATTACHMENT A
SWMU 196
Analysis Request/Chain of Custody Forms, 1994–1996

Sandia National Laboratories

SF 2001-COC (12-93)

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

AR/COC- 00350

PAGE 1 OF 1

Department No.: 7580
Project/Task Manager: [illegible]
Project Name: [illegible] 241, 196
Sample Team Members: [illegible]
SCL or Logbook Ref. No.: [illegible]

Date Samples Shipped:
Carrier/Waybill No.:
Lab Destination: [illegible]
Lab Contact: [illegible]
SMO Contact/Phone: [illegible]
Send Report to SMO: [illegible]
SMO Reference No.: [illegible]

SMO USE ONLY

Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154
Contract No.: 67-9736B
Case No.: 3617.300
SMO Authorization: [illegible]

Sample Number - Fraction	Sample Matrix	Date/Time Collected	Container Type	Sample Volume	Preservative	Required Analytical Testing	Lab Sample Number	Condition on Receipt
016476-1	SOIL	6-27-94 / 0925	GLASS	16oz	ICE, 4°C	EXPLOSIVE RESIDUE (8330)		
016477-1	↓	0926	GLASS	16oz		↓		
016478-1	↓	0927	GLASS	16oz		↓		
016479-1	SLUDGE	1035	GLASS	4oz		VOC (8240)		
016479-2	↓	1035	GLASS	16oz	↓	PCB (8080), TPH (418.1) TAL METALS (6010/7000)		
016480-1	WATER	↓ 1045	GLASS	4ml	HCL	VOC (8240) TRIP BLANK		

FOR LAB USE ONLY

Possible Hazard Identification
☑ Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Radiological

*Reference attached radiological screening for specific contact readings.

Turnaround Time
☑ Normal ☐ Rush ____ Required Report Date PER CONTRACT

Sample Disposal
☐ Return to Client ☑ Disposal by Lab Archive Until PER CONTRACT

Special Instructions/QC Requirements
- PLEASE FAX COPY OF RESULTS TO PAUL SCAVIN (505) 848-0417
- TRIP BLANK CONTAINS AIR BUBBLE

1. Relinquished by [illegible]	Org. ITC	Date 6-27-94	Time 1700	4. Relinquished by	Org.	Date	Time
1. Received by [illegible]	Org. SMO-7076	Date 6-27-94	Time	4. Received by	Org.	Date	Time
2. Relinquished by [illegible]	Org. SMO 7076	Date 6-27-94	Time [illegible]	5. Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3. Relinquished by	Org.	Date	Time	6. Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

SF 2001-COC (9-94)

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE 1 / 1

AR/COC- 02948

Dept. No./Mail Stop: 7582 / 1347
Project/Task Manager: Chris Aas / Slavin
Project Name: 4A 7/SRFI - Site 196
Record Center Code: ER/1306 196/DAT
Logbook Ref No: SCL 1595
SMO Reference No.: CF 0073

Date Samples Shipped: 4/26/95
Carrier/Waybill No.: 158026
Lab Contact: MARY FORD
Lab Destination: LOCKHEED
SMO Contact/Phone: Milo Gonzales/505 848-0404
Send Report to SMO: DEBORAH McLaughlin

Contract No.: AJ-2480
Case No.: 3617.300
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area V
Building NA Room NA

Reference LOV (available at SMO)

Parameter & Method Requested

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	Tritium	Isotopic Uranium									Lab Sample ID
021374-02	0196-131-C	0-4	196	4/25/95/1512	SL	AG	1L	None	C	SA	X										
021374-03	↓	↓	↓	↓	↓	P	↓	↓	↓	↓		X									
021375-02	0196-BC-C	↓	↓	1522	↓	AG	↓	↓	↓	↓	X										
021375-03	↓	↓	↓	↓	↓	P	↓	↓	↓	↓		X									
-																					
-																					
-																					
-																					
-																					
-																					

RMMA ☐ Yes ☒ No Ref. No.
Sample Disposal ☐ Return to Client ☒ Disposal by lab
Turnaround Time ☐ Normal ☒ Rush Required Report Date 3-day

Sample Tracking
Date Entered (mm/dd/yy) 5/2/95
Entered by: DDM
QC inits.

Special Instructions/QC Requirements
- Rush analysis
- send/fax ~~results~~ results to Paula Slavin at (505) 848-0417
- 3 day turn-around on samples

Abnormal Conditions on Receipt

Sample Team Members: Name	Signature	Init	Company/Organization
Tim Jackson	[signature]	TJ	ITC
David Bisnell	[signature]	DB	↓
Blake Baumgartner	[signature]	BB	↓

		Org.	Date	Time
1. Relinquished by	[signature]	11	4.26.95	1130
1. Received by	[signature]	7513	4.26.95	1130
2. Relinquished by	[signature]	7513	4/26/95	1400
2. Received by				
3. Relinquished by				
3. Received by				
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- Suspense Copy PINK- Field Copy

SF 2001-COC (9-94)

ANALYSIS REQUEST A[illegible] CHAIN OF CUSTODY 5CCJ515

PAGE 1 of 1

AR/COC- 02591

Dept. No./Mail Stop: 7582 Chris Aas / MS 1347
Project/Task Manager: Chris Aas / SLAVIN
Project Name: TA 3/5 RFI - Site 196
Record Center Code: ER / 1306 196 / DAT
Logbook Ref No: SCL 1555
SMO Reference No.: CF 0073

Date Samples Shipped: 4/26/95
Carrier/Waybill No.: HC
Lab Contact: AMIR MOHAGHEGHI
Lab Destination: SNL/NM 7715
SMO Contact/Phone: Mike Gonzales / 505 848-0404
Send Report to SMO Deborah McLaughlin

Contract No.: IN HOUSE
Case No.: 3617.300
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area II
Building NA Room NA

Reference LOV (available at SMO)

Parameter & Method Requested: γ-SPEC (High Count)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	γ-SPEC (High Count)	Lab Sample ID
021374-01	0196-B1-C	0-4	196	4/25/95 / 1512	SL	P	500ml	None	C	SA	X	
021375-01	0196-B2-C	↓	196	↓ 1522	↓	↓	↓	↓	↓	↓	X	
-												
-												
-												
-												
-												
-												
-												
-												

RMMA ☐ Yes ☒ No Ref. No. ______

Sample Disposal ☒ Return to Client ☐ Disposal by lab

Turnaround Time ☐ Normal ☒ Rush Required Report Date ______

Sample Tracking
Date Entered (mm/dd/yy) 5/11/95
Entered by: [initials]
QC inits.

Special Instructions/QC Requirements
6000 count analysis

Abnormal Conditions on Receipt

Sample Team Members: Name	Signature	Init	Company/Organization
Tim Jackson	[signature]	TJ	ITC
David Boswell	[signature]	DB	↓
Bruce Baumgartner	[signature]	BB	

		Org.	Date	Time
1. Relinquished by	[signature]	11	4-26-95	1130
1. Received by	[signature]	7513	4-26-95	1130
2. Relinquished by	[signature]	SMO 7513	4/26/95	1512
2. Received by	[signature]	SNL 7715	4/26/95	305
3. Relinquished by	[signature] for MEC	SNL 7715	5/1/95	1220
3. Received by	[signature]	SMO 7513	5/1/95	1220
4. Relinquished by	[signature]	SMO 7513	5/2/95	0725
4. Received by	[signature]	SNL 7715	5/2/95	0925
5. Relinquished by	[signature]	SNL 7715	5/3/95	1355
5. Received by	[signature]	SMO 7513	5/3/95	1355
6. Relinquished by				
6. Received by				

WHITE - To A[illegible] [illegible]pany Samples, Labo[illegible] Copy ~~BLUE~~ - To Accompany Samples, Return to SMO YELLOW - S[illegible] Suspense Copy PINK - Field Copy

nal Lab
Batch No.

2001-COC (6-95)

ANALYSIS REQUEST AN CHAIN OF CUSTODY

PAGE ____

AR/COC- 04513

Dept. No./Mail Stop: 7562/1147
Project/Task Manager: SINJIN EBERLE
Project Name: ER Site 196 CHAR
Record Center Code: ER/1306/196/DAT
Logbook Ref No: #013 - p.49
Service Order No.:

Date Samples Shipped:
Carrier/Waybill No.:
Lab Contact: ANDY
Lab Destination: ACN
SMO Contact/Phone: NA
Send Report to SMO NA

Contract No.:
Case No.:
SMO Authorization
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area
Building Room

Reference LOV (available at SMO)

Parameter & Method Requested

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	TPH 418.1	VOC 8240	Lab ID 603364	Lab Sample ID
-	TA3/5-196-D1-008	8	196	3-26-96 1448	Soil	AC	1 oz	4°C	G	SA	X		-01	
-	TA3/5-196-D1-009	9	↓	1550	↓	↓	↓	↓	↓	↓	X		-02	
-	TA3/5-196-D1-009	9	↓	↓ 1550	↓	↓	↓	↓	↓	↓		X	-02	
-														
-														
-														
-														
-														
-														
-														

MMA ☐ Yes ☒ No Ref. No.
Sample Disposal ☐ Return to Client ☐ Disposal by lab
Turnaround Time ☒ Normal ☐ Rush Required Report Date

Sample Tracking
Date Entered (mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
Please fax results to Paula Slavin at 284-2617.

Abnormal Conditions on Receipt

Sample Team Members: Name	Signature	Init	Company/Organization/Phone
STUART VAN DUSEN	[signature]	SVD	SNL/7584
PAULA SLAVIN	[signature]	PS	GRAM/7582/284-2494
SINJIN EBERLE	Sinjin Eberle	SE	SAIC/7582/284-2571

		Org.	Date	Time
Relinquished by	Sinjin Eberle	7582	3-26-96	1702
Received by	[signature]		3-26-96	17:05
Relinquished by				
Received by				
Relinquished by				
Received by				
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

nal Lab
Batch No. ______

2001-COC (6-95)

ANALYSIS REQUEST AN CHAIN OF CUSTODY

PAGE 1 of 2

AR/COC- 04427

ept. No./Mail Stop: 7582/MS1147
oject/Task Manager: LON DAWSON/SINJIN EBERLE
Project Name: ER SITE 196 CISTERN
Record Center Code: ER/1306/196/DAT
Logbook Ref No. 00 0115 pg. 55
Service Order No.: NA

Date Samples Shipped: 3.27.96
Carrier/Waybill No.: NA
Lab Contact: DAN
Lab Destination: AEN
SMO Contact/Phone: NA
Send Report to SMO NA

Contract No.: NA
Case No.: 3617.300
SMO Authorization:
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location
Tech Area V
Building W. of 6597 Room Site 196

Parameter & Method Requested: 603374

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	VOC 8240	TPH 418.1	Lab Sample ID
-	TA3/5-196-D1-13	13	196	3-27-96 1028	Soil	AC	2oz	4°C	G	SA		X	01
-	-D2-001	1		1125								X	02
-	-005	5		1131								X	03
-	-007	7		1155									04
-	-011	11		1215									05
-	-011-DUP	11		1215						DU			06
-	-012	12		1300						SA			07
-	-D1-13	13		1028							X		08
-	-D2-000	0		1125									09
-	-004	4		1131									10

MMA ☐ Yes ☒ No Ref. No. ______

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush Required Report Date ______

Sample Tracking
Date Entered (mm/dd/yy) ______
Entered by: ______
QC inits. ______

Special Instructions/QC Requirements
Do MS/MSD on samples -
TA3/5-196-D3-002 VOC
TA3/5-196-D3-002 TPH
Please fax results to
Paula Slavin @ 284-2617.

Abnormal Conditions on Receipt
- Received cold
- Received Intact.
18 Soils
1 TB.

Sample Team Members: Name	Signature	Init	Company/Organization/Phone
PAULA J. SLAVIN		PJS	GRAM/7582/284-2496
SINJIN EBERLE	Sinjin Eberle	SE	SAIC/7582/284-2521
Stuart Van Deusen		SVD	SNL/7584/284-3309

		Org.	Date	Time
Relinquished by	Sinjin Eberle	7582	3.27.96	4:28p
Received by	John Epley		3/27/96	4:28pm
Relinquished by				
Received by				
Relinquished by				
Received by				
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

Attachment B

ATTACHMENT B
SWMU 196
Analysis Request/Chain of Custody Forms, 1999

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC 602756

Batch No. SAR/WR No. SMO Use

Dept. No./Mail Stop:	6133/1087	[redacted]		Contract No.:	AJ-2480A
Project/Task Manager:	Anh Lai			Case No.:	7219.161
Project Name:	TA3-5 RFI	Lab Contact:	Edie Kent (803) 556-8171	SMO Authorization:	
Record Center Code:		Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:		SMO Contact/Phone:	Doug Salmi/ 844-3110	Supplier Services Dept.:	
Service Order No.	CF0678	Send Report to SMO:	S. Jensen/844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area V				
Building N/A	Room N/A				

Reference LOV(available at SMO)

Lab Use

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserve All @4°C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
050000-002	196-BH2-99-25-SS	25	196	08/31/99 1615	S	SL	125ml	4C	G	SA	VOC	
050001-002	196-BH2-99-30-SS	30	196	08/31/99 1630	S	SL	125ml	4C	G	SA	VOC	
050002-002	196-BH2-99-35-SS	35	196	08/31/99 1700	S	SL	125ml	4C	G	SA	VOC	
050003-002	196-BH2-99-40-SS	40	196	09/01/99 0815	S	SL	125ml	4C	G	SA	VOC	
050004-002	196-BH2-99-45-SS	45	196	09/01/99 0830	S	SL	125ml	4C	G	SA	VOC	
050005-002	196-BH2-99-50-SS	50	196	09/01/99 0845	S	SL	125ml	4C	G	SA	VOC	
050006-002	196-BH2-99-60-SS	60	196	09/01/99 0920	S	SL	125ml	4C	G	SA	VOC	
050007-002	196-BH2-99-70-SS	70	196	09/01/99 0955	S	SL	125ml	4C	G	SA	VOC	
050008-002	196-BH2-99-80-SS	80	196	09/01/99 1030	S	SL	125ml	4C	G	SA	VOC	

RMMA ☐ Yes ☑ No Ref. No. [redacted]

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush

Required Report Date

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Raw Data Package ☑ Yes ☐ No

[redacted]

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	Randy Roberts	Randy Roberts	RR	CDM/6118/284-3309
	Gill Baltazar	Gil	GB	Weston/6118/379-7579

VOC= EPA METHODS 8260

Fax copy report to Anh Lai@ 505 284-2616

Please list as separate report.

1.Relinquished by	Org. 6118 Date 9/1/99 Time 1525			4.Relinquished by	Org.	Date	Time
1. Received by	Org. 7577 Date 9/1/99 Time 1525			4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Analysis Request And Chain Of Custody (Continuation)

AR/COC- 602756

Project Name: TA3-5 RFI Project/Task Manger: Anh Lai Case No: 7219.161

Location Tech Area V

Building N/A Room N/A

Reference LOV (available at SMO)

Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserve All @4°C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
050009-002	196-BH2-99-90-SS	90	196	09/01/99 1105	S	SL	125ml	4C	G	SA	VOC	[redacted]
050010-002	196-BH2-99-100-SS	100	196	09/01/99 1135	S	SL	125ml	4C	G	SA	VOC	
050041-002	196-BH2-99- 35 -DU	35	196	08/31/99 1710	S	SL	125ml	4C	G	DU	VOC	

[redacted]

ernal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC 602811

tch No. SAR/WR No. SMO Use

pt. No./Mail Stop:	6133/1087	[redacted]		Contract No.:	AJ-2480A
oject/Task Manager:	Anh Lai			Case No.:	7219.161
oject Name:	TA3-5 RFI	Lab Contact:	Edie Kent (803) 556-8171	SMO Authorization:	
cord Center Code:	ER/1302/196/DAT	Lab Destination:	GEL	Bill To: Sandia National Laboratories	
gbook Ref. No.:	N/A	SMO Contact/Phone:	Doug Salmi/ 844-3110	Supplier Services Dept.:	
rvice Order No.	CF0678	Send Report to SMO:	S. Jensen/844-3184	P.O. Box 5800 MS 0154	
ocation	Tech Area V				
ilding N/A	Room N/A				

Recieved TB From Gel with Air Bubbles

Reference LOV(available at SMO)

Lab Use

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserve All @4°C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
049981-001	196-BH3-99-14-SS	14	196	090299/0825	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	[redacted]
049982-001	196-BH3-99-19-SS	19	196	090299/0840	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049983-001	196-BH3-99-24-SS	24	196	090299/0905	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049984-001	196-BH3-99-28-SS	28	196	090299/0947	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049985-001	196-BH3-99-40-SS	40	196	090299/1035	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049986-001	196-BH3-99-65-SS	65	196	090299/1340	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049987-001	196-BH3-99-75-SS	75	196	090299/1425	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049988-001	196-BH1-99-00-SP	N/A	196	090299/1525	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
049998-001	196-BH3-99-40-SD	40	196	090299/1035	S	AG	500ml	4C	G	DU	SVOC/ TPH/ RCRA METALS +Be	
04998.003	196 BH3 99 TB	0	196	090299/0854	W	AG	3x40ml	HCl	G	TB	VOC	

MMA ☐ Yes ☑ No Ref. No. [redacted]

ample Disposal ☐ Return to Client ☑ Disposal by lab

urnaround Time ☑ Normal ☐ Rush

Required Report Date

	Name	Signature	Init	Company/Organization/Phone/Cellular
ample eam lembers	Randy Roberts	Randy Roberts	RR	CDM/6118/284-3309
	Gill Baltazar	[illegible]	GB	Weston/6118/379-7579

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Raw Data Package ☑ Yes ☐ No

VOC= EPA METHODS 8260

SVOC= EPA METHODS 8270

TPH=EPA METHODS 418

RCRA METALS + Be = EPA METHODS 6010A AND 7471

Fax copy report to Anh Lai@ 505 284-2616

Please list as separate report.

PROJECT FINISHED

Relinquished by [illegible]	Org. 6118	Date 9-7-99	Time 0900	4.Relinquished by	Org.	Date	Time
Received by [illegible] SMO	Org. 7577	Date 9/7/99	Time 0900	4. Received by	Org.	Date	Time
Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Batch No. SAR/WR No. SMO Use

AR/COC 602812

Dept. No./Mail Stop:	6133/1087	[redacted]		Contract No.:	AJ-2480A
Project/Task Manager:	Anh Lai			Case No.:	7219.161
Project Name:	TA3-5 RFI	Lab Contact:	Edie Kent (803) 556-8171	SMO Authorization:	
Record Center Code:		Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:		SMO Contact/Phone:	Doug Salmi/ 844-3110	Supplier Services Dept.:	
Service Order No.	CF0678	Send Report to SMO:	S. Jensen/844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area				
Building	Room				

Reference LOV(available at SMO)

Lab Use

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserve All @4°C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
050000-001	196-BH2-99-25-SS	25	196	08/31/99 1615	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	[redacted]
050001-001	196-BH2-99-30-SS	30	196	08/31/99 1630	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050002-001	196-BH2-99-35-SS	35	196	08/31/99 1700	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050003-001	196-BH2-99-40-SS	40	196	09/01/99 0815	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050004-001	196-BH2-99-45-SS	45	196	09/01/99 0830	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050005-001	196-BH2-99-50-SS	50	196	09/01/99 0845	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050006-001	196-BH2-99-60-SS	60	196	09/01/99 0920	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050007-001	196-BH2-99-70-SS	70	196	09/01/99 0955	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050008-001	196-BH2-99-80-SS	80	196	09/01/99 1030	SOIL	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush

Required Report Date

[redacted]

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Raw Data Package ☑ Yes ☐ No

VOC= EPA METHODS 8260

SVOC= EPA METHODS 8270

TPH=EPA METHODS 418

RCRA METALS + Be = EPA METHODS 6010A AND 7471

Fax copy report to Anh Lai@ 505 284-2616

Please list as separate report.

[redacted]

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
Randy Roberts	[illegible]	RR	CDM/6118/284-3309
Gill Baltazar	[illegible]	[illegible]	Weston/6118/379-7579

1.Relinquished by [illegible]	Org. 6118	Date 9/1/99	Time 1515	4.Relinquished by	Org.	Date	Time
1. Received by [illegible] SMO	Org. 7577	Date 9-1-99	Time 1515	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Analysis Request And Chain Of Custody (Continuation)

Page_2_ of _2_

AR/COC- 602812

Project Name: TA3-5 RFI   Project/Task Manger: Anh Lai   Case No: 7219.161

Location Tech Area

Building   Room

Reference LOV (available at SMO)

Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Pump Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserve All @4°C	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
050009-001	196-BH2-99-90-SS	90	196	09/01/99 1105	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050010-001	196-BH2-99-100-SS	100	196	09/01/99 1135	S	AG	500ml	4C	G	SA	SVOC/ TPH/ RCRA METALS +Be	
050036-001	196-BH2-99-EB	N/A	196	09/01/99 1233	W	P	500ml	HNO3	G	EB	RCRA Metals +Be	
050037-001	196-BH2-99-EB	N/A	196	09/01/99 1235	W	AG	3X40ml	HCL	G	EB	VOC	
050038-001	196-BH2-99-EB	N/A	196	09/01/99 1230	W	AG	2X1Lt	4C	G	EB	SVOC	
050039-001	196-BH2-99-EB	N/A	196	09/01/99 1229	W	AG	2X1Lt	H2SO4	G	EB	TPH	
050040-001	196-BH2-99-TB	N/A	196	09/01/99 1258	W	AG	3X40ml	HCL	G	TB	VOC	
050041-001	196-BH2-99-35-DU	~~N/A~~ 35 ft	196	08/31/99 1710	S	AG	500ml	4C	G	DU	SVOC/ TPH/ RCRA METALS +Be	
049993-001	196-BH1-99-EB	N/A	196	08/31/99 0838	W	P	500ml	HNO3	G	EB	RCRA Metals +Be	
049994-001	196-BH1-99-EB	N/A	196	08/31/99 0842	W	AG	3X40ml	HCL	G	EB	VOC	
049995-001	196-BH1-99-EB	N/A	196	08/31/99 0837	W	AG	2X1Lt	4C	G	EB	SVOC	
049996-001	196-BH1-99-EB	N/A	196	08/31/99 0835	W	G	2X1Lt	H2SO4	G	EB	TPH	
049997-001	196-BH1-99-TB	N/A	196	08/31/99 0834	W	AG	3X40ml	HCL	G	TB	VOC	

Abnormal Conditions on Receipt   LAB USE

Recipient Initials

Internal Lab

ANALYSIS REQUEST AND CHAIN OF CUSTODY

Batch No. SAR/WR No. SMO Use

AR/COC 602813

Dept. No./Mail Stop:	6133/1087	[redacted]		Contract No.:	AJ-2480A
Project/Task Manager:	Anh Lai			Case No.:	7219.161
Project Name:	TA3-5 RFI	Lab Contact:	Edie Kent (803) 556-8171	SMO Authorization:	
Record Center Code:	ER/1302/196/DAT	Lab Destination:	GEL	Bill To: Sandia National Laboratories	
Logbook Ref. No.:	N/A	SMO Contact/Phone:	Doug Salmi/ 844-3110	Supplier Services Dept.:	
Service Order No.	CF0678	Send Report to SMO:	S. Jensen/844-3184	P.O. Box 5800 MS 0154	
Location	Tech Area V				
Building N/A	Room N/A				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserve All @4°C	Collection Method	Sample Type	Parameter & Method Requested	Lab Use: Lab Sample ID
049981-002	196-BH3-99-14-SS	14	196	090299/0825	S	SL	125ml	4C	G	SA	VOC	[redacted]
049982-002	196-BH3-99-19-SS	19	196	090299/0840	S	SL	125ml	4C	G	SA	VOC	
049983-002	196-BH3-99-24-SS	24	196	090299/0905	S	SL	125ml	4C	G	SA	VOC	
049984-002	196-BH3-99-28-SS	28	196	090299/0947	S	SL	125ml	4C	G	SA	VOC	
049985-002	196-BH3-99-40-SS	40	196	090299/1035	S	SL	125ml	4C	G	SA	VOC	
049986-002	196-BH3-99-65-SS	65	196	090299/1340	S	SL	125ml	4C	G	SA	VOC	
049987-002	196-BH3-99-75-SS	75	196	090299/1425	S	SL	125ml	4C	G	SA	VOC	
049988-002	196-BH1-99-00-SP	N/A	196	090299/1525	S	AG	4oz.	4C	G	SA	VOC	
049998-002	196-BH3-99-40-SD	40	196	090299/1035	S	SL	125ml	4C	G	DU	VOC	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush

Required Report Date

[redacted]

Special Instructions/QC Requirements

EDD ☑ Yes ☐ No

Raw Data Package ☑ Yes ☐ No

VOC= EPA METHODS 8260

Fax copy report to Anh Lai@ 505 284-2616

Please list as separate report.

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
Randy Roberts	Randy Roberts	RR	CDM/6118/284-3309
Gill Baltazar	GB	G	Weston/6118/379-7579

1.Relinquished by	Org. 6118	Date 9-7-99	Time 0915	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 7577	Date 9.7.99	Time 0915	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Attachment C

ATTACHMENT C
SWMU 196
Analysis Request/Chain of Custody Forms, 2003

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. SMO Use

AR/COC 606401

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.: 7219.02.02.05	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #: PO 21673	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		☐ Released by COC No.:
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		☐ Validation Required
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable)
Location	Tech Area TA-V				P.O. Box 5800 MS 0154
Building	Room				Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062038-001	TA 3/5-196-C01-100-SS	100	196	6/11/03	1335	S	SS	125ml	4c	G	SA	VOC(8260)	
062038-002	TA 3/5-196-C01-100-SS	100	196	6/11/03	1335	S	AG	250ml	4c	G	SA	SVOC(8270)	
062038-003	TA 3/5-196-C01-100-SS	100	196	6/11/03	1335	S	AG	125ml	4c	G	SA	TPH	
062041-001	TA 3/5-196-C02-110-SS	110	196	6/11/03	1400	S	SS	125ml	4c	G	SA	VOC(8260)	
062041-002	TA 3/5-196-C02-110-SS	110	196	6/11/03	1415	S	AG	250ml	4c	G	SA	SVOC(8270)	
062041-003	TA 3/5-196-C02-110-SS	110	196	6/11/03	1415	S	AG	125ml	4c	G	SA	TPH	
062039-001	TA 3/5-196-C02-110-SD	110	196	6/11/03	1400	S	SS	125ml	4c	G	DU ~~SA~~	VOC(8260)	
062039-002	TA 3/5-196-C02-110-SD	110	196	6/11/03	1415	S	AG	250ml	4c	G	DU ~~SA~~	SVOC(8270)	
062039-003	TA 3/5-196-C02-110-SD	110	196	6/11/03	1415	S	AG	125ml	4c	G	DU ~~SA~~	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
****Please list as separate report.***

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	[initials]	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SRG	Gram 6133/505-284-2588

1.Relinquished by [signature]	Org. 6134	Date 6-12-03	Time 0905	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 6/12/03	Time 0905	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. SMO Use

AR/COC 606402

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.: 7219.02.02.05	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #: PO 21673	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		☐ Released by COC No.:
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		☐ Validation Required
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area TA-V				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062042-001	TA 3/5-196-C03-120-SS	120	196	6/11/03 1430	S	SS	125ml	4c	G	SA	VOC(8260)	
062042-002	TA 3/5-196-C03-120-SS	120	196	6/11/03 1430	S	AG	250ml	4c	G	SA	SVOC(8270)	
062043-001	TA 3/5-196-C04-130-SS	130	196	6/11/03 1450	S	SS	125ml	4c	G	SA	VOC(8260)	
062043-002	TA 3/5-196-C04-130-SS	130	196	6/11/03 1450	S	AG	250ml	4c	G	SA	SVOC(8270)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SRG	Gram 6133/505-284-2588

***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

1.Relinquished by [signature]	Org. 6134	Date 6-12-03	Time 0905	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 6/12/03	Time 0905	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. | SMO Use | AR/COC **606403**

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.: 7219.02.02.05	☐ Waste Characterization -Send preliminary/copy report to:
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #: PO 21673	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		☐ Released by COC No.:
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		☐ Validation Required
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area TA-V				
Building	Room			**Reference LOV(available at SMO)**	

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062045-001	TA 3/5-196-C05-140-SS	140	196	6/11/03	1510	S	SS	125ml	4c	G	SA	VOC(8260)	
062045-002	TA 3/5-196-C05-140-SS	140	196	6/11/03	1510	S	AG	250ml	4c	G	SA	SVOC(8270)	
062045-003	TA 3/5-196-C05-140-SS	140	196	6/11/03	1510	S	AG	125ml	4c	G	SA	TPH	
062046-001	TA 3/5-196-C06-150-SS	150	196	6/11/03	1520	S	SS	125ml	4c	G	SA	VOC(8260)	
062046-002	TA 3/5-196-C06-150-SS	150	196	6/11/03	1545	S	AG	250ml	4c	G	SA	SVOC(8270)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SKG	Gram 6133/505-284-2588

1.Relinquished by [signature]	Org 6134	Date 6-12-03	Time 0905	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 6/12/03	Time 0905	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of ___

Batch No. | SMO Use | AR/COC 606404

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.: 7219.02.02.05	☐ Waste Characterization
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	-Send preliminary/copy report to:
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #: PO 21673	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		☐ Released by COC No.:
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		☐ Validation Required
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		Bill To: Sandia National Labs (Accounts Payable) P.O. Box 5800 MS 0154 Albuquerque, NM 87185-0154
Location	Tech Area TA-V				
Building	Room				

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062048-001	TA 3/5-196-C07-160-SS	160	196	6/11/03 1615	S	SS	125ml	4c	G	SA	VOC(8260)	
062048-002	TA 3/5-196-C07-160-SS	160	196	6/11/03 1630	S	AG	250ml	4c	G	SA	SVOC(8270	
062048-003	TA 3/5-196-C07-160-SS	160	196	6/11/03 1630	S	AG	125ml	4c	G	SA	TPH	
062049-001	TA 3/5-196-C07-160-SD	160	196	6/11/03 1630	S	SS	125ml	4c	G	~~SA~~ DU	VOC(8260)	
062049-002	TA 3/5-196-C07-160-SD	160	196	6/11/03 1630	S	AG	250ml	4c	G	DU ~~SA~~	SVOC(8270	
062049-003	TA 3/5-196-C07-160-SD	160	196	6/11/03 1630	S	AG	125ml	4c	G	~~SA~~ DU	TPH	
~~062050-001~~	~~TA 3/5-196-C08-170-SS~~	~~170~~	~~196~~		~~S~~	~~SS~~	~~125ml~~	~~4c~~	~~G~~	~~SA~~	~~VOC(8260)~~	
~~062050-002~~	~~TA 3/5-196-C08-170-SS~~	~~170~~	~~196~~		~~S~~	~~AG~~	~~250ml~~	~~4c~~	~~G~~	~~SA~~	~~SVOC(8270~~	
~~062050-003~~	~~TA 3/5-196-C08-170-SS~~	~~170~~	~~196~~		~~S~~	~~AG~~	~~125ml~~	~~4c~~	~~G~~	~~SA~~	~~TPH~~	
062051-001	TA 3/5-190-0X-TB		196	6/11/03 1600	L	G	3x40ml	HCL	G	TB	VOC(8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee		JDL	Weston Solutions/6135/505-284-3309
R Lynch		RL	Weston Solutions/6135/505-844-4013
S Griffith		SRG	Gram 6133/505-284-2588

1.Relinquished by	Org 6134	Date 6-12-03	Time 0905	4.Relinquished by	Org.	Date	Time
1. Received by	Org. 6133	Date 6/12/03	Time 0905	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

OFF-SITE LABORATORY
Analysis Request And Chain Of Custody (Continuation)

AR/COC- 606404

Project Name: SWMU 196 | Project/Task Manger: Brenda Langkopf | Project/Task No.: 7219.02.02.05

Location Tech Area

Building Room

Reference LOV (available at SMO)

Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062434-001	TA 3/5-190-0X-EB		196	6/11/03 1605	L	AG	2x1lt	4c	G	EB	SVOC(8270	
062435-001	TA 3/5-190-0X-EB		196	6/11/03 1610	L	G	3x40ml	HCL	G	EB	VOC(8260)	

Abnormal Conditions on Receipt LAB USE

Recipient Initials________

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. SMO Use

AR/COC **606405**

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062052-001	TA 3/5-196-C09-180-SS	180	196	6/12/03	1205	S	AG	125ml	4c	G	SA	VOC(8260)	
062052-002	TA 3/5-196-C09-180-SS	180	196	6/12/03	1205	S	AG	250ml	4c	G	SA	SVOC(8270	
062052-003	TA 3/5-196-C09-180-SS	180	196	6/12/03	1205	S	AG	125ml	4c	G	SA	TPH	
062053-001	TA 3/5-196-C10-190-SS	190	196	6/12/03	1225	S	AG	125ml	4c	G	SA	VOC(8260)	
062053-002	TA 3/5-196-C10-190-SS	190	196	6/12/03	1225	S	AG	250ml	4c	G	SA	SVOC(8270	
062053-003	TA 3/5-196-C10-190-SS	190	196	6/12/03	1225	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.
Sample Disposal ☐ Return to Client ☑ Disposal by lab
Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day
Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
See CoC 606407 for TB
***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SRG	Gram 6133/505-284-2588

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-16-03	1005	4.Relinquished by			
1. Received by [signature] for SWO	6133	6/16/03	1015	4. Received by			
2.Relinquished by				5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.

SMO Use

AR/COC 606406

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062055-001	TA 3/5-196-C11-200-SS	200	196	6/12/03 1255	S	AG	125ml	4c	G	SA	VOC(8260)	
062055-002	TA 3/5-196-C11-200-SS	200	196	6/12/03 1255	S	AG	250ml	4c	G	SA	SVOC(8270	
062055-003	TA 3/5-196-C11-200-SS	200	196	6/12/03 1255	S	AG	125ml	4c	G	SA	TPH	
062056-001	TA 3/5-196-C11-200-SD	200	196	6/12/03 1255	S	AG	125ml	4c	G	SA	VOC(8260)	
062056-002	TA 3/5-196-C11-200-SD	200	196	6/12/03 1255	S	AG	250ml	4c	G	SA	SVOC(8270	
062056-003	TA 3/5-196-C11-200-SD	200	196	6/12/03 1255	S	AG	125ml	4c	G	SA	TPH	
062057-001	TA 3/5-196-C12-210-SS	210	196	6/12/03 1320	S	AG	125ml	4c	G	SA	VOC(8260)	
062057-002	TA 3/5-196-C12-210-SS	210	196	6/12/03 1320	S	AG	250ml	4c	G	SA	SVOC(8270	
062057-003	TA 3/5-196-C12-210-SS	210	196	6/12/03 1320	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No

***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
See CoC 606407 for TB
***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	[initials]	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SG	Gram 6133/505-284-2588

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-16-03	1015	4.Relinquished by			
1. Received by [signature] GMi	6133	6/16/03	1015	4. Received by			
2.Relinquished by				5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

Internal Lab

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Batch No. | SMO Use | AR/COC **606407**

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062058-001	TA 3/5-196-C13-220-SS	220	196	6/12/03	1410	S	AG	125ml	4c	G	SA	VOC(8260)	
062059-001	TA 3/5-196-C14-230-SS	230	196	6/12/03	1435	S	AG	125ml	4c	G	SA	VOC(8260)	
062059-002	TA 3/5-196-C14-230-SS	230	196	6/12/03	1435	S	AG	250ml	4c	G	SA	SVOC(8270	
062059-003	TA 3/5-196-C14-230-SS	230	196	6/12/03	1435	S	AG	125ml	4c	G	SA	TPH	
062255-001	TA3/5-190-0X-~~FB~~EB				1600	L	G	3x40ml	HCL	G	TB	VOC (8260)	
062436-001	TA3/5-190-0X-EB				1550	L	AG	2x1lt	4c	G	EB	SVOC (8270)	
062437-001	TA3/5-190-0X-EB				1550	L	G	3x40ml	HCL	G	EB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.
Sample Disposal ☐ Return to Client ☑ Disposal by lab
Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day
Return Samples By: ☐ **Negotiated TAT**

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	[initials]	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SRG	Gram 6133/505-284-2588

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-16-03	1015	4.Relinquished by			
1. Received by [signature]	6133	6/16/03	1015	4. Received by			
2.Relinquished by				5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. SMO Use

AR/COC **606413**

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ **Waste Characterization**
-Send preliminary/copy report to:

☐ **Released by COC No.:**
☐ **Validation Required**

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062470-001	TA 3/5-196-C17-260-SS	260	196	6/13/03 1400	S	AG	125ml	4c	G	SA	VOC(8260)	
062470-002	TA 3/5-196-C17-260-SS	260	196	6/13/03 1400	S	AG	250ml	4c	G	SA	SVOC(8270	
062470-003	TA 3/5-196-C17-260-SS	260	196	6/13/03 1400	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	J. Lee	JDL	Weston Solutions/6135/505-284-3309
R Lynch	R Lynch	RL	Weston Solutions/6135/505-844-4013
~~S Griffith~~			~~Orgn. 6133/505-284-2588~~

1.Relinquished by J. Lee	Org. 6134	Date 6/16/03	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by [illegible] SMO	Org. 6133	Date 6/16/03	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. | SMO Use | **AR/COC** | **606414**

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ **Waste Characterization**
-Send preliminary/copy report to:

☐ **Released by COC No.:**
☐ **Validation Required**

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062473-001	TA 3/5-196-C19-280-SS	280	196	6/13/03 1515	S	AG	125ml	4c	G	SA	VOC(8260)	
062473-002	TA 3/5-196-C19-280-SS	280	196	6/13/03 1515	S	AG	250ml	4c	G	SA	SVOC(8270	
062473-003	TA 3/5-196-C19-280-SS	280	196	6/13/03 1515	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ **Yes** ☐ **No**
Level C Package ☑ **Yes** ☐ **No**
***Send report to:**
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

***Please list as separate report.**

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	[initials]	Weston Solutions/6135/505-844-4013
~~S Griffith~~			~~Gram 6133/505-284-2588~~

1.Relinquished by [signature]	Org. 6134	Date 6-16-03	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 6/16/03	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No. N/A

SMO Use

AR/COC 606415

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:		Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.		SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		See attached bottle order
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062476-001	TA 3/5-196-C21-300-SS	300	196	6/13/03 1645	S	AG	125ml	4c	G	SA	VOC(8260)	
062476-002	TA 3/5-196-C21-300-SS	300	196	6/13/03 1645	S	AG	250ml	4c	G	SA	SVOC(8270	
062476-003	TA 3/5-196-C21-300-SS	300	196	6/13/03 1645	S	AG	125ml	4c	G	SA	TPH	
062479-001	TA 3/5-190-0X-TB		196	6/13/03 1650	L	G	3x40ml	HCL	G	TB	VOC(8260)	
062484-001	TA 3/5-190-0X-EB		196	6/13/03 1650	L	G	3x40ml	HCL	G	EB	VOC(8260)	
062485-001	TA 3/5-190-0X-EB		196	6/13/03 1650	L	AG	2x1lt	4c	G	EB	SVOC(8270	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking — Smo Use
Date Entered(mm/dd/yy)
Entered by:
QC inits.

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee		JDL	Weston Solutions/6135/505-284-3309
R Lynch			Weston Solutions/6135/505-844-4013
~~S Griffith~~			~~Gram 6133/505-284-2588~~

1.Relinquished by	Org 6134	Date 6/16/03	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by	Org 6133	Date 6/16/03	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by	Org.	Date	Time	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Attachment D

ATTACHMENT D
SWMU 196
Data Validation Reports

2000 Data Validation Reports for
1994 Data

MEMORANDUM

DATE: November 14, 2000

TO: File

FROM: Kenneth Salazar

SUBJECT: Organic Data Review and Validation
TA3/5-Site 196,241, ARCOC #00350,
SDG #036545, Project/Task No. 7219.01.06

See the attached Data Validation Worksheets for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA8240 (VOCs), EPA8080 (PCBs), EPA8330 (HEs), and EPA418.1 (TPH). Problems were identified with the data package that result in the qualification of data.

1. VOC Analysis: For the trip blank (TB) and field sample, methylene chloride was detected in the method blanks. The associated sample results were detects, less than (<) 10X the blank concentrations, < the reporting limits (RLs), and will be qualified "5U,B" and "0.5U,B," respectively.

2. PCB Analysis: The DCB surrogate recovery of sample 036545-0005 was < QC limits but greater than (>) 10%. All results for this sample were non-detect (ND) and will be qualified "UJ,A1."

Data are acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation. It should be noted that this data package was historical, and the QC data provided by the laboratory were limited. Thus, complete data review and validation was not possible. Therefore, use of this data validation report should be at the sole discretion of the user.

Holding Times/Preservation

All Analyses: All samples were analyzed within the prescribed holding times and properly preserved.

Calibration

All Analyses: No calibration data were provided with the data package.

Blanks

VOC Analysis: No target analytes were detected in the method blanks except as noted above in the summary section.

PCB/HE/TPH Analyses: No target analytes were detected in the method blanks.

Surrogates

VOC Analysis: The surrogate %Rs met QC acceptance criteria.

PCB Analysis: The surrogate %R did not meet QC acceptance criteria as noted above in the summary section.

HE Analysis: No surrogate data for this method were provided with the data package.

TPH Analysis: Surrogates were not required for this method.

Internal Standards (ISs)

VOC Analysis: No IS data were provided with the data package.

PCB/HE/TPH Analyses: No ISs were required for these methods.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

All Analyses: No MS/MSD data were provide with the data package.

Laboratory Control Samples (LCS/LCSD)

All Analyses: The LCS/LCSDs met QC acceptance criteria.

Other QC

VOC Analysis: In the TB, 2-hexanone was detected. However, the associated sample result was ND. Thus, no data were qualified. No field duplicate or equipment blank (EB) were submitted on the ARCOC.

PCB/HE/TPH Analyses: No field duplicate, EB, or field blank (FB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Sample Findings Summary

Site: TA 3/5 - Site 196, 241 AR/COC: 00350 Data Classification: Inorganics (EPA 6010 ↓ 7471 ~~[illegible]~~) KAS 11/14/00

ER Sample ID	Analysis	DV Qualifiers	Comments
	No data were qualified.		
	Data are acceptable.		
	QC Measures appear to be adequate.		

ER Sample ID - This value is located on the AR/Chain of Custody.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 11/14/00

MEMORANDUM

DATE: November 14, 2000

TO: File

FROM: Kenneth Salaz KS

SUBJECT: Inorganic Data Review and Validation
TA3/5-Site 196,241, ARCOC #00350,
SDG #036545, Project/Task No. 7219.01.06

See the attached Data Validation Worksheets for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA6010 (ICP) and EPA7471 (CVAA). No problems were identified with the data package that result in the qualification of data.

Data are acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation. It should be noted that this data package was historical, and the QC data provided by the laboratory were limited. Thus, complete data review and validation was not possible. Therefore, use of this data validation report should be at the sole discretion of the user.

Holding Times

All Analyses: All samples were analyzed within the prescribed holding times.

Calibration

All Analyses: No calibration data were provided with the data package.

Blanks

ICP Analysis: No target analytes were detected in the method blank except zinc (Zn). However, the associated sample result was >5X the blank concentration. Thus, no data were qualified. No initial or continuing calibration blank (ICB/CCB) data were provided with the data package.

CVAA Analysis: No target analytes were detected in the method blank. No initial or continuing calibration blank (ICB/CCB) data were provided with the data package.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

All Analyses: No MS/MSD data were provided with the data package.

Laboratory Control Samples (LCS/LCSD)

All Analyses: The LCS/LCSD analyses met QC acceptance criteria.

Replicate Analysis

All Analyses: No replicate data were provided with the data package.

ICP Interference Check Sample (ICS)

ICP Analysis: No ICS data were provided with the data package.

CVAA Analysis: No ICS was required for this method.

ICP Serial Dilution

ICP Analysis: No serial dilution data were provided with the data package.

CVAA Analysis: No serial dilution was required for this method.

Other QC

All Analyses: No field duplicate, equipment blank (EB), or field blank (FB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Data Validation Summary

Site/Project: TA 3/5 - Site 196, 241 Project/Task #: 7219.01.06 # of Samples: 6 Matrix: 3 soil/2 sludge/1 aqueous

AR/COC #: 00350 Laboratory Sample IDs: 036545-0001 to -0006

Laboratory: Enseco

Laboratory Report #: 036545

QC Element	Analysis									
	Organics				Inorganics				RAD	Other (TPH)
	VOC	SVOC	Pesticide/PCB	HPLC (HE)	ICP/AES	GFAA/AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	NA	✓	✓	✓	NA	✓	NA	NA	✓
2. Calibrations	NP		NP	NP	NP		NP			NP
3. Method Blanks	U, B		✓	✓	✓		✓			✓
4. MS/MSD	NP		NP	NP	NP		NP			NP
5. Laboratory Control Samples	✓		✓	✓	✓		✓			✓
6. Replicates					NP		NP			NP
7. Surrogates	✓		UJ, A1	NP						NA
8. Internal Standards	NP									
9. TCL Compound Identification	NP									
10. ICP Interference Check Sample					NP					
11. ICP Serial Dilution					NP					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	✓		NA	NA	NA		NA			

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other: ______

Reviewed By: [signature] Date: 11/14/00

Volatile Organics (SW 846 Method 8260)

Site/Project: TA3/5 - Site 196, 241 AR/COC #: 00350 # of Samples: 2 Matrix: 1 sludge / 1 aqueous

Laboratory: Enseco Laboratory Report #: 036545 Laboratory Sample IDs: 036545 - 0004 & -0006 (TB)

Methods: EPA 8240 Batch #s: 08JUL94-A (sludge), 08JUL94-L (aqueous)

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks (sludge)	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks (ug/L)	Method Blank (aqueous)	
						>.05	<20% / 0.99	20%												
1	74-87-3	Chloromethane	✓	0.10					✓							NA	NA	✓	✓	
1	74-83-9	Bromomethane	✓	0.10																
1	75-01-4	vinyl chloride	✓	0.10																
1	75-00-3	Chloroethane	✓	0.01																
1	75-09-2	methylene chloride (10xblk)	✓	0.01					0.26										2.5	
1	67-64-1	acetone(10xblk)	✓	0.01					✓										✓	
1	75-15-0	carbon disulfide	✓	0.10																
1	75-35-4	1,1-dichloroethene	✓	0.20						✓	✓	✓	NA	NA	NP					
1	75-34-3	1,1-dichloroethane	✓	0.10																
1	67-66-3	Chloroform	✓	0.20																
1	107-06-2	1,2-dichloroethane	✓	0.10																
1	78-93-3	2-butanone(10xblk)	✓	0.01																
2	71-55-6	1,1,1-trichloroethane	✓	0.10																
2	56-23-5	carbon tetrachloride	✓	0.10		NP														
2	75-27-4	Bromodichloromethane	✓	0.20																
2	78-87-5	1,2-dichloropropane	✓	0.01																
2	10061-01-5	cis-1,3-dichloropropene	✓	0.20																
2	79-01-6	Trichloroethene	✓	0.30						✓	✓	✓	NP	NP	NP					
2	124-48-1	Dibromochloromethane	✓	0.10																
2	79-00-5	1,1,2-trichloroethane	✓	0.10																
2	71-43-2	Benzene	✓	0.50						✓	✓	✓	NP	NP	NP					
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																
2	75-25-2	Bromoform	✓	0.10																
3	108-10-1	4-methyl-2-pentanone	✓	0.10																
3	591-78 6	2-hexanone	✓	0.01														4.9		
3	127-18-4	Tetrachloroethene	✓	0.20														✓		
3	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																
3	108-88-3	toluene(10xblk)	✓	0.40						✓	✓	✓	NP	NP	NP					
3	108-90-7	Chlorobenzene	✓	0.50						✓	✓	✓	NP	NP	NP					
3	100-41-4	Ethylbenzene	✓	0.10																
3	100-42-5	Styrene	✓	0.30																
3	1330-20-7	xylenes(total)	✓	0.30																
	540-59-0	1,2-dichloroethylene(total)	✓	0.01																
	~~110-75-8~~	~~2-chloroethyl vinyl ether~~																		
	108-05-4	Vinyl Acetate	✓																	

Comments:

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable
NP = Not Provided

Reviewed By: [signature] Date: 11/14/00

Volatile Organics

Site/Project: TA 3/5 - Site 191, 241 AR/COC #: 00350 Batch #s: see Page 1 of 2

Laboratory: Enseco Laboratory Report #: 036545 # of Samples: 2 Matrix: 1 sludge / 1 aqueous

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
		All							
		Passed				NP			

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments: * Summary

⇒ In the method blanks for the TB and Field sample, methylene chloride was detected. The assoc. sample results were detects, < 10X the blank conc.s, < the RLs, and will be qualified "5U,B" and "0.5U,B," respectively

⇒ In the TB, 2-hexanone was detected. However, the assoc. sample result was ND. Thus, no data were qualified.

High Explosives (SW 846 Method 8330)

Site/Project: TA3/5 - Site 196, 241 AR/COC #: 00350 Laboratory Sample IDs: 036545-0001, -0002, -0003

Laboratory: Enseco Laboratory Report #: 036545

Methods: EPA 8330

# of Samples: 3 Matrix: Soil Batch #s: 06JUL94-7A

CAS #	NAME	TAL	Intercept	Curve R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
				.99	20%	U			20%			20%		U	U		
2691-41-0	HMX	✓				✓	✓	✓	✓	NP	NP	NP	NA	NA	NA		
121-82-4	RDX																
99-35-49	1,3,5-Trinitrobenzene																
99-65-0	1,3-dinitrobenzene																
98-95-3	Nitrobenzene																
479-45-8	Tetryl			NP													
118-96-7	2,4,6-trinitrotoluene																
35572-78-2	2-amino-4,6-dinitrotoluene																
19406-51-0	4-amino-2,6-dinitrotoluene																
121-14-2	2,4-dinitrotoluene																
606-20-2	2,6-dinitrotoluene																
88-72-2	2-nitrotoluene																
99-99-0	4-nitrotoluene																
99-08-1	3-nitrotoluene																
78-11-5	PETN																

NA = Not Applicable
NP = Not Provided

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
NP					

Comments: * Summary

=> All QC criteria were met. No data were qualified.

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA (All ND)					

Solids-to-aqueous conversion:
mg / kg = µg / g : [(µg / g) x (sample mass (g) / sample vol. (ml)) x (1000 ml / 1 liter)] / Dilution Factor = µg / l

Reviewed By: [signature] Date: 11/14/00

PCBs (SW 846 - Method 8082)

Site/Project: TA 3/5 – Site 196, 241 AR/COC #: 00350 Laboratory Sample IDs: 036545 – 0005

Laboratory: Enseco Laboratory Report #: 036545

Methods: EPA 8080

\# of Samples: 1 Matrix: Sludge Batch #s: 30 JUN94 - N1

CAS #	Name	TCL	Intercept	Calib RSD / R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
				<20% / 0.99	20%				20%			20%					
12674-11-2	Aroclor-1016	✓				✓				NP	NP	NP	NA	NA	NA		
11104-28-2	Aroclor-1221																
11141-16-5	Aroclor-1232			NP													
53469-21-9	Aroclor-1242																
12672-29-6	Aroclor-1248																
11097-69-1	Aroclor-1254						✓	✓	✓								
11096-82-5	Aroclor-1260	✓				✓											

NA = Not Applicable
NP = Not Provided

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
036545-0005	22 (DCB)	NP			

Comments:

*Summary

→ The DCB surrogate recovery was < QC limits but > 10%. All results for Sample -0005 were ND and will be qualified "UJ, A1."

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA					
(All ND)					

Reviewed By: [signature] Date: 11/14/00

Inorganic Metals

Site/Project: TA3/5 – Sx 196, 241 AR/COC #: 00350 Laboratory Sample IDs: 036545-0005

Laboratory: Enseco Laboratory Report #: 036545

Methods: EPA 6010 (ICP), EPA 7471 (CVAA)

\# of Samples: 1 Matrix: sludge Batch #s: 20JUL94-90 (ICP), 20JUL94-9A (CVAA)

CAS #/ Analyte	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks		
7429-90-5 Al	✓					✓	✓	✓	✓					NP	NP	NA	NA	NA		
7440-39-3 Ba	✓																			
7440-41-7 Be	✓																			
7440-43-9 Cd	✓																			
7440-70-2 Ca	✓																			
7440-47-3 Cr	✓																			
7440-48-4 Co	✓																			
7440-50-8 Cu	✓																			
7439-89-6 Fe	✓																			
7439-95-4 Mg	✓																			
7439-96-5 Mn	✓		NP								NP									
7440-02-0 Ni	✓																			
7440-09-7 K	✓																			
7440-22-4 Ag	✓																			
7440-23-5 Na	✓																			
7440-62-2 V	✓																			
7440-66-6 Zn	✓					2.7	✓	✓												
7439-92-1 Pb	✓					✓	✓	✓	✓											
7782-49-2 Se	✓																			
7440-38-2 As	✓																			
7440-36-0 Sb	✓																			
7440-28-0 Tl	✓																			
7439-97-6 Hg	✓					✓	✓	✓	✓					NA	NA					
Cyanide CN																				

Notes: Shaded rows are RCRA metals. Solids-to-aqueous conversion: mg / kg = µg / g : [(µg / g) x (sample mass (g) / sample vol. (ml)) x (1000 ml / 1 liter)] / Dilution Factor = µg / l

NA = Not Applicable
NP = Not Provided

Comments: *Summary

⇒ In the method blank, Zn was detected. However, the assoc. sample result was >5x the blank conc.. Thus, no data should be qualified.

Reviewed By: [signature] Date: 11/14/00

General Chemistry

Site/Project: TA 3/5 - Site 196, 241 AR/COC #: 00350 Laboratory Sample IDs: 036545-0005

Laboratory: Enseco Laboratory Report #: 036545

Methods: EPA 418.1 (TPH)

# of Samples: 1 Matrix: sludge Batch #s: 06JUL94-6A

CAS #	Analyte	QC Element																		
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilu-tion	Field Dup. RPD	Equip. Blanks	Field Blanks	
	TPH	✓	NP	NP	NP	NP	✓	✓	✓	✓	NP	NP	NP	NP	NA	NA	NA	NA	NA	

NA = Not Applicable
NP = Not Provided

Comments:

Reviewed By: [signature] Date: 11/14/00

Sandia National Laboratories

SF 2001-COC (12-93)

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

AR/COC- 0?350

Department No.: 7582
Project/Task Manager: Chris Nas / Paula Slavin
Project Name: ... - Site 241, 196
Sample Team Members: Tim Jackson, Nelson Chapman
SCL or Logbook Ref. No.: 00621, 00624

Date Samples Shipped: 6/27
Carrier/Waybill No.: A41337
Lab Destination: Enseco / Armal
Lab Contact: Ellen LaRiviere
SMO Contact/Phone: Pam Puissant (505) 844-0402
Send Report to SMO: Pam Puissant
SMO Reference No.: 301455.152.02

Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154
Contract No.: 67-9736B
Case No.: 3617.300
SMO Authorization: D McLaughlin

Sample Number - Fraction	Sample Matrix	Date/Time Collected	Container Type	Sample Volume	Preservative	Required Analytical Testing	Lab Sample Number	Condition on Receipt
016476-1	Soil	6-22-94/0925	Glass	16oz	Ice, 4°C	Explosive Residue (8330)		
016477-1	↓	0926	Glass	16oz		↓		
016478-1	↓	0927	Glass	16oz		↓		
016479-1	Sludge	1035	Glass	4oz		VOC (8240)		
016479-2	↓	1035	Glass	16oz	↓	PCB (8080), TPH (418.1) TAL Metals (6010/7000)		
016480-1	Water	↓ 1045	Glass	40ml	HCl	VOC (8240) Trip Blank		

Possible Hazard Identification
☑ Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Radiological

*Reference attached radiological screening for specific contact readings.

Turnaround Time
☑ Normal ☐ Rush ____ Required Report Date: Per Contract

Sample Disposal
☐ Return to Client ☑ Disposal by Lab Archive Until: Per Contract

Special Instructions/QC Requirements
- Please fax copy of results to Paula Slavin (505) 848-0417
- Tripblank contains air bubble

1. Relinquished by [signature]	Org. ITC	Date 6-22-94	Time 1200	4. Relinquished by Org. Date Time
1. Received by [signature]	Org. SMO-7576	Date 6-27-94	Time 1100	4. Received by Org. Date Time
2. Relinquished by [signature]	Org. SMO 7576	Date 6-27-94	Time 1100	5. Relinquished by Org. Date Time
2. Received by	Org.	Date	Time	5. Received by Org. Date Time
3. Relinquished by	Org.	Date	Time	6. Relinquished by Org. Date Time
3. Received by	Org.	Date	Time	6. Received by Org. Date Time

... YELLOW- SMO Suspense Copy PINK- Field Copy

Sandia National Laboratories
Albuquerque, New Mexico 87185

date: June 21, 1995

to: Paula Slavin, 7582

from: Mark Lyon, 7513

project: TA 3/5, RFI, Site 196

ARCOC: 02948

Lab: Lockheed Analytical Svs.

Lab #: L4382, L4426 (Re-run)

Date Sampled: 4/25/95

Enclosed are two data packages for your project. The packages include copies of the ARCOC form, analytical laboratory report, verification check lists, and any additional supporting documentation. The SMO has performed a Data Verification Level 1 and Level 2 (DV1/DV2) on the data. The data are being sent to you so that you may perform project specific data validation and approval/acceptance. Refer to the report narrative and verification check lists for comments regarding data quality. All original documentation has been forwarded to the Records Center for filing. If you need assistance with the data review or have any questions regarding the data please contact me at 262-8920.

SAMPLE MANAGEMENT OFFICE

Mark Lyon

Mark Lyon

MLL:7513

Distribution:
7500 Record Center

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

Project Name TA 3/5 RFI, Site 196
Case Number 3617.300
Sample Numbers 021374-02, 021374-03, 021375-02, 021375-03

AR/COC No. 02948 Analytical laboratory Lockheed SDG No. L4382
AR/COC No. ______ Analytical laboratory ______ SDG No. ______
AR/COC No. ______ Analytical laboratory ______ SDG No. ______
AR/COC No. ______ Analytical laboratory ______ SDG No. ______

In the tables below, mark any information that is missing or incorrect.

1.0 Sample Collection Log

Item	Complete? Yes	Complete? No	Corrected? Yes	Corrected? No[a]
Date				
Sheet number and total number of sheets below				
General information				
Sample description				
Sample ID number(s) and fraction number(s)				
Location				
Time of sample collection				
Sample type				
Depth below surface				
QC sample?[b]				
Comments				
Analyses requested				
Project information				
Project name				
Case number/service order number				
Contact information				
Turnaround time				
Regulatory program				
Special QC requirements				
Sample team member(s), their signature(s), and initials				
Sample tracking information (the "Data Entered" and "By" spaces may be empty)				

MLL

[a] Describe any uncorrected deficiencies in Section 5.0, "Completeness Assessment," below.
[b] Comments are only required for QC samples; for other samples, this item can be blank.

Reviewed by: Mark Lyon

Date: 6-20-95

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

2.0 Analysis Request and Chain of Custody Record

Item	Complete?		Corrected?		
	Yes	No	Yes	No[a]	
Page number and total number of pages	✓				
Project information	✓				
Sample shipping information	✓				
Contract and case number	✓				
SMO authorization signature	✓				
Location information	✓				
Sample number(s)/fraction number(s)	✓				
Sample ID information	✓				
Date/time sample(s) collected	✓				
Sample matrix	✓				
Container type(s)	✓				
Sample volume	✓				
Preservative (chemical and/or thermal)	✓				
Sample collection method	✓				
Sample type	✓				
Required analytical testing	✓				
Sample information		✓	✓		①
Special instruction/QC requirements	✓				
Custody records	✓				
Lab sample number		✓		✓	②
Condition upon receipt	✓				

[a] Describe any uncorrected deficiencies in Section 5.0 "Completeness Assessment" below.

3.0 Document Comparison

Item	Complete?		Corrected?	
	Yes	No	Yes	No[a]
Dates on Sample Collection Log and AR/COC agree.				
Sample team members on the Sample Collection Log and the AR/COC agree.				
Sample ID numbers on Sample Collection Log and AR/COC agree.				
Date and time on Sample Collection Log and AR/COC agree.				
Analyses requested on AR/COC agree with those shown on Sample Collection Log.				
Project information on Sample Collection Log and AR/COC agree.				
The sample location on the Sample Collection Log agrees with the AR/COC and project- specific plan requirements or authorized changes to the plan(s).				
The number of investigative and QC samples collected was that specified in the project-specific plan(s) or authorized changes to the plan(s).				
The analyses requested on the AR/COC were those specified in the project-specific plan(s) or authorized changes to the plan(s).				

NA

[a] Describe any uncorrected deficiencies in Section 5.0, "Completeness Assessment," below.

Reviewed by: Mark Lyon Date: 6-20-95

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

4.0 Analytical Laboratory Report

Item	Complete? Yes	Complete? No	Corrected? Yes	Corrected? No[a]	
Data reviewed, signature	✓				
Date samples received	✓				
Method reference number(s)		✓		✓	①
Quality control data	✓				②
Matrix spike/matrix spike duplicate data	NOT	REQUESTED			③
Narrative complete		✓		✓	④

[a] Describe any uncorrected deficiencies in Section 5.0 "Completeness Assessment" below.

5.0 **Completeness Assessment** For each section below, mark the appropriate box and describe any problems that remain unresolved.

5.1 Sample Collection Log N/A

	Yes	No
All boxes on the Sample Collection Log are complete:	☐	☐
Some boxes have been checked no; all problems are resolved.	☐	☐

If any boxes have been checked no, describe problem and resolution:
The sample collection log is an optional submittal and was not included in the document package for SMO Review. ARCOC 02948 references SCL 1595 for additional sampling information.

5.2 Analysis Request And Chain Of Custody Record AR/COC

	Yes	No
All boxes on the AR/COC review are complete:	☐	☑
Some boxes have been checked no; all problems are resolved.	☐	☑

If any boxes have been checked no, describe problem and resolution:
① Contract requires sample disposal be "Return to Client" for all samples. Reviewer edited yellow ARCOC field copy. ② Lab failed to return blue ARCOC copy, returned Xerox copy instead, and did not indicate lab sample id number on ARCOC. Information is found in lab log-in documents.

Reviewed by: Mark [signature]
Date: 6-20-95

DOCUMENTATION COMPLETENESS CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 1—DV1)

5.3 Document Comparison N/A

	Yes	No
All boxes on the Document Comparison are complete:	☐	☐
Some boxes have been checked no; all problems are resolved.	☐	☐

If any boxes have been checked no, describe problem and resolution:

MC

5.4 Analytical Laboratory Report

	Yes	No
All boxes on the Lab Report review are complete:	☐	☒
Some boxes have been checked no; all problems are resolved.	☐	☒

If any boxes have been checked no, describe problem and resolution:

① Methods referenced are lab SOPs not published methods required by the contract.
② Accuracy & precision data for these samples are in package. QC does not conform to contract req.
③ MS not required but was ran and reported on ISO-U this ARCOC for lab batch QC.
④ Report does not show location detail / OR sample id. MDA on summary data sheets is actually critical level / Decision amount. Except for blank, no control limits were provided.

BASED ON THE REVIEW, DOCUMENTATION IS COMPLETE: ☐ Yes ☒ No

Reviewed by: Mark Lyon **Approved by:*** ____________
Date: 6-21-95 **Date:** ____________

* Task/Project Leader must approve data package.

COMMENTS: ____________

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Project Name TA 3/5 RFI, Site 196
Case Number 3617.300
Sample Numbers 021374-02, 021374-03, 021375-02, 021375-03

AR/COC No. 02948 Analytical laboratory Lockheed SDG No. 24382
AR/COC No. ______ Analytical laboratory ______ SDG No. ______
AR/COC No. ______ Analytical laboratory ______ SDG No. ______
AR/COC No. ______ Analytical laboratory ______ SDG No. ______

1.0 EVALUATION

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
1) Sample volume, container, and preservation correct?	✓		
2) Holding times met for all samples?	✓		
3) Reporting units appropriate for the matrix and meet project-specific requirements?	✓		
4) Quantitation limit met for all samples?	✓		
5) Accuracy a) Laboratory control sample accuracy reported and met for all samples?	✓		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?			NOT Applicable

Reviewed by: Mark [signature]

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
c) Matrix spike recovery data reported and met for all samples for which it was requested?			NOT REQUESTED SEE COMMENT
6) Precision a) Laboratory control sample precision reported and met for all samples?		✓	SEE COMMENT
b) Matrix spike duplicate RPD data reported and met for all samples for which it was requested?			NOT REQUESTED
7) Blank data a) Method or reagent blank data reported and met for all samples?	✓		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?			NONE SUBMITTED
8) Narrative included, correct, and complete?		✓	See comment

2.0 COMMENTS: All items marked "No" above must be explained in this section. For each item, give SNL/NM ID No. and the analysis, if appropriate, of all samples affected by the finding.

5c) Matrix spike reported for ISO-U on 021374-03 even though not requested. U-233/234, U-238 recovery acceptable, U-235 recovery flagged outside lab acceptance window (6) Sample duplicate of 021374 reported instead of duplicate control sample. Precision for detectable

Reviewed by: ____________________

Date: ____________________

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

2.0 COMMENTS CONTINUATION SHEET

U-233/234 and U-238 acceptable. Precision for U-235 poor at 89.3 RPD. Precision for non-detect tritium is expected poor at 419 RPD. (8) Lab did not report control limits, except for blank, even though flags are applied when values exceed limits. MDA value on summary data sheets is actually the critical level/Decision amount confirmed in the raw data pkg.

Reviewed by: Mark [illegible]

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

3.0 SUMMARY: Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted. Use the qualifiers given at the end of the table if possible. Explain any other qualifiers in the comments column.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
D21374-02	Tritium	U	Activity is less than 2-sigma error and less than critical level/precision amt
021375-02	↓	↓	↓ ↓
D21374-03	U-235	J	Poor precision on sample duplicate and low matrix spike recovery
021375-03	↓	↓	↓ ↓

Attach continuation sheet for additional samples

QUALIFIERS:

J = Estimated quantity (provide reason)
B = Contamination in blank (indicate which blank)
P = Laboratory precision does not meet criteria
R = Reporting units inappropriate
N = There is presumptive evidence of the presence of the material
UJ = The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Q = Quantitation limit does not meet criteria
A = Laboratory accuracy does not meet criteria
U = Analyte is undetected (indicate which analyte and reason for qualification)
NJ = There is presumptive evidence of the presence of the material at an estimated quantity.

Reviewed by: Mark [signature]

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

SAMPLE FINDINGS SUMMARY CONTINUATION SHEET

Sample/ Fraction No.	Analysis	Qualifiers	Comments

Reviewed by: Mark Lyon Approved by:* ______________________

Date: 6-21-95 Date: ______________________

*Task/Project Leader must approve data package.

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DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Project Name TA 3/5 RFI, Site 196

Case Number 3617.300

Sample Numbers Re-analysis of 021374-03 for Iso-U

AR/COC No. 02948 Analytical laboratory Lockheed SDG No. L4426

AR/COC No. ____ Analytical laboratory ____ SDG No. ____

AR/COC No. ____ Analytical laboratory ____ SDG No. ____

AR/COC No. ____ Analytical laboratory ____ SDG No. ____

1.0 EVALUATION

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
1) Sample volume, container, and preservation correct?	✓		
2) Holding times met for all samples?	✓		
3) Reporting units appropriate for the matrix and meet project-specific requirements?	✓		
4) Quantitation limit met for all samples?	✓		
5) Accuracy a) Laboratory control sample accuracy reported and met for all samples?	✓		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique?			Not Applicable

Reviewed by: Mark [signature]

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
c) Matrix spike recovery data reported and met for all samples for which it was requested?	/	/	NOT REQUESTED SEE COMMENT
6) Precision a) Laboratory control sample precision reported and met for all samples?		✓	SEE COMMENT
b) Matrix spike duplicate RPD data reported and met for all samples for which it was requested?	/	/	NOT REQUESTED SEE COMMENT
7) Blank data a) Method or reagent blank data reported and met for all samples?	✓		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met?	/	/	NOT SUBMITTED
8) Narrative included, correct, and complete?		✓	

2.0 COMMENTS: All items marked "No" above must be explained in this section. For each item, give SNL/NM ID No. and the analysis, if appropriate, of all samples affected by the finding.

6) Duplicate control sample not analyzed. Lab substituted sample duplicate for 021374-03 precision. Precision of all uranium isotopes measured is less than 25 RPD. 5c, 6b MS/MSD not requested but ran on 021374-03 and reported by lab for batch QC. Acceptable

Reviewed by: Mark Lyon

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

2.0 COMMENTS CONTINUATION SHEET

MS/MSD accuracy and precision for U-233/234 and U-238. %R for U-235 @ 97% and 153% yields poor precision measure of ~50 RPD. (8.) Lab did not provide control limits in report (except blank) even though data are flagged for excursions. MDA on summary data sheets is actually critical level/decision amount.

Reviewed by: Mark [signature]

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

3.0 SUMMARY: Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted. Use the qualifiers given at the end of the table if possible. Explain any other qualifiers in the comments column.

Sample/ Fraction No.	Analysis	Qualifiers	Comments
D 21374-03	U-235	J	Poor MSD ~~precision~~ precision
			at ~50 RPD.

Attach continuation sheet for additional samples

QUALIFIERS:

J = Estimated quantity (provide reason)
B = Contamination in blank (indicate which blank)
P = Laboratory precision does not meet criteria
R = Reporting units inappropriate
N = There is presumptive evidence of the presence of the material
UJ = The material was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
Q = Quantitation limit does not meet criteria
A = Laboratory accuracy does not meet criteria
U = Analyte is undetected (indicate which analyte and reason for qualification)
NJ = There is presumptive evidence of the presence of the material at an estimated quantity.

Reviewed by: Mark Lya

Date: 6-21-95

DATA QUALITY INDICATOR CHECKLIST
(DATA VERIFICATION/VALIDATION LEVEL 2—DV2)

SAMPLE FINDINGS SUMMARY CONTINUATION SHEET

Sample/ Fraction No.	Analysis	Qualifiers	Comments
		ML	

Reviewed by: Mark [illegible]

Date:

Approved by:*

Date:

*Task/Project Leader must approve data package.

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2004 Data Validation Reports for 1996 Data

Sample Findings Summary

Site: Site 196 | **AR/COC:** 04427 | **Data Type:** Organic | Page

Overall quality of the data is not clear and no data qualifiers have been assigned. Reported QC data for VOC and TPH met QC acceptance limits.

Validated By: Kevin A Lambert

Date: 04/23/04

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
Phone: 505-299-5201
Fax: 505-299-6744
Email: minteer@aol.com

Memorandum

Date: April 23, 2004

To: File

From: Kevin Lambert

Subject: Organic Data Review and Validation – SNL
Site: ER Site 196
AR/COC: 04427
SDG: 603374
Laboratory: AEN
Project/Task: 7219.02.02.05

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM SMO AOP 00-03 Rev 1.

Summary

The samples were prepared and analyzed using method EPA8240 (VOC) and EPA418.1 (Total Petroleum Hydrocarbons). It should be noted that this data package contains little analytical information. The data provided is insufficient to perform a thorough data review and validation using SNL/NM SMO AOP 00-03 Rev 1. The QC data that was included in the package appears to be acceptable and met QC acceptance limits. However, the overall quality of the data is not clear and no data qualifiers have been assigned. The use of the data is at the discretion of the Task Leader.

The following sections discuss the data review.

Holding Times/Preservation

All samples were within the prescribed holding times and properly preserved.

Calibration

No initial calibration and continuing calibration data were provided.

Blanks

No target analytes were detected in the blanks.

Internal Standards (ISs)

No internal standards data was provided.

Surrogates

VOC:
The surrogate recoveries met QC acceptance limits of 80% to 120%.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

No LCS/LCSD was provided.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

VOC:
The MS and MSD percent recovery (%R) met QC acceptance limits of 80% to 120% and the MS/MSD relative percent difference (RPD) of 20%.

Total Petroleum Hydrocarbons (TPH):
The MS %R met QC acceptance limit of 80% to 120%. No MSD was provided.

Target Compound Identification/Confirmation

No target compound identification/confirmation analyses were required for these methods.

Detection Limits/Dilutions

It appears that detection limits were properly reported. No dilutions were required.

Other QC

No trip blank (TB), equipment blank (EB) or field duplicate pair was submitted on the AR/COC except as follows.

TPH:
A field duplicate pair was submitted on the AR/COC. There are no "required" review criteria for field duplicate analyses comparability; no data will be qualified as a result.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: ER Site 196 Project/Task #: 7219.02.02.05 # of Samples: 19 Matrix: 18 soil, 1 aqueous

AR/COC #: 04427 Laboratory Sample IDs: 603374-01 to -19

Laboratory: AEN

SDG #: 603374

QC Element	Analysis									
	Organics				Inorganics				RAD	Other
	VOC	TPH SVOC	Pesticide/PCB	HPLC (HE)	ICP/AES	GFAA/AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓								
2. Calibrations	NP	NP								
3. Method Blanks	✓	✓								
4. MS/MSD	✓	✓ MS ONLY								
5. Laboratory Control Samples	NP	NP								
6. Replicates										
7. Surrogates	✓	NA								
8. Internal Standards	NP	NA								
9. TCL Compound Identification	NA	NA								
10. ICP Interference Check Sample										
11. ICP Serial Dilution										
12. Carrier/Chemical Tracer Recoveries										
13. Other QC Field Dup	NA	✓								

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other:

Reviewed By: Kevin A Lambert Date: 04-23-04

Volatile Organics (SW 846 Method ~~8260~~)

Site/Project: ER Site 196 AR/COC #: 04427 # of Samples: 10 Matrix: 9 soil 1 aqueous

Laboratory: AEN SDG #: 603374 Laboratory Sample IDs: 603374-08 ~~to-19~~ to -14, -17 to -19 KAL

Methods: EPA 8240 (VOC) Batch #s: NP

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	← MS	① MSD	→ MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
1	71-55-6	1,1,1-trichloroethane	✓	0.10					✓							NA	NA	✓		
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																
2	79-00-5	1,1,2-trichloroethane	✓	0.10																
1	75-34-3	1,1-dichloroethane	✓	0.10																
1	75-35-4	1,1-dichloroethene	✓	0.20									✓	✓	✓					
1	107-06-2	1,2-dichloroethane	✓	0.10																
1	156-59-2	cis-1,2-dichloroethene	✓	0.01																
1	78-87-5	1,2-dichloropropane	✓	0.01																
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01																
1	156-60-5	trans-1,2-dichloroethene	✓																	
2	591-78-6	2-hexanone (MBK)	✓	0.01						Not										
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10																
1	67-64-1	acetone(10xblk)	✓	0.01		Not														
1	71-43-2	benzene	✓	0.50						Provided			✓	✓	✓					
1	75-27-4	bromodichloromethane	✓	0.20																
3	75-25-2	bromoform	✓	0.10																
1	74-83-9	bromomethane	✓	0.10		Provided														
1	75-15-0	carbon disulfide	✓	0.10																
1	56-23-5	carbon tetrachloride	✓	0.10																
2	108-90-7	chlorobenzene	✓	0.50									✓	✓	✓					
1	75-00-3	chloroethane	✓	0.01																
1	67-66-3	chloroform	✓	0.20																
1	74-87-3	chloromethane	✓	0.10																
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20																
2	124-48-1	dibromochloromethane	✓	0.10																
2	100-41-4	ethylbenzene	✓	0.10																
1	75-09-2	methylene chloride (10xblk)	✓	0.01																
2	100-42-5	styrene	✓	0.30																
2	127-18-4	tetrachloroethene	✓	0.20																
2	108-88-3	toluene(10xblk)	✓	0.40									✓	✓	✓					
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																
1	79-01-6	trichloroethene	✓	0.30									✓	✓	✓					
1	75-01-4	vinyl chloride	✓	0.10																
2	1330-20-7	xylenes(total)	✓	0.30																
	108-05-4	vinyl acetate	✓																	

Comments:

① %R limits 80-120
RPD = 20%

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 04-23-04

VOC

Organics (supplemental)

Site/Project: ______ AR/COC #: 04427 # of Samples: ______ Matrix: ______

Laboratory: ______ SDG #: ______ Laboratory Sample IDs#: ______

Methods: EPA8240 (VOC) Batch #s: ______

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
	110-75-8	2-Chloroethyl vinyl ether	✓		Not Provided				✓	Not Provided						NA	NA	✓		
	106-93-4	1,2-Dibromomethane	✓																	
	95-50-1	1,2-Dichlorobenzene	✓																	
	541-73-1	1,3-Dichlorobenzene	✓																	
	106-45-7	1,4-Dichlorobenzene	✓																	
	75-71-8	Dichlorodifluoromethane	✓																	
	74-88-4	Iodomethane	✓																	
	75-69-4	Trichlorofluoromethane	✓																	

Comments:

Notes: Shaded rows are RCRA compounds.

KAL
04-23-04

Volatile Organics

3/3 Page ~~2 of 2~~ ~~3~~ KHL

Site/Project: ______ AR/COC #: 04427 Batch #s: ______

Laboratory: ______ SDG #: ______ # of Samples: ______ Matrix: ______

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
					Not				
	Met					Provided			
	Criteria								
	80 - 120								

SMC 1: Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

IS 1: Fluorobenzene
IS 2: Chlorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments:

Organics (supplemental)

Site/Project: ER Site 196 AR/COC #: 04427 # of Samples: 9 Matrix: soil

Laboratory: AEN SDG #: 603374 Laboratory Sample IDs#: 603374-01 to -07, -15, 16

Methods: EPA8240 (VOC) Batch #s: NP

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS (1)	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
	5290000-00-0	TPH	✓	NA	NP	NP	NP	NP	✓	NP	NP	NP	✓	NA	NA	9	NA	NA		

Comments:

Notes: Shaded rows are RCRA compounds. (1) MS %R limit 80-120

KAC 04-23-04

Internal Lab
Batch No. ______

ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC- 04427

SF 2001-COC (6-95)

Dept. No./Mail Stop: 7582/MS1147
Project/Task Manager: LOU DAWSON/SINJIN EBERLE
Project Name: ER SITE 196 CISTERN
Record Center Code: ER/1306/196/DAT
Logbook Ref No: 96 0115 pg. 55
Service Order No.: NA

Date Samples Shipped: 3.27.96
Carrier/Waybill No.: NA
Lab Contact: DAN
Lab Destination: AEN
SMO Contact/Phone: NA
Send Report to SMO: NA

Contract No.: NA
Case No.: 3617.300
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location Tech Area: V
Building: W of 6597 Room: Site 196

Parameter & Method Requested: 603374

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	VOC 8240	TPH 418.1	Lab Sample ID
-	TA3/5-196-D1-13	13	196	3-27-96 1028	Soil	AC	2oz	4°C	G	SA		X	01
-	-D2-001	1		1125								X	02
-	-005	5		1131								X	03
-	-007	7		1155									04
-	-011	11		1215									05
-	-011-DUP	11		1215						DU			06
-	-012	12		1300						SA			07
-	-D1-13	13		1028							X		08
-	-D2-000	0		1125									09
-	-004	4		1131									10

RMMA ☐ Yes ☒ No Ref. No. ______

Sample Disposal ☐ Return to Client ☒ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date ______

Sample Tracking
Date Entered (mm/dd/yy) ______
Entered by: ______
QC inits. ______

Special Instructions/QC Requirements
Do MS/MSD on samples -
TA3/5-196-D3-002 VOC
TA3/5-196-D3-002 TPH
Please Fax results to
Paula Slavin @ 284-2617.

Abnormal Conditions on Receipt
- Recieved cold
- Received Intact.
18 soils
1 TB.

Sample Team Members Name	Signature	Init	Company/Organization/Phone
PAULA J. SLAVIN	[signature]	PJS	GRAM/7582/284-2496
SINJIN EBERLE	Sinjin Eberle	SE	SAIC/7582/284-2571
Stuart Van Deusen	[signature]	SVD	SNL/7584/284-3309

	Org.	Date	Time
1. Relinquished by Sinjin Eberle	7582	3.27.96	4:28p
1. Received by John Epley		3/27/96	4:28pm
2. Relinquished by			
2. Received by			
3. Relinquished by			
3. Received by			
4. Relinquished by			
4. Received by			
5. Relinquished by			
5. Received by			
6. Relinquished by			
6. Received by			

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

SF 2001-COD (9-94)

ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC- 01427

Parameter & Method Requested: 603374

Project Name: ERSite 196 Cistern Project/Task Manager: Sinjin Eberle Case No.: 3617.300

Location Tech Area V

Building WOE 6597 Room Site 196

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	VOC 8240	TPH 418.1	TB 8240	Lab Sample ID
-	TA3/5-196-D2-006	6	196	3-27-96 1155	Soil	AC	2oz	4°C	G	SA	X			1
-	-010	10		1215										2
-	-010-DUP	10		1215						DU				3
-	-011	11		1300						SA				4
-	D3 -002	2		1410								X		5
-	-004	4		1420										6
-	-002	2		1410							X			7
-	-003	3		1420										8
-	TA3/5-196-TB	0		3-22									X	9
-														
-														
-														
-														
-														
-														
-														
-														
-														

Abnormal Conditions on Receipt

Sinjin Eberle 3/27/96 4:28

JE 3/27/96 4:28pm

Recipient Initials ______

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

Sample Findings Summary

Site: Site 196 **AR/COC:** 04513 **Data Type:** Organic

Overall quality of the data is not clear and no data qualifiers have been assigned. Reported QC data for VOC and TPH met QC acceptance limits.

Validated By: Kevin A Lambert

Date: 04/23/04

Data Validation Summary

Site/Project: ER Site 196 Project/Task #: 7219.02.02.05 # of Samples: ~~3~~ 2 KAL Matrix: soil

AR/COC #: 04513 Laboratory Sample IDs: 603364-01, -02

Laboratory: AEN

SDG #: 603364

QC Element	Analysis									
	Organics				Inorganics				RAD	Other
	VOC	TPH ~~SVOC~~ KAL	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓								
2. Calibrations	NP	NP								
3. Method Blanks	✓	✓								
4. MS/MSD	✓	✓ MS ONLY								
5. Laboratory Control Samples	NP	NP								
6. Replicates										
7. Surrogates	✓	NA								
8. Internal Standards	NP	NA								
9. TCL Compound Identification	NA	NA								
10. ICP Interference Check Sample										
11. ICP Serial Dilution										
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	NA	NA								

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other: ____

Reviewed By: Kevin A Lambert Date: 04-23-04

Volatile Organics (SW 846 Method ~~8260~~ KAC)

Site/Project: ER Site 196 AR/COC #: 04513 # of Samples: 1 Matrix: Soil

Laboratory: AEN SDG #: 603364 Laboratory Sample IDs: 603364-02

Methods: EPA8240 (VOC) Batch #s: NP

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	MS	① MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
1	71-55-6	1,1,1-trichloroethane	✓	0.10					✓											
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																
2	79-00-5	1,1,2-trichloroethane	✓	0.10																
1	75-34-3	1,1-dichloroethane	✓	0.10																
1	75-35-4	1,1-dichloroethene	✓	0.20									✓	✓	✓					
1	107-06-2	1,2-dichloroethane	✓	0.10																
1	156-59-2	cis-1,2-dichloroethene	✓	0.01																
1	78-87-5	1,2-dichloropropane	✓	0.01																
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01																
1	156-60-5	trans-1,2-dichloroethene	✓																	
2	591-78-6	2-hexanone (MBK)	✓	0.01		Not					Not									
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10																
1	67-64-1	acetone(10xblk)	✓	0.01							Provided									
1	71-43-2	benzene	✓	0.50		Provided							✓	✓	✓					
1	75-27-4	bromodichloromethane	✓	0.20																
3	75-25-2	bromoform	✓	0.10																
1	74-83-9	bromomethane	✓	0.10																
1	75-15-0	carbon disulfide	✓	0.10																
1	56-23-5	carbon tetrachloride	✓	0.10																
2	108-90-7	chlorobenzene	✓	0.50									✓	✓	✓					
1	75-00-3	chloroethane	✓	0.01																
1	67-66-3	chloroform	✓	0.20																
1	74-87-3	chloromethane	✓	0.10																
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20																
2	124-48-1	dibromochloromethane	✓	0.10																
2	100-41-4	ethylbenzene	✓	0.10																
1	75-09-2	methylene chloride (10xblk)	✓	0.01																
2	100-42-5	styrene	✓	0.30																
2	127-18-4	tetrachloroethene	✓	0.20																
2	108-88-3	toluene(10xblk)	✓	0.40									✓	✓	✓					
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																
1	79-01-6	trichloroethene	✓	0.30									✓	✓	✓					
1	75-01-4	vinyl chloride	✓	0.10																
2	1330-20-7	xylenes(total)	✓	0.30																
	108-05-4	vinyl acetate	✓						✓											

Comments:

① %R limits 80-120
RPD = 20

Notes: Shaded rows are RCRA compounds.

Reviewed By: Kevin A Lambert Date: 04-23-04

Organics (supplemental)

Site/Project: ____________ AR/COC #: 04513 # of Samples: ____________ Matrix: ____________

Laboratory: ____________ SDG #: ____________ Laboratory Sample IDs#: ____________

Methods: EPA 8240 (VOC) Batch #s: ____________

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
	110-75-8	2-Chloroethyl vinyl ether	✓						✓											
	106-93-4	1,2-Dibromoethane	✓																	
	95-50-1	1,2-Dichlorobenzene	✓																	
	541-73-1	1,3-Dichlorobenzene	✓																	
	106-45-7	1,4-Dichlorobenzene	✓																	
	75-71-8	Dichlorodifluoromethane	✓			Not Provided														
	74-88-4	Iodomethane	✓								Not Provided									
	75-69-4	Trichlorofluoromethane	✓																	

Comments:

Notes: Shaded rows are RCRA compounds.

KAL
04-23-04

Volatile Organics

Site/Project: ______ AR/COC #: 04513 Batch #s: ______

Laboratory: ______ SDG #: ______ # of Samples: ______ Matrix: ______

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
	met			Not					
	Criteria			Provided					
	80 - 120								

SMC 1: Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

IS 1: Fluorobenzene
IS 2: Chlorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments:

Organics (supplemental)

Site/Project: Site 196 AR/COC #: 04513 # of Samples: 2 Matrix: soil

Laboratory: AEN SDG #: 603364 Laboratory Sample IDs#: 603364-01, -02

Methods: EPA 418.1 (TPH Batch #s: NP

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	① MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
	5290000-00-0	TPH	✓	NA	NP	NP	NP	NP	✓	NP	NP	NP	✓	NP	NP	NP	NP	NA		

Comments:

Notes: Shaded rows are RCRA compounds.

① %R limit 80-120

Kevin A Lambert
04-23-04

ANALYSIS REQUEST AND CHAIN OF CUSTODY

PAGE ____ OF ____

AR/COC- 04513

SF 2001-COC (6-95)

Internal Lab Batch No. ____

Dept. No./Mail Stop: 7562/1147
Project/Task Manager: SINJIN EBERLE
Project Name: ER Site 196 CHAR
Record Center Code: ER/1306/196/DAT
Logbook Ref No: #013 - p.49
Service Order No.: ____

Date Samples Shipped: ____
Carrier/Waybill No.: ____
Lab Contact: ANDY
Lab Destination: ACN
SMO Contact/Phone: NA
Send Report to SMO: NA

Contract No.: ____
Case No.: ____
SMO Authorization: [signature]
Bill to: Sandia National Laboratories
Supplier Services Department
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Location: Tech Area ____ Building ____ Room ____

Reference LOV (available at SMO)

Sample No. - Fraction	ER Sample ID or Sample Location Detail	Beginning Depth in Ft.	ER Site No.	Date/Time Collected	Sample Matrix	Container Type	Container Volume	Preservative	Sample Collection Method	Sample Type	TPH 418.1	VOC 8240	Lab ID 603764	Lab Sample ID
-	TA3/5-196-D1-008	8	196	3-26-96 1448	Soil	AC	1oz	4°C	G	SA	X		-01	
-	TA3/5-196-D1-009	9	↓	1550	↓	↓	↓	↓	↓	↓	X		-02	
-	TA3/5-196-D1-009	9	↓	↓ 1550	↓	↓	↓	↓	↓	↓		X	-02	
-														
-														
-														
-														
-														
-														

RMMA ☐ Yes ☒ No Ref. No. ____

Sample Disposal ☐ Return to Client ☐ Disposal by lab

Turnaround Time ☒ Normal ☐ Rush Required Report Date ____

Sample Tracking
Date Entered (mm/dd/yy) ____
Entered by: ____
QC Inits. ____

Special Instructions/QC Requirements
Please fax results to Paula Slavin at 284-2617.

Abnormal Conditions on Receipt

Sample Team Members: Name	Signature	Init	Company/Organization/Phone
STUART VAN DUSEN	[signature]	WD	SNL/7584
PAULA SLAVIN	[signature]	PS	GRAM/7082/284-2494
SINJIN EBERLE	Sinjin Eberle	SE	SAIC/7582/284-2571

	Name	Org.	Date	Time
1. Relinquished by	Sinjin Eberle	7562	3-26-96	1702
1. Received by	[signature]		3-26-96	17:05
2. Relinquished by				
2. Received by				
3. Relinquished by				
3. Received by				
4. Relinquished by				
4. Received by				
5. Relinquished by				
5. Received by				
6. Relinquished by				
6. Received by				

WHITE - To Accompany Samples, Laboratory Copy BLUE- To Accompany Samples, Return to SMO YELLOW- SMO Suspense Copy PINK- Field Copy

1999 Data Validation Reports

SAMPLE FINDINGS SUMMARY

Site: III/V RFI Rpt

AR/COC: 602756 Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
050000-002 196-BH2-99-25-55	EPA 8260 All Non-detects	UJ	
	and detects as follows:		
	100-41-4 (ethylbenzene)	J, A1	Also, internal std was below lower limit
	108-88-3 (toluene)		
	1330-20-7 (xylenes, total)		

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method. use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate. needs modification because of an unusual circumstance. or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010. EPA6020. EPA7470/1. EPA8015B. EPA8081. EPA8260. EPA8260-M3. EPA8270. HACH_ALK. HACH_NO2. HACH_NO3. MEKC_HE. PCBRISC

Reviewed by: Kevin A Lambert Date: 11-30-99

MEMORANDUM

DATE: November 30, 1999

TO: File

FROM: Kevin Lambert KAL

SUBJECT: Organic Data Review and Validation
III/V RFI Rpt, ARCOC No. 602756, and Project/Task No. 7219.01.06

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

The samples were prepared and analyzed with accepted procedures and specified method (VOC – EPA8260). Problems were identified with the data package that result in the qualification of data.

1. For sample 9909155-01, the surrogate percent recovery (%R) was greater than (>) the upper acceptance limit (129%) for bromofluorobenzene (134%) and the internal standard (IS) count was less than (<) the lower acceptance limit (220675) for 1,4-dichlorobenzene-d4 (164891). This sample (9909155-01) was selected as the matrix spike/matrix spike duplicate (MS/MSD) and the same IS compound (1,4-dichlorobenzene-d4) was < the lower acceptance limit. The surrogate %R and IS counts met acceptance criteria in all remaining samples. Therefore, only sample 9909155-01 will be qualified; detects will be qualified "J" and non-detects will be qualified "UJ."

Data is acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were extracted and analyzed within the prescribed holding times.

Calibration

The initial and continuing calibration data met QC acceptance criteria. The calibration response factor (RF) for 1,1-dichloroethene and trichloroethene are slightly < the minimum RF but are > 0.05, and the calibration RF for 2-butanone was < 0.05 but > the minimum RF. The continuing calibration verification (CCV) percent difference (%D) for these compounds met QC acceptance criteria and sample results are non-detect; no data were qualified. The CCV %D for chloromethane, acetone, 2-hexanone, and vinyl acetate are > 20% but < 40%. The RFs for these compounds met acceptance criteria and sample results are non-detect; no data were qualified.

DATA VALIDATION SUMMARY:

SITE/PROJECT: III/V RFI Rpt CASE #: 7219.161
ARCOC #: 602756
LABORATORY: GEL
LABORATORY REPORT #: 9909155

OF SAMPLES: 12 MATRIX: soil
LAB SAMPLE IDs: 9909155-01 to -12

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. CALIBRATIONS	✓									
3. METHOD BLANKS	✓									
4. MS/MSD	✓									
5. LABORATORY CONTROL SAMPLES	✓									
6. REPLICATES										
7. SURROGATES	J									
8. INTERNAL STDS	J, UJ									
9. TCL COMPOUND IDENTIFICATION	✓									
10. ICP INTERFERENCE CHECK SAMPLE										
11. ICP SERIAL DILUTION										
12. CARRIER/CHEM TRACER RECOVERIES										
13. OTHER QC	NA									

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE (NA)
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWED BY: Kevin A Lambert DATE: 11-30-99

VOLATILE ORGANICS: Page 1 of 2
SW-846 - Method 8260

Soil

Batch# 157[illegible]

Lab# 9909155-01, -02, -03(Du), -04, -05, -06; 9909155-07, -08, -09, -10, -11, -12(Du)

SITE/PROJECT: III/V RFI Rpt ARCOC #: 602756
LABORATORY: GEL LABORATORY REPORT #: 9909155

IS	GC/MS Name	CAS #	Min RF	Intercept	Calib RF (1)	Calib RSD / R²	CCV %D (2)	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks	TAL		
					>.05	<20% / 0.99	20%									NA	NA			
1	Chloromethane	74-87-3	0.10	✓	✓	✓	34.8	✓							Sample Results are ND, RPD cannot be determined			✓		
1	Bromomethane	74-83-9	0.10	✓	✓	✓	✓											✓		
1	vinyl chloride	75-01-4	0.10		✓	✓	✓											✓		
1	Chloroethane	75-00-3	0.01		✓	✓	✓											✓		
1	methylene chloride (10xblk)	75-09-2	0.01	✓	✓	✓	✓											✓		
1	acetone(10xblk)	67-64-1	0.01	✓	✓	✓	30.8											✓		
1	carbon disulfide	75-15-0	0.10		✓	✓	✓											✓		
1	1,1-dichloroethene	75-35-4	0.20		0.133	✓	✓		✓	✓	✓	✓	✓	✓				✓		
1	1,1-dichloroethane	75-34-3	0.10		✓	✓	✓											✓		
1	Chloroform	67-66-3	0.20		✓	✓	✓											✓		
1	1,2-dichloroethane	107-06-2	0.10		✓	✓	✓											✓		
1	2-butanone(10xblk)	78-93-3	0.01		0.035	✓	✓											✓		
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓	✓											✓		
2	carbon tetrachloride	56-23-5	0.10		✓	✓	✓											✓		
2	Bromodichloromethane	75-27-4	0.20		✓	✓	✓											✓		
2	1,2-dichloropropane	78-87-5	0.01		✓	✓	✓											✓		
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓	✓											✓		
2	Trichloroethene	79-01-6	0.30		0.248	✓	✓		✓	✓	✓	✓	✓	✓				✓		
2	Dibromochloromethane	124-48-1	0.10		✓	✓	✓											✓		
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓	✓											✓		
2	Benzene	71-43-2	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓		
2	trans-1,3-dichloropropene	10061-02-6	0.10		✓	✓	✓											✓		
2	Bromoform	75-25-2	0.10	✓	✓	✓	✓											✓		
3	4-methyl-2-pentanone	108-10-1	0.10		✓	✓	✓											✓		
3	2-hexanone	591-78-6	0.01		✓	✓	29.7											✓		
3	Tetrachloroethene	127-18-4	0.20		✓	✓	✓											✓		
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓	✓											✓		
3	toluene(10xblk)	108-88-3	0.40		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓		
3	Chlorobenzene	108-90-7	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓		
3	Ethylbenzene	100-41-4	0.10		✓	✓	✓											✓		
3	Styrene	100-42-5	0.30		✓	✓	✓											✓		
3	xylenes(total)	1330-20-7	0.30		✓	✓	✓											✓		
	~~1,2-dichloroethylene(total)~~	~~540-59-0~~	~~0.01~~																	
	~~2-chloroethyl vinyl ether~~	~~110-75-8~~																		
	1,2-cis-dichloroethylene	156-59-2			✓	✓	✓											✓		
	1,2-trans-dichloroethylene	156-60-5			✓	✓	✓											✓		
	vinyl acetate	108-05-4			✓	✓	29.9											✓		

Comments: NA - Not Applicable

REVIEWED BY: Kevin A Lambert DATE: 11-30-99

VOLATILE ORGANICS: Page 2 of 2
SW-846 - Method 8260

SITE/PROJECT: III/V RFI Rpt ARCOC #: 602756
LABORATORY: GEL LABORATORY REPORT #: 9909155

Surrogate Recovery and Internal Standard Outliers

③

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
9909155-01	134	✓	✓	✓	✓	164891	✓	✓	✓			
↓ MS				✓	✓	180209	✓	✓	✓			
↓ MSD				✓	✓	167438	✓	✓	✓			

SMC 1: 4-Bromofluorobenzene (73-129) IS 1: Bromochloromethane
SMC 2: 1,2-Dichloroethane-d4 IS 2: ~~1,4-Difluorobenzene~~ 1,4-dichlorobenzene-d4 (882700 to 220675)
SMC 3: Toluene-d8 IS 3: Chlorobenzene-d5

Comments: ① The RF for 1,1-dichloroethene and trichloroethene are slightly < the min RF but > 0.05; CCV %D met criteria; Sample results are ND, no data were qualified. The RF for 2-butanone is < 0.05 but > the min RF; CCV %D met criteria; Sample results are ND; no data were qualified.

② The CCV %D for 4 compounds are > 20% but < 40%; The RFs met criteria; Sample results are ND; no data were qualified.

③ One surrogate is out high and ~~the~~ one 11-30-99 KAL IS is out low for 9909155-01; The same IS is out low for the MS and MSD; ~~Since~~ 11-30-99 KAL No other samples experienced any surrogate or IS failure, therefore only 9909155-01 will be qualified; Detects will be "J" coded and non-detects will be "UJ" coded.

Contract Verification Review (CVR)

Project Leader LAI — Project Name SITE III / V RFI REPORT — Case No. 7219.161

AR/COC No. 602756 — Analytical Lab GEL — SDG No. 9909155

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	NA				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	bromofluorobenzene high for sample 050000-002
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	NA		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	NA		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and pesticides/PCBs	X		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
.1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		
e) Instrument run logs provided	X		
.2 GC/HPLC (8330 and 8010)			
a) Initial calibration provided	NA		
b) Continuing calibration provided	NA		
c) Instrument run logs provided	NA		
.3 Inorganics (metals)			
a) Initial calibration provided	NA		
b) Continuing calibration provided	NA		
c) ICP interference check sample data provided	NA		
d) ICP serial dilution provided	NA		
e) Instrument run logs provided	NA		
.4 Radiochemistry			
a) Instrument run logs provided	NA		

Contract Verification Review (Concluded)

5.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? ☐ Yes X No

Based on the review, this data package is complete. X Yes ☐ No

If no, provide: nonconformance report or correction request number ________ and date correction request was submitted: ________

Reviewed by: L. Herrera Ukun Date: 10/19/1999 Closed by: L. Herrera Ukun Date: 10/19/1999

SAMPLE FINDINGS SUMMARY

Site: TA3-5 RFI

AR/COC: 602811 Data Classification: Organics (EPA 8260A, 8270C, 418.1)

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
04998-003	75-35-4 (1,1-dichloroethene)	UJ	VOCs
04998-003	79-01-6 (trichloroethene)	UJ	VOCs
Note: See attached spreadsheet for SVOC data qualifications			
Data are acceptable (except as noted on spreadsheet.)			
QC Measures appear to be adequate.			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 12/1/99

ARCOC #602811 Organic Analyses (SVOCs) Sample No.-Fraction	SVOCs:	EPA8270B (all SVOCs except...)	87-86-5 (pentachlorophenol)	100-02-7 (4-nitrophenol)	121-14-2 (2,4-dinitrotoluene)
049981-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1
049982-001		R,A1	R,A1,A2	R,A1,A2	R,A1,A2,P1
049983-001		R,A1	R,A1,A2	R,A1,A2	R,A1,A2,P1
049984-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1
049985-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1
049986-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1
049987-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1
049988-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1
049998-001		UJ2,A1	R,A1,A2	R,A1,A2	UJ2,A1,A2,P1

SAMPLE FINDINGS SUMMARY

Site: TA3-5 RFI

AR/COC: 602811 Data Classification: Inorganics (EPA 6010B ↓ 7471A)

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
049981-001	7439-97-6	J, B3	
82-	(mercury)		
83-		UJ, B3	
84-			
85-			
86-			
87-			
98-			
83-	7782-49-2	J, B3	
84-	(selenium)		
85-			
86-			
87-			
88-			
98-			
81-	7439-92-1	J, A	
82-	(lead)		

Data are acceptable.

QC Measures appear to be adequate.

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 12/1/95

MEMORANDUM

DATE: December 1, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Organic Data Review and Validation
TA3-5 RFI, ARCOC #602811, Project/Task No. 7219.01.06

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA8260A (VOCs), EPA8270C (SVOCs), and EPA418.1 (TPH). Problems were identified with the data package that result in the qualification of data.

1. SVOC Analysis: The extraction holding time was exceeded for the re-extraction of all samples as a result of a QC failure. All results of samples 9909227-01, -02, -03, -04, -05, -06, -07, -08, and -09 were non-detect (ND) and will be qualified "UJ2."

2. VOC Analysis: The initial calibration response factors (RFs) of 1,1-dichloroethene and trichloroethene were less than (<) the required minimums. The associated results of sample 9909227-10 were ND and will be qualified "UJ."

3. SVOC Analysis: Surrogate percent recovery (%REC) criteria were not met as a result of an initial dilution. For samples 9909227-02 and -03, all surrogate %RECs were <10%. The sample results were ND and will be qualified "R,A1" (unusable). For samples -01, -04, -05, -06, -07, -08, and -09, some surrogate %RECs were >10%. The sample results were ND and will be qualified "UJ,A1."

4. SVOC Analysis: The MS/MSD %RECs of 4-nitrophenol and pentachlorophenol were <10%. The associated results of samples 9909227-01, -02, -03, -04, -05, -06, -07, -08, and -09 were ND and will be qualified "R,A2" (unusable). 2,4-dinitrotoluene had an MSD %REC < QC limits and a relative percent difference (RPD) greater than (>) QC limits. The associated results of the samples listed above were ND and will be qualified "UJ,A2,P1."

Data are acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

VOC/TPH Analyses: All samples were analyzed within the prescribed holding times.

SVOC Analysis: All samples were extracted out of holding as noted above in the summary section.

Calibration

VOC Analysis: The initial and continuing calibrations met QC acceptance criteria except as noted above in the summary section.

SVOC Analysis: The initial and continuing calibrations met QC acceptance criteria except as noted above in the summary section and the following. The continuing calibration verification (CCV) percent difference (%D) of benzo(b)fluoranthene was <-20%. All associated sample results were ND. Thus, no data were qualified.ere ND. Thus, no data were qualified.

TPH Analysis: The initial and continuing calibrations met QC acceptance criteria.

Blanks

All Analyses: No target analytes were detected in the method blanks.

Surrogates

VOC Analysis: The surrogate %RECs met QC acceptance criteria.

SVOC Analysis: The surrogate %RECs did not meet QC acceptance criteria as noted above in the summary section.

TPH Analysis: No surrogates were required for this method.

Internal Standards (ISs)

VOC/SVOC Analyses: The IS areas and retention times (RTs) met QC acceptance criteria.

TPH Analysis: No internal standards were required for this method.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

VOC Analysis: The MS/MSD were performed on a sample from another SDG.

SVOC Analysis: The MS/MSD met QC acceptance criteria except as noted above in the summary section.

TPH Analysis: The MS met QC acceptance criteria. No MSD was performed. However, a replicate analysis was performed as a measure of laboratory precision.

Laboratory Control Samples (LCS/LCSD)

All Analyses: The LCS/LCSD met QC acceptance criteria.

Other QC

VOC Analysis: No field duplicate or equipment blank (EB) were submitted on the ARCOC. The sample was a trip blank (TB).

SVOC Analysis: A field duplicate was submitted on the ARCOC. However, all sample results were ND. Thus, RPDs could not be calculated. No EB or field blank (FB) were submitted on the ARCOC.

TPH Analysis: A field duplicate was submitted on the ARCOC. The RPD can be found on the attached General Chemistry worksheet.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

MEMORANDUM

DATE: December 1, 1999

TO: File

FROM: Kenneth Salaz KAS

SUBJECT: Inorganic Data Review and Validation
TA3-5 RFI, ARCOC #602811, Project/Task No. 7219.01.06

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and specified methods: EPA6010B (ICP metals) and EPA7471A (Hg). Problems were identified with the data package that result in the qualification of data.

1. ICP Analysis: In the initial calibration blank (ICB), selenium (Se) was detected. The associated results of samples 9909227-03, -04, -05, -06, -07, -08, and -09 were positive, less than (<) 5X the blank concentration, and will be qualified "J,B3."

   Hg Analysis: In the continuing calibration blank (CCB), mercury (Hg) was detected at a negative concentration. The absolute value was greater than (>) the detection limit (DL) but < the reporting limit (RL). The associated results of samples 9909227-01 and -02 were positive, <5X the DL, and will be qualified "J,B3." The associated results of samples -03, -04, -05, -06, -07, and -09 were ND and will be qualified "UJ,B3."

2. ICP Analysis: The LCS/LCSD percent recoveries (%RECs) of lead (Pb) were > QC limits. The associated results of samples 9909227-01 and -02 were positive and will be qualified "J,A."

Data are acceptable except as noted above. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

All Analyses: All samples were extracted and analyzed within the prescribed holding times.

Calibration

All Analyses: The initial and continuing calibrations met QC acceptance criteria.

Blanks

ICP Analysis: No target analytes were detected in the blanks except as noted above in the summary section and the following. Barium (Ba) and beryllium (Be) were detected in the ICB and/or CCB. However, the blank concentrations were < the associated detection limits (DLs). Thus, no data were qualified. Pb was detected in the ICB, CCB, and method blank. Arsenic (As) was detected in the CCB. However, the associated sample results were all >5X the blank concentrations. Thus, no data were qualified.

Hg Analysis: Hg was detected in the CCB as noted above in the summary section.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

All Analyses: The MS met QC acceptance criteria. No MSD was performed. However, a replicate analysis was performed as a measure of laboratory precision.

Laboratory Control Samples (LCS/LCSD)

ICP Analysis: The LCS/LCSD met QC acceptance criteria except as noted above in the summary section and the following. The %RECs of cadmium (Cd) were > QC limits. However, the associated sample results were ND. Thus, no data were qualified.

Hg Analysis: The LCS/LCSD met QC acceptance criteria.

Replicates

All Analyses: The replicate analyses met QC acceptance criteria.

ICP Interference Check Sample (ICS)

ICP Analysis: The ICP ICS met QC acceptance criteria.

Hg Analysis: No ICS was required for this method.

ICP Serial Dilution

ICP Analysis: The serial dilution met QC acceptance criteria.

Hg Analysis: No serial dilution was required for this method.

Other QC

All Analyses: A field duplicate was submitted on the ARCOC. Relative differences were calculated and can be found on the attached worksheet. No equipment blank (EB) or field blank (FB) were submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

Data Validation Summary

Site/Project: TA3-5 RFI Project/Task #: 7219.01.06 # of Samples: 10 Matrix: 9 soils / 1 aqueous

AR/COC #: 602811 Laboratory Sample IDs: 9909227-01, -02, -03, -04, -05,
" -06, -07, -08, -09, -10

Laboratory: GEL

Laboratory Report #: 9909227

QC Element	Organics: VOC	Organics: SVOC	Organics: Pesticide/PCB	Organics: HPLC (HE)	Inorganics: ICP/AES	Inorganics: GFAA/AA	Inorganics: CVAA (Hg)	Inorganics: CN	RAD	Other (TPH)
1. Holding Times/Preservation	✓	UJ2	NA	NA	✓	NA	✓	NA	NA	✓
2. Calibrations	UJ	✓			✓		✓			NP
3. Method Blanks	✓	✓			J, B3		J, B3 UJ, B3			✓
4. MS/MSD	NA	R, A2 UJ, A2, P1			✓		✓			NA
5. Laboratory Control Samples	✓	✓			J, A		✓			✓
6. Replicates					✓		NA			✓
7. Surrogates	✓	R, A1 UJ, A1								NA
8. Internal Standards	✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample					✓					
11. ICP Serial Dilution					✓					
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	NA	NA			NA		NA			

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other ______

Reviewed By: ______ Date: 12/1/99

Holding Time and Preservation

Site/Project: TA3-5 RFI AR/COC #: 602811 Laboratory Sample IDs: 9909227-01, -02, -03, -04, -05,

Laboratory: GEL Laboratory Report #: 9909227 " -06, -07, -08, -09, -10

# of Samples: 10 Matrix: 9 soil / 1 aqueous

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
9909227-01 → -09	EPA 8270C (SVOCs)	14 days	14 days	NA	NA	Samples re-extracted out of holding

viewed By: [signature] Date: 12/1/99

Volatile Organics (SW 846 Method 8260)

Site/Project: TA3-5 RFI AR/COC #: 602811 # of Samples: 1 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: 9909227 Laboratory Sample IDs: 9909227-10

Methods: EPA 8260A Batch #s: 158072

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	① MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	② Trip Blanks		
						>.05	<20% / 0.99	20%												
1	74-87-3	Chloromethane	✓	0.10	✓	✓	✓	✓	✓				NA	NA	NA	NA	NA	NA		
1	74-83-9	Bromomethane	✓	0.10	✓	✓	✓													
1	75-01-4	vinyl chloride	✓	0.10	NA	✓	✓													
1	75-00-3	Chloroethane	✓	0.01		✓	✓													
1	75-09-2	methylene chloride (10xblk)	✓	0.01	✓	✓	✓													
1	67-64-1	acetone(10xblk)	✓	0.01	✓	✓	✓													
1	75-15-0	carbon disulfide	✓	0.10	NA	✓	✓													
1	75-35-4	1,1-dichloroethene	✓	0.20		0.17	✓			✓	✓	✓								
1	75-34-3	1,1-dichloroethane	✓	0.10		✓	✓													
1	67-66-3	Chloroform	✓	0.20		✓	✓													
1	107-06-2	1,2-dichloroethane	✓	0.10		✓	✓													
1	78-93-3	2-butanone(10xblk)	✓	0.01		✓	✓													
2	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓													
2	56-23-5	carbon tetrachloride	✓	0.10		✓	✓													
2	75-27-4	Bromodichloromethane	✓	0.20		✓	✓													
2	78-87-5	1,2-dichloropropane	✓	0.01		✓	✓													
2	10061-01-5	cis-1,3-dichloropropene	✓	0.20		✓	✓													
2	79-01-6	Trichloroethene	✓	0.30		0.25	✓			✓	✓	✓								
2	124-48-1	Dibromochloromethane	✓	0.10		✓	✓													
2	79-00-5	1,1,2-trichloroethane	✓	0.10		✓	✓													
2	71-43-2	Benzene	✓	0.50		✓	✓			✓	✓	✓								
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10		✓	✓													
2	75-25-2	Bromoform	✓	0.10	✓	✓	✓													
3	108-10-1	4-methyl-2-pentanone	✓	0.10	NA	✓	✓													
3	591-78-6	2-hexanone	✓	0.01		✓	✓													
3	127-18-4	Tetrachloroethene	✓	0.20		✓	✓													
3	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30		✓	✓													
3	108-88-3	toluene(10xblk)	✓	0.40		✓	✓			✓	✓	✓								
3	108-90-7	Chlorobenzene	✓	0.50		✓	✓			✓	✓	✓								
3	100-41-4	Ethylbenzene	✓	0.10		✓	✓													
3	100-42-5	Styrene	✓	0.30		✓	✓													
3	1330-20-7	xylenes(total)	✓	0.30		✓	✓													
	540-59-0	1,2-dichloroethylene(total)	✓	0.01		✓	✓													
	110-75-8	2-chloroethyl vinyl ether				NA	NA	NA	NA											
	108-05-4	Vinyl Acetate	✓			✓	✓	✓	✓											

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable

Comments:
① MS/MSD performed on a sample from another SDG.
② Sample is a TB.

Reviewed By: [signature] Date: 12/1/99

Volatile Organics

Site/Project: TA3-5 RFI AR/COC #: 602811 Batch #s: ~~KS~~8072

Laboratory: GEL Laboratory Report #: 9909227 # of Samples: 1 Matrix: Aqueous

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
All									
Passed									

SMC 1: ~~4-~~Bromofluorobenzene
SMC 2: ~~1,2-Dichloroethane-d4~~
SMC 3: Toluene-d8
Dibromofluoromethane

IS 1: ~~Bromochloromethane~~ Fluorobenzene
IS 2: ~~1,4-~~Difluorobenzene-d4
IS 3: Chlorobenzene-d5
KBS 11/24/99

Comments: *Summary:

Calibration:

⟹ 1,1-dichloroethane and trichloroethene had initial calibration response factors (RFs) < the required minimums. The assoc. sample results were ND. ~~Thus, no data were qualified~~ KBS 11/24/99 and will be qualified "UJ."

Semivolatile Organics (SW 846 Method 8270)

Site/Project: TA3-5 RFI AR/COC #: 602811 Laboratory Sample IDs: 9909227-01, -02, -03, -04, -05,

Laboratory: GEL Laboratory Report #: 9909227 " -06, -07, -08, -09

Methods: EPA 8270C

# of Samples: 9 Matrix: Soil Batch #s: 159423

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	① Field Dup. RPD	② Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
1	A	108-95-2	Phenol	✓	0.80	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA		
1	BN	111-44-4	bis(2-Chloroethyl)ether	✓	0.70		✓	✓													
1	A	95-57-8	2-Chlorophenol	✓	0.80		✓	✓			✓	✓	✓	✓	✓	✓					
1	BN	541-73-1	1,3-Dichlorobenzene	✓	0.60		✓	✓													
1	BN	106-46-7	1,4-Dichlorobenzene	✓	0.50		✓	✓			✓	✓	✓	✓	✓	✓					
1	BN	95-50-1	1,2-Dichlorobenzene	✓	0.40		✓	✓													
1	A	95-48-7	2-Methylphenol (o-cresol)	✓	0.70		✓	✓													
1	BN	108-60-1	bis(2-chloroisopropyl)ether	✓	0.01		✓	✓													
1	A	106-44-5	4-Methylphenol		0.60		NA	NA	NA	NA											
1	BN	621-64-7	N-Nitroso-di-n-propylamine	✓	0.50		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					
1	BN	67-72-1	Hexachloroethane	✓	0.30		✓	✓													
2	BN	98-95-3	Nitrobenzene	✓	0.20		✓	✓													
2	BN	78-59-1	Isophorone	✓	0.40		✓	✓													
2	A	88-75-5	2-Nitrophenol	✓	0.10		✓	✓													
2	A	105-67-9	2,4-Dimethylphenol	✓	0.20		✓	✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane	✓	0.30		✓	✓													
2	A	120-83-2	2,4-Dichlorophenol	✓	0.20		✓	✓													
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓			✓	✓	✓	✓	✓	✓					
2	BN	91-20-3	Naphthalene	✓	0.70		✓	✓													
2	BN	106-47-8	4-Chloroaniline	✓	0.01	✓	✓	✓													
2	BN	87-68-3	Hexachlorobutadiene	✓	0.01	NA	✓	✓													
2	A	59-50-7	4-Chloro-3-methylphenol	✓	0.20		✓	✓			✓	✓	✓	✓	✓	✓					
2	BN	91-57-6	2-Methylnaphthalene	✓	0.40		✓	✓													
3	BN	77-47-4	Hexachlorocyclopentadiene	✓	0.01		✓	✓													
3	A	88-06-2	2,4,6-Trichlorophenol	✓	0.20		✓	✓													
3	A	95-95-4	2,4,5-Trichlorophenol	✓	0.20		✓	✓													

Comments:
① Sample and field dup. results all ND. Thus, no RPDs were calculated.
② No EB or FB submitted on the COC.

Notes: Shaded rows are RCRA compounds.

NA = Not Applicable

Reviewed By: [signature] Date: 12/1/99

Semivolatile Organics

Site/Project: TA3-5 RFI AR/COC #: 602811 Batch #s: 159423

Laboratory: GEL Laboratory Report #: 9909227 # of Samples: 9 Matrix: soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R²	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	(1) Field Dup. RPD	(2) Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
3	BN	91-58-7	2-Chloronaphthalene	✓	0.80	NA	✓	✓	✓	✓							NA	NA	NA		
3	BN	88-74-4	2-Nitroaniline (o-)	✓	0.01	✓	✓	✓													
3	BN	131-11-3	Dimethylphthalate	✓	0.01	NA	✓	✓													
3	BN	208-96-8	Acenaphthylene	✓	0.90		✓	✓													
3	BN	606-20-2	2,6-Dinitrotoluene	✓	0.20		✓	✓													
3	BN	99-09-2	3-Nitroaniline (m-)	✓	0.01	✓	✓	✓													
3	BN	83-32-9	Acenaphthene	✓	0.90	NA	✓	✓			✓	✓	✓	✓	✓	✓					
3	A	51-28-5	2,4-Dinitrophenol	✓	0.01	✓	✓	✓													
3	A	100-02-7	4-Nitrophenol	✓	0.01	✓	✓	✓			✓	✓	✓	0.0	0.0	✓					
3	BN	132-64-9	Dibenzofuran	✓	0.80	NA	✓	✓													
3	BN	121-14-2	2,4-Dinitrotoluene	✓	0.20		✓	✓			✓	✓	✓	✓	34.3	28.3					
3	BN	84-66-2	Diethylphthalate	✓	0.01		✓	✓													
3	BN	005-72-3	4-Chlorophenyl-phenylether	✓	0.40		✓	✓													
3	BN	86-73-7	Fluorene	✓	0.90		✓	✓													
3	BN	100-01-6	4-Nitroaniline (p-)	✓	0.01	✓	✓	✓													
4	A	534-52-1	4,6-Dinitro-2-methylphenol	✓	0.01	NA	✓	✓													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	✓	0.01		✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether	✓	0.10		✓	✓													
4	BN	18-74-1	Hexachlorobenzene	✓	0.10		✓	✓													
4	A	87-86-5	Pentachlorophenol	✓	0.05		✓	✓			✓	✓	✓	0.0	0.0	✓					
4	BN	85-01-8	Phenanthrene	✓	0.70		✓	✓													
4	BN	20-12-7	Anthracene	✓	0.70		✓	✓													
4	BN	86-74-8	Carbazole	✓	0.01		✓	✓													
4	BN	84-74-2	Di-n-butylphthalate	✓	0.01		✓	✓													
4	BN	06-44-0	Fluoranthene	✓	0.60		✓	✓													
5	BN	129-00-0	Pyrene	✓	0.60		✓	✓			✓	✓	✓	✓	✓	✓					
5	BN	85-68-7	Butylbenzylphthalate	✓	0.01		✓	✓													
5	BN	91-94-1	3,3'-Dichlorobenzidine	✓	0.01		✓	✓													
5	BN	56-55-3	Benzo(a)anthracene	✓	0.80		✓	✓													

NA=N[illegible] Applicable

Comments:
(1) Sample and fi[illegible] dup. results all ND. Thus, no RPDs were calculated.

Semivolatile Organics

Site/Project: TA3-5 RFI AR/COC #: 602811 Batch #s: 159423

Laboratory: GEL Laboratory Report #: 9909227 # of Samples: 9 Matrix: soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blanks	LCS	LCS D	LCS RPD	MS	MSD	MS RPD	① Field Dup. RPD	② Equip. Blanks	Field Blanks		
5	BN	218-01-9	Chrysene	✓	0.70	NA	✓	✓	✓	✓							NA	NA	NA		
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	✓	0.01	✓	✓	✓													
6	BN	117-84-0	Di-n-octylphthalate	✓	0.01	NA	✓	✓													
6	BN	205-99-2	Benzo(b)fluoranthene	✓	0.70	✓	✓	✓	-26.2												
6	BN	207-08-9	Benzo(k)fluoranthene	✓	0.70	NA	✓	✓	✓												
6	BN	50-32-8	Benzo(a)pyrene	✓	0.70		✓	✓													
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50		✓	✓													
6	BN	53-70-3	Dibenz(a,h)anthracene	✓	0.40	✓	✓	✓													
6	BN	191-24-2	Benzo(g,h,i)perylene	✓	0.50	NA	✓	✓													
	BN	122-66-7	1,2-diphenylhydrazine	✓			✓	✓													
	A	N22	m,p-cresol	✓			✓	✓													

NA = Not Applicable

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
01/-02,-03	0.0/0.0	✓/0.0	139/0.0	✓/0.0	29.7/0.0	✓/0.0	NA	NA
-04/-05	0.0/0.0	111/✓	137/118	✓/25.4	0.0/0.0	✓/✓		
-06/-07	0.0/0.0	✓/127	128/158	✓/✓	0.0/35.6	✓/✓		
-08/-09	0.0/0.0	✓/✓	117/119	38.8/35.9	0.0/0.0	25.9/38.0		

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d6 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
~~SMC 7: 2-Chlorophenol-d4 (A)~~ DRS 11/30/99 ~~SMC 8: 1,2-Dichlorobenzene-d4 (BN)~~

Comments:
① Sample and field dup. results all ND. Thus, no RPDS were calculated.
② No EB or FB submitted on the COC.

*Summary → See back of this page.

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
All Passed												

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

General Chemistry

Site/Project: TA3-5 RFI AR/COC #: 602811 Laboratory Sample IDs: 9909227-01, -02, -03, -04, -05,

Laboratory: GEL Laboratory Report #: 9909227 " -06, -07, -08, -09, -10

Methods: EPA 418.1

# of Samples: 9 Matrix: soil Batch #s: 159324

CAS #	Analyte	QC Element																			
		TAL	ICV (1)	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS (2)	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	
5290000-00-0	TPH	✓	NP	NP	NA	NA	✓	✓	✓	✓	NA	NA	NA	✓ ~~NA~~ EAS [illegible]	NA	NA	27	NA	NA	

NA = Not Applicable

Comments:

(1) No calibration data were provided. However, the case narrative stated that the instrument was properly calibrated.

(2) MS criteria do not apply when sample conc. is > 4X the spike conc.

*Summary

=> All QC criteria were met. No data were qualified.

Reviewed By: [signature] Date: [illegible]

Inorganic Metals

Site/Project: TA3-5 RFI AR/COC #: 602811 Laboratory Sample IDs: 9909227-01, -02, -03, -04, -05

Laboratory: GEL Laboratory Report #: 9909227 " -06, -07, -08, -09

Methods: EPA 6010B (ICP), EPA 7471A (Hg)

# of Samples: 9 Matrix: Soil Batch #s: 158024/158216 (ICP), 158057 (Hg)

CAS #/ Analyte	QC Element																		
	TAL	ICV	CCV	(µg/L) ICB	(µg/L) CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	(1) Rep. RPD	ICS AB	(2) Serial Dilution	Field Dup. RPD	(3) Equip. Blanks	Field Blanks		
7429-90-5 Al					✓/0.3	KMS 11/30/99														
7440-39-3 Ba	✓	✓	✓	✓	[illegible]	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	82.5	NA	NA		
7440-41-7 Be	✓	↓	↓	0.1/✓	0.2/0.1	✓	✓	✓	✓	✓	↓	↓	NA	↓	NA	1.6	↓	↓		
7440-43-9 Cd	✓	↓	↓	✓	✓	✓	✓/122	✓/123	✓	✓	↓	↓	NA	↓	NA	NA	↓	↓		
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	✓	✓	NA	5.2	NA	NA		
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	✓	NA	NA	NA	NA		
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓/2.5	✓/2.7	✓/.316	✓/121	✓/123	✓	✓	NA	NA	✓	✓	NA	0.6	NA	NA		
7782-49-2 Se	✓	↓	↓	2.9/✓	✓	✓	✓	✓	✓	✓	↓	↓	↓	↓	↓	33.5	↓	↓		
7440-38-2 As	✓	↓	↓	✓/2.9	✓/4.7	✓	✓	✓	✓	✓	↓	↓	↓	↓	↓	10.5	↓	↓		
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	-0.042	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA	NA	NA		
Cyanide CN																				

Notes: Shaded rows are RCRA metals. Solids-to-aqueous conversion: mg / kg = µg / g : [(µg / g) x (sample mass {g} / sample vol. {ml}) x (1000 ml / 1 liter)] / Dilution Factor = µg / l

NA = Not Applicable

Comments:

1) Replicate criteria do not apply to sample results < the RL.

2) Serial dilution criteria do not apply to sample results < 50X the RL.

3) No EB or FB submitted on the COC.

Reviewed By: [signature] Date: 12/1/99

See back

Contract Verification Review (CVR)

Project Leader LAI   Project Name TA III / V RFI REPORT   Case No. 7219.161

AR/COC No. 602811   Analytical Lab GEL   SDG No. 9909227

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
2.5	Detection limits provided; PQL and MDL(or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	NA				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met		X	SVOC SAMPLES REEXTRACTED OUTSIDE HOLDING TIME DUE TO QC FAILURE	X	
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	CADMIUM & LEAD RECOVERY ABOVE QC LIMITS FOR LCS/LCD
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	SVOC SURROGATES DILUTED OUT DUE TO MATRIX
c) Matrix spike recovery data reported and met		X	SEVERAL SVOC ANALYTES FAILED QC RECOVERY LIMITS
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples		X	RPD FOR SELENIUM OUTSIDE ACCEPTANCE LIMITS FOR SAMPLE #9909227-09DUP
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	RPD for 2,4-DINITROTOLUENE, 4-NITROPHENOL & PENTACHLOROPHENOL OUTSIDE ACCEPTANCE LIMITS
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	X		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"-analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	NA		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and pesticid[illegible]CBs	X		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
.1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		
e) Instrument run logs provided	X		
.2 GC/HPLC (8330 and 8010)			
a) Initial calibration provided	NA		
b) Continuing calibration provided	NA		
c) Instrument run logs provided	NA		
.3 Inorganics (metals)			
a) Initial calibration provided	X		
b) Continuing calibration provided	X		
c) ICP interference check sample data provided	X		
d) ICP serial dilution provided	X		
e) Instrument run logs provided	X		
.4 Radiochemistry			
a) Instrument run logs provided	NA		

Contract Verification Review (Concluded)

5.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Vere deficiencies unresolved? ☐ Yes ☑ No

ased on the review, this data package is complete. ☑ Yes ☐ No

' no, provide: nonconformance report or correction request number ________________ and date correction request was submitted:_________

leviewed by: U Palencia Date: 10-21-99 Closed by:__________________Date:____________

SAMPLE FINDINGS SUMMARY

Site: Area III/V RFI

AR/COC: 602812 Data Classification: General Chemistry

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
196-BH2-99-40-SS	Total petroleum hydrocarbons TPH	JB	
196-BH2-99-70-SS			
196-BH2-99-80-SS			
196-BH2-99-90-SS			
196-BH2-99-100-SS			
196-BH2-99-35-DU			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method. use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 11/29/99

SAMPLE FINDINGS SUMMARY

Site: Area III/V RFI

AR/COC: 602812 Data Classification: Inorganic

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
See Attached Table			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method. use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 11/29/99

INORGANIC METALS

SAMPLE FINDINGS SUMMARY

COC:602812 Sample Number	Ba (7440-39-3)	Ag (7440-22-4)	As (7440-38-2)	Hg (7439-97-6)
196-BH2-99-25-SS	JP2	JB		
196-BH2-99-30-SS	JP2	JB	JB	
196-BH2-99-35-SS	JP2	JB	JB	JB
196-BH2-99-40-SS	JP2	JB	JB	JB
196-BH2-99-45-SS	JP2	JB	JB	
196-BH2-99-50-SS	JP2	JB	JB	
196-BH2-99-60-SS	JP2	JB	JB	JB
196-BH2-99-70-SS	JP2	JB	JB	JB
196-BH2-99-80-SS	JP2	JB	JB	
196-BH2-99-90-SS	JP2	JB		JB
196-BH2-99-100-SS	JP2	JB		JB
196-BH2-99-35-DU	JP2	JB	JB	JB

SAMPLE FINDINGS SUMMARY

Site: Area III/V RFI

AR/COC: 602812 Data Classification: Organic

Sample/ Fraction No.	Analysis	DV Qualifiers	Comments
See Attached Table			

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_ NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: [signature] Date: 11/29/99

ORGANICS

SAMPLE FINDINGS SUMMARY

COC: 602812

Sample Number	SVOC EPA 8260 all analytes	4-nitrophenol (100-02-7)	1,4dichlorobenzene (106-46-7
196-BH2-99-25-SS		R	
196-BH2-99-30-SS		R	
196-BH2-99-35-SS	UJ2		
196-BH2-99-40-SS		UJ	
196-BH2-99-45-SS	UJ2		
196-BH2-99-50-SS		UJ	
196-BH2-99-60-SS		UJ	
196-BH2-99-70-SS		UJ	
196-BH2-99-80-SS		UJ	
196-BH2-99-90-SS		UJ	
196-BH2-99-100-SS		UJ	
196-BH2-99-35-DU		UJ	
196-BH2-99-EB			UJA2
196-BH1-99-EB			UJA2

Memorandum

Date: 11/29/99

To: File

From: Marcia Hilchey

Subject: Organic Data Review and Validation
Site: Area III/V RFI
AR/COC: 602812
Case: 7219.01.06
Laboratory: GEL
SDG: 9909158

See attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and with specified methods (VOC EPA8270, SVOC EPA8260). All compounds were successfully analyzed.

No qualifications were applied to VOC sample data.

Qualifications were applied to SVOC sample data due to: exceeded holding time, failure to meet CCV %D acceptance criteria, failure to meet surrogate recovery acceptance criteria, and failure to meet MS/MSD acceptance criteria.

Holding Times

VOC samples were analyzed within the prescribed holding times.

According to the SVOC laboratory case narrative, the initial analysis of SVOC samples 196-BH2-99-35-SS and 196-BH2-99-45-SS failed to meet surrogate recovery acceptance criteria. These samples were re-extracted and reanalyzed past the prescribed holding time, with acceptable surrogate recovery and similar sample results. Original sample results were not reported. All results for these samples were UJ2 qualified.

Calibration

Initial and continuing calibration met acceptance criteria for VOC and aqueous SVOC analyses.

The CCV analyzed on 9/20/99 associated with samples 196-BH2-99-25-SS, 196-BH2-99-30-SS, 196-BH2-99-40-SS, 196-BH2-99-50-SS, 196-BH2-99-60-SS, 196-BH2-99-70-SS, 196-BH2-99-80-SS, 196-BH2-99-90-SS, 196-BH2-99-100-SS, and 196-BH2-99-35-DU failed to meet %D acceptance criteria for 4-nitrophenol. These sample results were qualified UJ.

Several other SVOC CCVs had %D >20 and <40. No sample data were qualified as a result.

Blanks

No target VOC or SVOC analytes were detected above the reporting limit in the method blanks or equipment blanks associated this these samples.

Note: The CVR for this SDG indicated that the VOC method blank exhibited toluene and methylene chloride; however, the method blanks in question were not associated with samples in this SDG.

Surrogates

All VOC surrogate recoveries met acceptance criteria.

SVOC samples 196-BH2-99-25-SS and 196-BH2-99-30-SS were diluted 40x because of low internal standard recovery (due to matrix interference) on the initial analysis. The samples were not re-extracted because the laboratory determined that a GPC cleanup would not solve the interference problem. Results from the undiluted analysis were not reported. Recovery for all surrogates in the diluted analyses was zero. All SVOC results for these samples are rejected (qualified R). Analysis by another acceptable method or modification of the existing method may be necessary.

SVOC surrogate recovery for the soil MS and MSD samples failed to meet acceptance criteria. See MS/MSD section below.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

VOC MS/MSD sample analyses met acceptance criteria.

The aqueous SVOC MS/MSD recoveries for 1,4-dichlorobenzene failed low. Aqueous SVOC sample results for this compound were qualified UJA2.

MSD recovery for several other SVOC analytes failed to meet acceptance criteria; however, MS recovery and MSD RPD met acceptance criteria for these compounds. No sample data were qualified as a result.

The soil sample chosen for SVOC matrix spiking had matrix interference problems which caused failed surrogate recovery in the MS/MSD sample analyses (see Surrogate section above). MS/MSD results could not be used to evaluate soil SVOC sample data quality. No data were qualified as a result.

Internal Standards

VOC and aqueous SVOC internal standards met QC acceptance criteria.

SVOC internal standards failed to meet recovery acceptance criteria in the soil MS/MSD samples. See MS/MSD section above.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD)

VOC and aqueous SVOC LCS/LCSD samples met all QC acceptance criteria.

Several SVOC analytes failed to meet soil LCSD recovery acceptance criteria; however, LCS recovery and LCSD RPD criteria were met. No sample data were qualified as a result.

Other QC

SVOC field duplicates met RPD acceptance criteria.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

SEMI-VOLATILE ORGANICS: Page 1 of 3
SW-846 - Method 8270

SITE/PROJECT: Site III/IV RFI ARCOC #: 602812 soil
LABORATORY: GEL LABORATORY REPORT #: 9909158

9/20 9/20 n/9 9/27

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks	CCV RPD		
						>.05	<20% / 0.99	<20%											✓		
1	A	108-95-2	Phenol	0.80	✓	✓	✓	✓	✓	✓	✓	✓	50.8	✓	✓	✓	✓				
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70																	
1	A	95-57-8	2-Chlorophenol	0.80						✓	43.7	~~X~~ ✓	✓	✓	~~20~~ ✓						
1	BN	541-73-1	1,3-Dichlorobenzene	0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene	0.50						✓	✓	✓	✓	✓	✓						
1	BN	95-50-1	1,2-Dichlorobenzene	0.40																	
1	A	95-48-7	2-Methylphenol	0.70																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01																	
1	A	106-44-5	4-Methylphenol	0.60																	
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50																	
1	BN	67-72-1	Hexachloroethane	0.30																	
2	BN	98-95-3	Nitrobenzene	0.20																	
2	BN	78-59-1	Isophorone	0.40																	
2	A	88-75-5	2-Nitrophenol	0.10																	
2	A	105-67-9	2,4-Dimethylphenol	0.20																	
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30																	
2	A	120-83-2	2,4-Dichlorophenol	0.20																	
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20						✓	✓	✓	✓	✓	✓						
2	BN	91-20-3	Naphthalene	0.70																	
2	BN	106-47-8	4-Chloroaniline	0.01																	
2	BN	87-68-3	Hexachlorobutadiene	0.01																	
2	A	59-50-7	4-Chloro-3-methylphenol	0.20						✓	46.2	✓	✓	30.2	77.9						
2	BN	91-57-6	2-Methylnaphthalene	0.40																	
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01																	
3	A	88-06-2	2,4,6-Trichlorophenol	0.20																	
3	A	95-95-4	2,4,5-Trichlorophenol	0.20																	

Comments:

SEMI-VOLATILE ORGANICS: Page 2 of 3
SW 846 - Method 8270

SITE/PROJECT: ____________ ARCOC #: 602812 soil
LABORATORY: ____________ LABORATORY REPORT #: ____________

9/20 n/a 9/27

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R²	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks	CCV ✓ RPD		
						>.05	<20% / 0.99	<20%													
3	BN	91-58-7	2-Chloronaphthalene	0.80	✓	✓	✓	✓	✓							✓	✓		✓		
3	BN	88-74-4	2-Nitroaniline	0.01																	
3	BN	131-11-3	Dimethylphthalate	0.01																	
3	BN	208-96-8	Acenaphthylene	0.90						✓	✓	✓	28.1	✓	109						
3	BN	606-20-2	2,6-Dinitrotoluene	0.20																	
3	BN	99-09-2	3-Nitroaniline	0.01				25.2													
3	BN	83-32-9	Acenaphthene	0.90				✓		✓	✓	✓	20.7	✓	109						
3	A	51-28-5	2,4-Dinitrophenol	0.01				✓													
3	A	100-02-7	4-Nitrophenol	0.01				48.5		✓	✓	✓	✓	29.3	66.6						
3	BN	132-64-9	Dibenzofuran	0.80				✓													
3	BN	121-14-2	2,4-Dinitrotoluene	0.20						✓	✓	~~28.7~~	28.7	30.9	✓						
3	BN	84-66-2	Diethylphthalate	0.01																	
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40																	
3	BN	86-73-7	Fluorene	0.90																	
3	BN	100-01-6	4-Nitroaniline	0.01				36.0													
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01				✓													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01						✓	✓	✓	✓	✓	✓						
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10																	
4	BN	118-74-1	Hexachlorobenzene	0.10																	
4	A	87-86-5	Pentachlorophenol	0.05						✓	44.4	✓	27.1	✓	106						
4	BN	85-01-8	Phenanthrene	0.70																	
4	BN	120-12-7	Anthracene	0.70																	
4	BN	86-74-8	Carbazole	0.01																	
4	BN	84-74-2	Di-n-butylphthalate	0.01																	
4	BN	206-44-0	Fluoranthene	0.60																	
5	BN	129-00-0	Pyrene	0.60				-23.5		✓	✓	✓	26.4	24.4	161						
5	BN	85-68-7	Butylbenzylphthalate	0.01				✓													
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01				✓													
5	BN	56-55-3	Benzo(a)anthracene	0.80				✓													

Comments:

SEMI-VOLATILE ORGANICS: Page 5 of 5
SW 846 - Method 8270

SITE/PROJECT: ____________________ ARCOC #: 602812 soil
LABORATORY: ____________________ LABORATORY REPORT #: ____________________

9/20 9/27

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks	CCV RPD	
						>.05	<20% / 0.99	<20%												
5	BN	218-01-9	Chrysene	0.70	✓	✓	✓	✓	✓							✓	✓		✓	
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01																
6	BN	117-84-0	Di-n-octylphthalate	0.01																
6	BN	205-99-2	Benzo(b)fluoranthene	0.70																
6	BN	207-08-9	Benzo(k)fluoranthene	0.70																
6	BN	50-32-8	Benzo(a)pyrene	0.70																
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50																
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40																
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50															-280	

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
-MS			28.3			18.2		
-MSD			11.8			36.1		
-01	0	0	0	0	0	0		
-02	0	0	0	0	0	0		

Comments:

SMC 1: Nitrobenzene-d5 (BN)
SMC 2: 2-Fluorobiphenyl (BN)
SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d5 (A)
SMC 5: 2-Fluorophenol (A)
SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A)
SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
-MS							10		10			
-MSD							10		10			

IS 1: 1,4-Dichlorobenzene-d4 (BN)
IS 2: Naphthalene-d8 (BN)
IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN)
IS 5: Chrysene-d12 (BN)
IS 6: Perylene-d12 (BN)

SEMI-VOLATILE ORGANICS: Page 1 of 3
SW-846 - Method 8270

SITE/PROJECT: Site III/II RFI ARCOC #: 602812 aqueous
LABORATORY: GEL LABORATORY REPORT #: 9909158
9

n/a

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
1	A	108-95-2	Phenol	0.80	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						
1	BN	111-44-4	bis(2-Chloroethyl)ether	0.70																	
1	A	95-57-8	2-Chlorophenol	0.80						✓	✓	✓	✓	52.5	✓						
1	BN	541-73-1	1,3-Dichlorobenzene	0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene	0.50						✓	✓	✓	56.4	52.9	✓						
1	BN	95-50-1	1,2-Dichlorobenzene	0.40																	
1	A	95-48-7	2-Methylphenol	0.70																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether	0.01																	
1	A	106-44-5	4-Methylphenol	0.60																	
1	BN	621-64-7	N-Nitroso-di-n-propylamine	0.50																	
1	BN	67-72-1	Hexachloroethane	0.30																	
2	BN	98-95-3	Nitrobenzene	0.20																	
2	BN	78-59-1	Isophorone	0.40																	
2	A	88-75-5	2-Nitrophenol	0.10																	
2	A	105-67-9	2,4-Dimethylphenol	0.20																	
2	BN	111-91-1	bis(2-Chloroethoxy)methane	0.30																	
2	A	120-83-2	2,4-Dichlorophenol	0.20																	
2	BN	120-82-1	1,2,4-Trichlorobenzene	0.20						✓	✓	✓	✓	✓	✓						
2	BN	91-20-3	Naphthalene	0.70																	
2	BN	106-47-8	4-Chloroaniline	0.01																	
2	BN	87-68-3	Hexachlorobutadiene	0.01																	
2	A	59-50-7	4-Chloro-3-methylphenol	0.20						✓	✓	✓	✓	✓	✓						
2	BN	91-57-6	2-Methylnaphthalene	0.40																	
3	BN	77-47-4	Hexachlorocyclopentadiene	0.01																	
3	A	88-06-2	2,4,6-Trichlorophenol	0.20																	
3	A	95-95-4	2,4,5-Trichlorophenol	0.20																	

Comments:

REVIEWED BY: [signature] DATE: 11/29/99

SW 846 - Method 8270

SITE/PROJECT: ____________ ARCOC #: 602812 aq.
LABORATORY: ____________ LABORATORY REPORT #: ____________

n/a

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks
						>.05	<20% / 0.99	<20%										
3	BN	91-58-7	2-Chloronaphthalene	0.80	✓	✓	✓	✓	✓									
3	BN	88-74-4	2-Nitroaniline	0.01														
3	BN	131-11-3	Dimethylphthalate	0.01														
3	BN	208-96-8	Acenaphthylene	0.90														
3	BN	606-20-2	2,6-Dinitrotoluene	0.20														
3	BN	99-09-2	3-Nitroaniline	0.01														
3	BN	83-32-9	Acenaphthene	0.90						✓	✓	✓	✓	55.4	✓			
3	A	51-28-5	2,4-Dinitrophenol	0.01														
3	A	100-02-7	4-Nitrophenol	0.01						✓	✓	✓	✓	✓	✓			
3	BN	132-64-9	Dibenzofuran	0.80														
3	BN	121-14-2	2,4-Dinitrotoluene	0.20														
3	BN	84-66-2	Diethylphthalate	0.01														
3	BN	7005-72-3	4-Chlorophenyl-phenylether	0.40														
3	BN	86-73-7	Fluorene	0.90														
3	BN	100-01-6	4-Nitroaniline	0.01				32.5										
4	A	534-52-1	4,6-Dinitro-2-methylphenol	0.01				✓										
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	0.01						✓	✓	✓	✓	✓	✓			
4	BN	101-55-3	4-Bromophenyl-phenylether	0.10														
4	BN	118-74-1	Hexachlorobenzene	0.10														
4	A	87-86-5	Pentachlorophenol	0.05						✓	✓	✓	✓	✓	✓			
4	BN	85-01-8	Phenanthrene	0.70														
4	BN	120-12-7	Anthracene	0.70														
4	BN	86-74-8	Carbazole	0.01														
4	BN	84-74-2	Di-n-butylphthalate	0.01														
4	BN	206-44-0	Fluoranthene	0.60														
5	BN	129-00-0	Pyrene	0.60						✓	✓	✓	✓	✓	✓			
5	BN	85-68-7	Butylbenzylphthalate	0.01														
5	BN	91-94-1	3,3'-Dichlorobenzidine	0.01														
5	BN	56-55-3	Benzo(a)anthracene	0.80														

Comments:

SW 846 - Method 8270

SITE/PROJECT: ____________ ARCOC #: 602812 aq.
LABORATORY: ____________ LABORATORY REPORT #: ____________

n/a

IS	BNA	CAS #	NAME	Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV RPD	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Field Blks			
						>.05	<20% / 0.99	<20%													
5	BN	218-01-9	Chrysene	0.70	✓	✓	✓	✓	✓												
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	0.01																	
6	BN	117-84-0	Di-n-octylphthalate	0.01																	
6	BN	205-99-2	Benzo(b)fluoranthene	0.70																	
6	BN	207-08-9	Benzo(k)fluoranthene	0.70				31.1	✓	✓	✓	✓	✓	✓	✓						
6	BN	50-32-8	Benzo(a)pyrene	0.70				✓													
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	0.50																	
6	BN	53-70-3	Dibenz(a,h)anthracene	0.40																	
6	BN	191-24-2	Benzo(g,h,i)perylene	0.50																	

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
-blk			124					
-MS			111					

Comments:

SMC 1: Nitrobenzene-d5 (BN)
SMC 4: Phenol-d5 (A)
SMC 7: 2-2-Chlorophenol-d4 (A)
SMC 2: 2-Fluorobiphenyl (BN)
SMC 5: 2-Fluorophenol (A)
SMC 8: 1,2-Dichlorobenzene-d4 (BN)
SMC 3: p-Terphenyl-d14 (BN)
SMC 6: 2,4,6-Tribromophenol (A)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	Is 6-area	IS 6-RT
			OK									

IS 1: 1,4-Dichlorobenzene-d4 (BN)
IS 4: Phenathrene-d10 (BN)
IS 2: Naphthalene-d8 (BN)
IS 5: Chrysene-d12 (BN)
IS 3: Acenaphthene-d10 (BN)
IS 6: Perylene-d12 (BN)

VOLATILE ORGANICS: Page 1 of 2
SW-846 Method 8260

SITE/PROJECT: Site III/V RFI ARCOC #: 602812
LABORATORY: GEL LABORATORY REPORT #: 9909158

n/a

IS	GC/MS		Min RF	Intercept	Calib RF	Calib RSD / R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks	TAL		
	Name	CAS #			>.05	<20% / 0.99	20%													
1	Chloromethane	74-87-3	0.10	✓	✓	✓	✓	✓												
1	Bromomethane	74-83-9	0.10																	
1	vinyl chloride	75-01-4	0.10																	
1	Chloroethane	75-00-3	0.01				29.2													
1	methylene chloride (10xblk)	75-09-2	0.01				✓													
1	acetone(10xblk)	67-64-1	0.01																	
1	carbon disulfide	75-15-0	0.10																	
1	1,1-dichloroethene	75-35-4	0.20		.17				✓	✓	✓	✓	✓	✓						
1	1,1-dichloroethane	75-34-3	0.10		✓															
1	Chloroform	67-66-3	0.20																	
1	1,2-dichloroethane	107-06-2	0.10																	
1	2-butanone(10xblk)	78-93-3	0.01																	
2	1,1,1-trichloroethane	71-55-6	0.10																	
2	carbon tetrachloride	56-23-5	0.10																	
2	Bromodichloromethane	75-27-4	0.20																	
2	1,2-dichloropropane	78-87-5	0.01																	
2	cis-1,3-dichloropropene	10061-01-5	0.20																	
2	Trichloroethene	79-01-6	0.30						✓	✓	✓	✓	✓	✓						
2	Dibromochloromethane	124-48-1	0.10																	
2	1,1,2-trichloroethane	79-00-5	0.10																	
2	Benzene	71-43-2	0.50						✓	✓	✓	✓	✓	✓						
2	trans-1,3-dichloropropene	10061-02-6	0.10																	
2	Bromoform	75-25-2	0.10																	
3	4-methyl-2-pentanone	108-10-1	0.10																	
3	2-hexanone	591-78-6	0.01																	
3	Tetrachloroethene	127-18-4	0.20																	
3	1,1,2,2-tetrachloroethane	79-34-5	0.30																	
3	toluene(10xblk)	108-88-3	0.40					0.7	✓	✓	✓	✓	✓	✓						
3	Chlorobenzene	108-90-7	0.50					✓	✓	✓	✓	✓	✓	✓						
3	Ethylbenzene	100-41-4	0.10																	
3	Styrene	100-42-5	0.30																	
3	xylenes(total)	1330-20-7	0.30																	
	1,2-dichloroethylene(total)	540-59-0	0.01																	
	~~2-chloroethyl vinyl ether~~	110-75-8																		
	Vinyl acetate			✓	✓															

Comments:

REVIEWED BY: [signature] DATE: 11/29/99

SW-846 - Method 8260

SITE/PROJECT: ____________ ARCOC #: 602812
LABORATORY: ____________ LABORATORY REPORT #: ____________

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			

OK

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

Memorandum

Date: 11/29/99

To: File

From: Marcia Hilchey

Subject: Inorganic Data Review and Validation
Site: Area III/V RFI
AR/COC: 602812
Case: 7219.01.06
Laboratory: GEL
SDG: 9909158

See attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and with specified methods (ICP EPA6010, CVAA EPA7470). All components were successfully analyzed.

Qualifications were applied to metals sample results due to blank contamination and failure to meet replicate RPD acceptance criteria.

Holding Times

The samples were analyzed within the prescribed holding times.

Calibration

Initial and continuing calibration met QC acceptance criteria for both methods.

Note: No calibration information for beryllium was reported in the laboratory's QC summary. Calibration verification and calibration blank values for beryllium were present in the package raw data.

Blanks

Several samples exhibited analytes at less than 5 times the calibration blank or method blank values. These results were qualified JB. See attached Sample Findings Summary.

Equipment blanks were free of target analytes.

Matrix Spike Analysis

All matrix spike sample QC acceptance criteria were met for both methods.

Laboratory Control/Laboratory Control Duplicate Samples

The LCS/LCSD samples met QC acceptance criteria for both methods.

ICP Interference check sample (ICS) Analysis

The ICS analyses met all QC acceptance criteria.

Laboratory Replicate Analysis

All laboratory replicate analyses met RPD acceptance criteria, with the exception of barium in soil. All soil barium results were qualified JP2.

Serial Dilution

All serial dilution met QC acceptance criteria.

Other QC

Field soil duplicate samples failed to meet acceptance criteria for chromium and arsenic. No sample data were qualified.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

INORGANIC METALS:

SITE/PROJECT: Area III/V RFI ARCOC #: 602812 soil
LABORATORY: GEL LABORATORY REPORT #: 9909158
METHODS: ICP, CVAA

mg/l mg/kg n/a

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD
7429-90-5 Al															
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	✓	✓			[illegible]	✓	✓	✓
7440-41-7 Be	✓	✓	✓	-.36	✓	✓	✓	✓	✓			✓		✓	✓
7440-43-9 Cd	✓	✓	.4	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
7440-70-2 Ca															
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	hi
7440-48-4 Co															
7440-50-8 Cu	✓	✓	✓	-1.9									✓		
7439-89-6 Fe															
7439-95-4 Mg															
7439-96-5 Mn															
7440-02-0 Ni															
7440-09-7 K															
7440-22-4 Ag	✓	✓	✓	5.5	.18	✓	✓	✓	✓			✓	✓	✓	✓
7440-23-5 Na															
7440-62-2 V															
7440-66-6 Zn	✓	✓	✓	.6	✓							M	✓	M	
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
7440-38-2 As	✓	✓	4.6	3.0	✓	✓	✓	✓	✓			✓	✓	✓	hi
7440-36-0 Sb															
7440-28-0 Tl															
7439-97-6 Hg	✓	✓	✓	-.1	✓	✓	✓	✓	✓			✓			✓
Cyanide CN															

mg/kg = ug/g : [(ug/g) x (sample mass {g} / sample vol. {ml}) x (1000ml / 1liter)] / Dilution Factor = ug / l

Comments:

REVIEWED BY: [signature] DATE: 11/29/99

INORGANIC METALS:

SITE/PROJECT: Area III/V RFI ARCOC #: 602812 aqueous
LABORATORY: GEL LABORATORY REPORT #: 9909158
METHODS: ICP, CVAA

mg/l mg/l n/a n/a

QC Element/ Analyte	ICV	CCV	ICB	CCB	Method Blks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	REP RPD	ICS AB	Serial Dilution	Field Dup RPD	Eq. Blks	Field Blks			
7429-90-5 Al																				
7440-39-3 Ba	✓	✓	.2	.3	✓	✓	✓	✓	✓			✓	✓	✓						
7440-41-7 Be	✓	✓	.1	-.2	✓	✓	✓	✓	✓			✓	✓	✓						
7440-43-9 Cd	✓	✓	✓	.4	✓	✓	✓	✓	✓			✓	✓	✓						
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓						
7440-48-4 Co																				
7440-50-8 Cu																				
7439-89-6 Fe																				
7439-95-4 Mg																				
7439-96-5 Mn																				
7440-02-0 Ni																				
7440-09-7 K																				
7440-22-4 Ag	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓						
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	.23	✓	✓	✓	✓	✓	✓			✓	✓	✓						
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓						
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓						
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓								
Cyanide CN																				

mg/kg = ug/g : [(ug/g) x (sample mass {g} / sample vol. {ml}) x (1000ml / 1liter)] / Dilution Factor = ug / l

Comments:

REVIEWED BY: [signature] DATE: 11/29/99

Memorandum

Date: 11/29/99

To: File

From: Marcia Hilchey

Subject: General Chemistry Data Review and Validation
Site: Non-ER Septic Systems
AR/COC: 602812
Case: 7219.01.06
Laboratory: GEL
SDG: 9909158

See attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

All samples were prepared and analyzed with accepted procedures and with specified methods (total petroleum hydrocarbons (TPH) EPA418.1). All components were successfully analyzed.

Qualifications were applied to TPH sample results due to blank contamination.

Holding Times

The samples were analyzed within the prescribed holding time.

Calibration

Initial and continuing calibrations met QC acceptance criteria.

Blanks

The equipment blanks were free of TPH above reporting limits.

Several samples exhibited TPH at less than 5 times the method blank value. These results were qualified JB. See attached Sample Findings Summary.

Matrix Spike Analysis

The aqueous matrix spike sample analysis met QC acceptance criteria.

Two soil samples were analyzed for matrix spike recovery. The spike of sample 196-BH2-99-90-SS failed to meet %R acceptance criteria due to matrix interference; however, the spike of sample 196-BH2-99-60-SS met acceptance criteria. No sample results were qualified.

Laboratory Control/Laboratory Control Duplicate Samples

The LCS/LCSD samples met QC acceptance criteria.

Laboratory Replicate Analysis

The replicate sample analyses met QC acceptance criteria.

Other QC

Note: Field duplicate soil sample analysis failed to meet RPD acceptance criteria. No sample data were qualified as a result.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

GENERAL CHEMISTRY:

SITE/PROJECT: Area III/V RFI ARCOC #: ~~60-208~~ 60[illegible]812.

LABORATORY: Gel LABORATORY REPORT #: 9909158

METHODS: TPH (EPA 418.1)

QC/ Analyte	CAS #	ICV	CCV	ICB	CCB	Method Blanks (mg/kg)	LCS	LCSD	LCSD RPD	MS	MSD (n/a)	MSD RPD	REP RPD	Serial Dilution (n/a)	Field Dup RPD	Equip. Blks	Field Blks			
TPH		✓	✓	——	——	18.6	✓	✓	✓	37.7[1]			✓		hi	✓	✓			

Comments:

[1] for MS of sample -10 only: MS of sample -07 OK

REVIEWED BY: [signature] DATE: 11/29/99

DATA VALIDATION SUMMARY:

SITE/PR CT: Site III/IV RFI CASE #: 7219.01.06
ARCOC #: 602812
LABORATORY: GEL
LABORATORY REPORT #: 9909158

SAMPLES: ~~4~~ 10 MATRIX: aqueous
LAB SAMPLE IDs:
9909158 - ~~13 16 19 22~~
-12 thru -16, -18 thru -22

ANALYSIS/ QC ELEMENT	VOC	SVOC	~~PEST/ PCB~~	~~HPLC (HE)~~	ICP/AES	GFAA/ AA	CVAA (Hg)	~~CN~~	~~RAD~~	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	✓								
2. CALIBRATIONS	✓	✓								
3. METHOD BLANKS	✓	✓								
4. MS/MSD	✓	UJA2								
5. LABORATORY CONTROL SAMPLES	✓	✓								
6. REPLICATES										
7. SURROGATES	✓	✓								
8. INTERNAL STDS	✓	✓								
9. TCL COMPOUND IDENTIFICATION	✓	✓								
10. ICP INTERFERENCE CHECK SAMPLE										
11. ICP SERIAL DILUTION										
12. CARRIER/CHEM TRACER RECOVERIES										
13. OTHER QC										

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWED BY: [signature] DATE: 11/29/99

DATA VALIDATION SUMMARY:

SITE/PROJECT: Site III/V RFI CASE #: 7219.01.06
ARCOC #: 602812
LABORATORY: GEL
LABORATORY REPORT #: 9909158

SAMPLES: 12 MATRIX: soil
LAB SAMPLE IDs: 9909158-01 thru 11, -17

ANALYSIS/ QC ELEMENT	~~VOC~~	SVOC	~~PEST/ PCB~~	~~HPLC (HE)~~	ICP/AES	GFAA/ AA	CVAA (Hg)	~~CN~~	~~RAD~~	OTHER
1. HOLDING TIMES/ PRESERVATION		UJ2								
2. CALIBRATIONS		UJ								
3. METHOD BLANKS		✓								
4. MS/MSD		—								
5. LABORATORY CONTROL SAMPLES		✓								
6. REPLICATES										
7. SURROGATES		R								
8. INTERNAL STDS		✓								
9. TCL COMPOUND IDENTIFICATION		✓								
10. ICP INTERFERENCE CHECK SAMPLE										
11. ICP SERIAL DILUTION										
12. CARRIER/CHEM TRACER RECOVERIES										
13. OTHER QC		✓								

CHECK MARK (√) – ACCEPTABLE
J – ESTIMATED
U – NOT DETECTED

SHADED CELLS – NOT APPLICABLE
UJ – NOT DETECTED, ESTIMATED
R – UNUSABLE

REVIEWED BY: [signature] DATE: 11/29/99

SAMPLE FINDINGS SUMMARY

Site: III/V RFI Report

AR/COC: 602813 Data Classification: Organics

Sample Fraction No.	Analysis	DV Qualifiers	Comments
	SEE ATTACHED		
	TABLE		

Sample No./Fraction No. - This value is located on the Chain of Custody in the ER Sample Id field.

Analysis - Use valid test methods provided below or if the result applies to an individual analyte within a test method, use the CAS number from the analytical data sheet.

DV Qualifiers - The entry will be taken from the list of valid qualifiers and associated comments. If other qualifiers not on the list are needed, contact Tina Sanchez to coordinate adding them to the list.

Comments - This is only to be used if a comment associated with the qualifier is not appropriate, needs modification because of an unusual circumstance, or additional clarification is warranted.

Test Methods - Anions_CE, EPA6010, EPA6020, EPA7470/1, EPA8015B, EPA8081, EPA8260, EPA8260-M3, EPA8270, HACH_ALK, HACH_NO2, HACH_NO3, MEKC_HE, PCBRISC

Reviewed by: Kevin A Lambert Date: 12-2-99

Sample Number	67-64-1(acetone)	78-93-3 (2-butanone)	108-10-1 (4-methyl-2-pentanone)	591-78-6 (2-hexanone)
ARCOC #602813				
VOC Analysis				
049981-002/196-BH3-99-14-SS	UJ	UJ	UJ	UJ
049982-002/196-BH3-99-19-SS	EPA8260 - Qualify all results "R."			
049983-002/196-BH3-99-24-SS	UJ	UJ	UJ	UJ
049984-002/196-BH3-99-28-SS	EPA8260 - Qualify all results "R."			
049985-002/196-BH3-99-40-SS	EPA8260 - Qualify all results "R."			
049986-002/196-BH3-99-65-SS	EPA8260 - Qualify all results "R."			
049987-002/196-BH3-99-75-SS	EPA8260 - Qualify all results "R" except methylene chloride (75-09-2) qualify "J."			
049988-002/196-BH1-99-00-SP	UJ	UJ	UJ	UJ
049998-002/196-BH3-99-40-SD	EPA8260 - Qualify all results "R."			

Kevin A Lambert 12-2-

DATA VALIDATION SUMMARY:

SITE/PROJECT: III/V RFI Rpt CASE #: 7219.161
ARCOC #: 602813
LABORATORY: GEL
LABORATORY REPORT #: 9909222

OF SAMPLES: 9 MATRIX: soil
LAB SAMPLE IDs: 9909222-01 to -09

ANALYSIS/ QC ELEMENT	VOC	SVOC	PEST/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN	RAD	OTHER
1. HOLDING TIMES/ PRESERVATION	✓	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. CALIBRATIONS	UJ									
3. METHOD BLANKS	✓									
4. MS/MSD	✓									
5. LABORATORY CONTROL SAMPLES	✓									
6. REPLICATES										
7. SURROGATES	J, UJ									
8. INTERNAL STDS	J, R									
9. TCL COMPOUND IDENTIFICATION	✓									
10. ICP INTERFERENCE CHECK SAMPLE										
11. ICP SERIAL DILUTION										
12. CARRIER CHEM TRACER RECOVERIES										
13. OTHER QC	NA									

CHECK MARK (✓) - ACCEPTABLE
J - ESTIMATED
U - NOT DETECTED

SHADED CELLS - NOT APPLICABLE (NA)
UJ - NOT DETECTED, ESTIMATED
R - UNUSABLE

REVIEWED BY Kevin A Lambert DATE 12-2-99

Data Validation Qualifiers and Descriptive Flags*

Note: Qualifiers may be used in conjunction with descriptive flags [e.g., J,A; UJ,P; U,B].

Qualifiers	Comment
J	The associated value is an estimated quantity.
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
U	The associated result is less than ten times the concentration in any blank and is determined to be non-detect. The analyte is a common laboratory contaminant.
U1	The associated result is less than five times the concentration in any blank and is determined to be non-detect.
R	The data are unusable for their intended purpose. The analyte may or may not be present. (Note: Resampling and reanalysis is necessary for verification.)

Descriptive Flags	
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample and/or duplicate (LCS/LCSD) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike and/or duplicate (MS/MSD) do not meet acceptance criteria.
A3	Insufficient quality control data to determine laboratory accuracy.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in calibration blank.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria.
P2	Insufficient quality control data to determine laboratory precision.

* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03. Notify Tina Sanchez to revise list.

Updated: September 14, 1999

MEMORANDUM

DATE: December 2, 1999

TO: File

FROM: Kevin Lambert KAL

SUBJECT: Organic Data Review and Validation
III/V RFI Rpt, ARCOC No. 602813, and Project/Task No. 7219.01.06

See the attached Data Assessment Summary Forms for supporting documentation on the data review and validation.

Summary

The samples were prepared and analyzed with accepted procedures and specified method (VOC – EPA8260). Problems were identified with the data package that result in the qualification of data.

1. The internal standard (IS) area count was less than (<) the lower acceptance limit for chlorobenzene-d5 in samples 9909222-04, -05, -06, -07, and –09, and for 1,4-dichlorobenzene-d4 in samples 9909222-02, -04, -05, -06, -07, and -09. Also, the IS area count for the same IS compounds were < the lower acceptance limit in the matrix spike/matrix spike duplicate (MS/MSD), sample 9909222-09. Samples were reanalyzed with smaller aliquots and the low recoveries were confirmed. Matrix interference is suspected to be the cause of the poor recovery. In sample 9909222-02, the IS area count for 1,4-dichlorobenzene-d4 was greater than (>) 25% but < 50% of the average result from the calibration standard. Sample results are non-detect and will be qualified "UJ." In samples 9909222-04, -05, -06, -07, and –09, the IS area count for 1,4-dichlorobenzene-d4 was < 25% of the average result from the calibration standard. Therefore, detects will be qualified "J" and non-detects will be qualified "R", unusable.

2. The surrogate percent recovery (%R) was > the upper acceptance limit for bromofluorobenzene in samples 9909222-04, -05, -06, -07, and –09. Matrix interference is suspected to be the cause of the poor recovery. Since the IS data did meet acceptance criteria as noted above, detects will be qualified "J" and non-detects will be qualified "R", unusable.

3. The calibration response factor (RF) for 2-butanone is > minimum RF but < 0.05 and the continuing calibration verification (CCV) percent difference (%D) is > 20% but < 40%. Sample results are non-detect and will be qualified "UJ" in samples 990922-01, -03, and –08. The remaining samples are already qualified as noted above due to IS data not meeting acceptance criteria. The calibration RF for 4-methyl-2-pentanone is < minimum RF but > 0.05 and the CCV %D is

> 20% but < 40%. Sample results are non-detect and will be qualified "UJ" in samples 990922-01, -03, and –08. The remaining samples are already qualified as noted above due to IS data not meeting acceptance criteria.

4. The CCV %D for acetone and 2-hexanone are > 40% but < 60%. Sample results are non-detect and will be qualified "UJ" in samples 990922-01, -03, and –08. The remaining samples are already qualified as noted above due to IS data not meeting acceptance criteria.

Data is acceptable except for sample results qualified "R" due to poor IS recovery. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times

The samples were extracted and analyzed within the prescribed holding times.

Calibration

The initial calibration data met QC acceptance criteria except as noted above in the summary section. The continuing calibration data met QC acceptance criteria except as noted above in the summary section. The CCV%D for methylene chloride, 1,2-dichloroethane, 1,1,2-trichloroethane, trans-1,3-dichloropropene, 1,1,2,2-tetrachloroethane, and vinyl acetate are > 20% but < 40%. The RFs for these compounds met acceptance criteria and sample results are non-detect; no data were qualified.

Blanks

No target analytes were detected in the MB except as noted above in the summary section.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

The MS/MSD met acceptance criteria.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

The LCS/LCSD met QC acceptance criteria.

Surrogates

The surrogate recoveries met QC acceptance criteria except as noted above in the summary section.

Internal Standards

Internal standards met QC acceptance criteria except as noted above in the summary section.

Other QC

No equipment blank (EB), trip blank (TB), or field blank (FB) were submitted on the ARCOC. Sample results for the field duplicate pair were non-detect; the RPD cannot be determined.

No other specific issues were identified which affect data quality.

Please contact me if you have any questions or comments regarding the review of this package.

VOLATILE ORGANICS: Page 1 of 2
SW-846 - Method 8260

Soil

Batch# 158071

Lab# 9909222-01
-02
-03
-04
-05(Du)

9909222-06
-07
-08
-09(DU)

SITE/PROJECT: III/V RFI Rpt ARCOC #: 602813
LABORATORY: GEL LABORATORY REPORT #: 9909222

IS	GC/MS Name	CAS #	Min RF	Intercept	① Calib RF	Calib RSD / R²	② CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup RPD	Eq. Blks	Trip Blks	TAL
					>.05	<20% / 0.99	20%									NA	NA	
1	Chloromethane	74-87-3	0.10		✓	✓	✓	✓							Sample results are ND RPD cannot be determined			
1	Bromomethane	74-83-9	0.10	✓	✓	✓	✓											✓
1	**vinyl chloride**	75-01-4	0.10		✓	✓	✓											✓
1	Chloroethane	75-00-3	0.01		✓	✓	✓											✓
1	methylene chloride (10xblk)	75-09-2	0.01	✓	✓	✓	21.8											✓
1	**acetone(10xblk)**	67-64-1	0.01		✓	✓	51.4											✓
1	carbon disulfide	75-15-0	0.10		✓	✓	✓											✓
1	**1,1-dichloroethene**	75-35-4	0.20		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
1	**1,1-dichloroethane**	75-34-3	0.10		✓	✓	✓											✓
1	**Chloroform**	67-66-3	0.20		✓	✓	✓											✓
1	**1,2-dichloroethane**	107-06-2	0.10		✓	✓	21.6											✓
1	**2-butanone(10xblk)**	78-93-3	0.01		0.02	✓	33.0											✓
2	1,1,1-trichloroethane	71-55-6	0.10		✓	✓	✓											✓
2	**carbon tetrachloride**	56-23-5	0.10		✓	✓	✓											✓
2	Bromodichloromethane	75-27-4	0.20		✓	✓	✓											✓
2	**1,2-dichloropropane**	78-87-5	0.01		✓	✓	✓											✓
2	cis-1,3-dichloropropene	10061-01-5	0.20		✓	✓	✓											✓
2	**Trichloroethene**	79-01-6	0.30		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
2	Dibromochloromethane	124-48-1	0.10		✓	✓	✓											✓
2	1,1,2-trichloroethane	79-00-5	0.10		✓	✓	27.7											✓
2	**Benzene**	71-43-2	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
2	trans-1,3-dichloropropene	10061-02-6	0.10		✓	✓	21.2											✓
2	Bromoform	75-25-2	0.10		✓	✓	✓											✓
3	4-methyl-2-pentanone	108-10-1	0.10		0.08	✓	28.7											✓
3	2-hexanone	591-78-6	0.01		✓	✓	50.8											✓
3	**Tetrachloroethene**	127-18-4	0.20		✓	✓	✓											✓
3	1,1,2,2-tetrachloroethane	79-34-5	0.30		✓	✓	21.7											✓
3	toluene(10xblk)	108-88-3	0.40		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
3	**Chlorobenzene**	108-90-7	0.50		✓	✓	✓		✓	✓	✓	✓	✓	✓				✓
3	Ethylbenzene	100-41-4	0.10		✓	✓	✓											✓
3	Styrene	100-42-5	0.30		✓	✓	✓											✓
3	xylenes(total)	1330-20-7	0.30		✓	✓	✓											✓
	~~1,2-dichloroethylene(total)~~	~~540-59-0~~	~~0.01~~															
	~~2-chloroethyl vinyl ether~~	~~110-75-8~~																
	1,2-cis-dichloroethylene	156-59-2			✓	✓	✓											✓
	1,2-trans-dichloroethylene	156-60-5			✓	✓	✓											✓
	vinyl Acetate	108-05-4			✓	✓	28.9											✓

Comments: NA - Not Applicable

REVIEWED BY: Kevin A Lambert DATE: 12-2-99

VOLATILE ORGANICS: Page 2 of 2
SW-846 - Method 8260

Soil

SITE/PROJECT: III/V RFIRpt ARCOC #: 602813
LABORATORY: GEL LABORATORY REPORT #: 9909222

Surrogate Recovery and Internal Standard Outliers

Sample	SMC 1	SMC 2	SMC 3	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3- area	IS 3- RT			
③ 9909222-04	159	✓	✓									
-05	150	✓	✓									
-06	179	✓	✓									
-07	195	✓	✓									
-09	150	✓	✓									
④ 9909222-02				✓	✓	35087	✓	✓	✓			
-04				60145	✓	14260	✓	✓	✓			
-05				72049	✓	18268	✓	✓	✓			
-06				54067	✓	10101	✓	✓	✓			
-07				46139	✓	6961	✓	✓	✓			
-09				87984	✓	23973	✓	✓	✓			
9909222-09MS				✓	✓	25731	✓	✓	✓			
-09MSD				77848	✓	21007	✓	✓	✓			

~~SMC 1: 4-Bromofluorobenzene~~ (73-129) IS 1: ~~Bromochloromethane~~ chlorobenzene-d5 (354856 - 88714)
SMC 2: 1,2-Dichloroethane-d4 IS 2: ~~1,4-Difluorobenzene~~ 1,4-dichlorobenzene-d4 (210520 - 52630)
SMC 3: Toluene-d8 IS 3: ~~Chlorobenzene-d5~~ fluorobenzene

Comments: ① The RF for 2-butanone is > min RF but < 0.05 and CCV %D is > 20% but < 40%; sample results are ND and will be qualified "UJ." The RF for 4-methyl-2-pentanone is < min RF but > 0.05 and CCV %D is > 20% but < 40%; Sample results are ND and will be qualified "UJ."
② The CCV %D for 10 compounds are > acceptance limit; 8 compounds > 20% but < 40% and 2 compounds > 40% but < 60%. 2-butanone and 4-methyl-2-pentanone are already qualified due to RF and CCV %D not meeting criteria. Methylene chloride, 1,2-dichloroethane, 1,1,2-trichloroethene, trans-1, 3-dichloropropene, 1,1,2,2-tetrachloroethane, and vinyl acetate RFs met criteria and KAL 12-2-99 ~~except~~ sample results are ND; no data were qualified. Acetone and 2-hexanone KAL 12-2-99 ~~as~~ sample results are ND but will be qualified "UJ" due to CCV %D > 40% but < 60%.
③ One surrogate for samples 9909222-04, -05, -06, -07, and -09 was out high; Detects will be qualified "J" and non-detects will be qualified "UJ."
④ The IS ... below acceptance limits for samples 9909222-02, -04, -05, -06, -07, and -09 plus MS/MSD

Contract Verification Review (CVR)

Project Leader A. LAI Project Name SITE III / V RFI REPORT Case No. 7219.161

AR/COC No. 602813 Analytical Lab GEL SDG No. 9909222

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
.1	All items on COC complete - data entry clerk initialed and dated	X				
.2	Container type(s) correct for analyses requested	X				
.3	Sample volume adequate for # and types of analyses requested	X				
.4	Preservative correct for analyses requested	X				
.5	Custody records continuous and complete	X				
.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
.7	Date samples received	X				
.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
.1	Data reviewed, signature	X				
.2	Method reference number(s) complete and correct	X				
.3	~~QC analysis and acceptance limits provided (MB, LCS, Replicate)~~	X				
.4	Matrix spike/matrix spike duplicate data provided(if requested)	X				
.5	Detection limits provided; PQL and MDL(or IDL), MDA and L_c	X				
.6	QC batch numbers provided	X				
.7	Dilution factors provided and all dilution levels reported	X				
.8	Data reported in appropriate units and using correct significant figures	X				
.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	NA				
.10	Narrative provided	X				
.11	TAT met	X				
.12	Hold times met	X				
.13	Contractual qualifiers provided	X				
.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	bromofluorobenzene out of acceptable limits
c) Matrix spike recovery data reported and met	X		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	NA		
b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	NA		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	NA		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and pesticides/PCBs	NA		

Contract Verification Review (Continued)

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		1,4-dichlorobenzene and chlorobenzene-d5 not within required limits
e) Instrument run logs provided	X		
.2 GC/HPLC (8330 and 8010)			
a) Initial calibration provided	NA		
b) Continuing calibration provided	NA		
c) Instrument run logs provided	NA		
.3 Inorganics (metals)			
a) Initial calibration provided	NA		
b) Continuing calibration provided	NA		
c) ICP interference check sample data provided	NA		
d) ICP serial dilution provided	NA		
e) Instrument run logs provided	NA		
.4 Radiochemistry			
a) Instrument run logs provided	NA		

Contract Verification Review (Concluded)

5.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Vere deficiencies unresolved? ☐ Yes X No

3ased on the review, this data package is complete. X Yes ☐ No

f no, provide: nonconformance report or correction request number ____________ and date correction request was submitted: ________

Reviewed by: L. Herrera [signature] Date: 10/19/1999 Closed by: L. Herrera [signature] Date: 10/19/1999

2003 Data Validation Reports

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
Phone: 505-299-5201
Fax: 505-299-6744
Email: minteer@aol.com

Memorandum

DATE: 08/07/03

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: Site 196
ARCOC # 606401, 606402, 606403 and 606404
STSL SDG # F3F130271
Project/Task No. 7219.02.02.05

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM ER Project AOP 00-03.

Summary

The samples were prepared and analyzed with approved procedures using methods SW-846 8260B (VOC), 8270C (SVOC) and 8015 modified (TPH). Problems were identified with the data package that resulted in the qualification of data.

VOC Batch # 3177229 (EB and TB)
In the initial calibration preceding the samples, acetone (33%) had a RSD > 20%. In the CCV preceding the samples, acetone (38.5%) had a %D > 20% but < 40% with a negative bias. Both associated sample results were detect and will be qualified "J".
In the CCV preceding the samples, butanone (43%) had a %D > 40% but < 60% with a negative bias. Both associated sample results were non-detect and will be qualified "UJ".
The MB had an acetone value > DL but < RL. Both associated sample results were > DL but < RL and < 10X MB value and will be further qualified "20U, B".
The MB had a methylene chloride value > DL but < RL. Both associated sample results were > RL but < 10X MB value and will be qualified "U, B" at the reported value.
The LCS had a %R < QC acceptance criteria (73-150%) for 2-butanone (62%). The sample results are already qualified "UJ" due to CCV infractions. The descriptor flag "A" will be added to the qualification.
No MS/MSD, LCSD or duplicate was performed for this batch. As there is no measure of precision available for the batch, all the results for both sample will be qualified "P2".

VOC Batch # 3175173 (Sample F3F130271-002,-003,-004)
In the initial calibration preceding the samples, acetone (34%) had a RSD > 20%. All associated sample results were detect and will be qualified "J".
The MB had an acetone value > DL but < RL. All associated sample results were detects with values < 10X MB value. Sample F3F130271-002 had a value < RL and will be qualified "U, B" at the RL; sample F3F130271-003 and -004 had values > RL and will be reported "U, B" at the reported values.

VOC Batch # 3178293 (Sample F3F130271-001,-005 though 009)

In the initial calibration preceding the samples, acetone (33%) had a RSD > 20%. In the CCV preceding the samples, acetone (32 %) had a %D > 20% but < 40% with a negative bias. All associated sample results, with the exception of sample F3F130271-009, were detect and will be qualified "J". Sample F3F130271-009 was non-detect, and using professional judgment will be qualified "UJ".
In the CCV preceding the samples, 2-butanone (34 %) had a %D > 20% but < 40% with a negative bias. All associated sample results, with the exception of sample F3F130271-005 and -006, were detect and will be qualified "J".
The MB had an acetone value > RL. All associated sample results, with the exception of sample F3F130271-009, were detects with values < 10X MB value. Sample F3F130271-001, -005 and -007 had a value < RL or at the RL and will be qualified "U, B" at the RL; sample F3F130271-006 and -008 had values > RL and will be reported "U, B" at the reported values.
The MB had a methylene chloride value > DL. All associated sample results were detects with values < 10X MB value. Sample F3F130271-005, -006, -007, -008 and -009 had a value < RL and will be qualified "U, B" at the RL; sample F3F130271-001 had a value > RL and will be reported "U, B" at the reported value.
All the internal standards for sample F3F130271-006 had area counts > 25% but < 50% of the calibration standard. All detects (acetone and methylene chloride) will be qualified "J" and all non-detects "UJ".

SVOC Batch # 3167494 (EB)
Bis(2-ethylhexyl)phthalate was detected in the MB at a value > RL. The associated sample result had a value > DL but < RL and < 10X MB value and will be qualified "U, B" at the RL. All the acid surrogates had 0% recovery. All acid compounds will be qualified "R, A1".

SVOC Batch # 3174314 (EB)
Due to a QC failure the sample was re-extracted out of hold time but within 2X the hold time. Both sets of results are reported and both sets of data will be validated. In the re-extracted batch, all detects will be qualified "J, HT" and all non-detects "UJ, HT".
Bis(2-ethylhexyl)phthalate was detected in the MB at a value > DL. The associated sample result had a value > DL but < RL and < 10X MB value and will be qualified "U, B" at the RL.

Data are acceptable except as mentioned above and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times/Preservation

All Analyses: The samples were properly preserved and analyzed within the method prescribed holding time except as mentioned above in the summary section.

Calibration

All Analyses: All initial and continuing calibration acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC Batch # 3177229 (EB and TB)
In the CCV preceding the samples, several compounds had %D > 20% but < 40% with a negative bias (see Data Validation Worksheet). The associated sample results were non-detect and no data will be qualified.

VOC Batch # 3178293 (Sample F3F130271-001,-005 though 009)
In the CCV preceding the samples, 2-butanone (34 %) and 1,2-dichloroethane (21%) had a %D > 20% but < 40% with a negative bias. All associated sample results were non detect for 1,2-dichloroethane, and samples F3F130271-005 and -006 were non-detect for 2-butanone; no data will be qualified.

Blanks

All Analyses: All method blank (MB), equipment blank (EB) and trip blank (TB) acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC Batch # 3175173 (Sample F3F130271-002,-003,-004)
It should be noted that methylene chloride is a common laboratory contaminant. However, the MB associated with this batch was non-detect for methylene chloride, and thus these sample results, which exhibited low level "hits" for methylene chloride (13ppb, 13ppb and 11ppb), have not been qualified. The EB (5.5ppb) and TB (6.1ppb) associated with the samples both had values > RL, but are qualified non-detect at their reported values due to the presence of methylene chloride in their MB.

VOC Batch # 3178293 (Sample F3F130271-001,-005 though 009)
The MB had an acetone value > RL. Sample F3F130271-009 was non-detect and will not be qualified.

SVOC Batch # 3167494 (EB)
Diethylphthalate and phenol were detected in the MB at values > DL but < RL. The associated sample result was non-detect and will not be qualified.

Surrogates

All Analyses: All surrogate acceptance criteria were met except as mentioned above in the summary section and as follows:

TPH
The surrogate recovery in the MSD was out of criteria high. The spike recovery was in criteria and no data will be qualified.

SVOC Batch # 3174314 (EB)
One of the three acid surrogates failed QC acceptance criteria in the LCSD. It is thought to have been an extraction related problem and thus no data will be qualified.

Internal Standards (ISs)

VOC and SVOC: All internal standard acceptance criteria were met except as mentioned above in the summary section.

TPH: No internal standard required.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

All Analyses: All MS/MSD acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC Batch # 3175173 (Sample F3F130271-002,-003,-004)
The MS/MSD associated with this batch was from a non-Sandia SDG and will not be used to qualify data from this SDG. A sample from this SDG was used as a MS/MSD in Batch # 3178293 and exhibited acceptable recoveries for all compounds excluding 1,1,-trichloroethane. Using professional judgment, no data will be qualified.

VOC Batch # 3178293 (Sample F3F130271-001,-005 though 009)
The MS/MSD had %R's slightly < QC acceptance criteria for 1,1,1-trichloroethane. Using professional judgment, no data will be qualified.

SVOC Batch # 3167494 and 3174314 (EB)
No MS/MSD was extracted with these batches. An LCSD was extracted and will be used to assess the precision for the batch. No data will be qualified.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analyses: The LCS and or LCSD acceptance criteria were met except as mentioned above in the summary section and as follows:

> VOC Batch # 3178293 (Sample F3F130271-001,-005 though 009)
> The LCS had %R slightly < QC acceptance criteria for 2-butanone and bromodichloromethane. Using professional judgment, no data will be qualified.
>
> SVOC Batch # 3167494 (EB)
> Several compounds had RPD's > QC acceptance criteria (see data validation worksheet). The %R's were in criteria and the sample results were non-detect. Using professional judgment, no data will be qualified.
>
> SVOC Batch # 3174314 (EB)
> The LCSD had 5/60 compounds fail %R. The LCS/LCSD failed RPD for 13/60 compounds. The LCS %R's were in criteria and it is possible the LCSD failures were due to an extraction related problem that occurred during the acid extraction phase. The sample data is already qualified "UJ" due to a hold time infringement. Using professional judgment, no data will be further qualified.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. Samples were not diluted.

Confirmation Analyses

All Analyses: No confirmation analyses required.

Other QC

VOC: A trip blank, equipment blank and field duplicates were submitted on the ARCOCs included with this package. There is no "required " validation procedure for assessing field duplicates.

SVOC: An equipment blank and field duplicate were included with this package. There is no "required validation procedure for assessing a field duplicate. No field blank was submitted.

TPH: A field duplicate was submitted on the ARCOC's included with this package. There is no "required " validation procedure for assessing field duplicates. No field blank or equipment blank was submitted.

It should be noted that the client required no APP IX compounds, and although they have been included on some of the reports, none of these compounds have been validated.

No other specific issues were identified which affect data quality.

Site: Site 196 **ARCOC:** 606401, [illegible]402, 606403 and 606404 **Data:** [illegible]nic

Sample ID	All VOC (8260B) TAL compounds except:	78-93-3 (2-butanone)	67-64-1 (acetone)	75-09-2 (methylene chloride)	All SVOC (8270C) TAL compounds except:	117-81-7 (bis(2-ethylhexyl)phthalate	MP34 (m,p-methylphenol)	87-86-5 (pentachlorophenol)	95-95-4 (2,4,5-trichlorophenol)	59-50-7 (4-chloro-3-methylphenol)	95-57-8 (2-chlorophenol)	108-95-2 (phenol)	95-48-7 (2-methylphenol)	88-75-5 (2-nitrophenol)	105-67-9 (2,4-dimethylphenol)	88-06-2 (2,4,6-trichlorophenol)	51-28-5 (2,4-dinitrophenol)	120-83-2 (2,4-dichlorophenol)	534-52-1 (4,6-dinitro-2-methylphenol)	TPH (8015)
062051-001 TA 3/5-190-OX-TB	P2	UJ,A,P2	20UJ,B,P2	6.1U,B,P2																All QC acceptance criteria were met. No data will be qualified.
062435-001 TA 3/5-190-OX-EB	P2	UJ,A,P2	20UJ,B,P2	5.5U,B,P2																
062434-001 TA 3/5-190-OX-EB						10U,B	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	
062434-R01 TA 3/5-190-OX-EB-RE					UJ,HT	10UJ,B,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	
062042-001 TA 3/5-196-C03-120-SS		J	20UJ,B	11U,B																
062043-001 TA 3/5-196-C04-130-SS			20UJ,B																	
062045-001 TA 3/5-196-C05-140-SS			29UJ,B																	
062046-001 TA 3/5-196-C06-150-SS			34UJ,B																	
062038-001 TA 3/5-196-C01-100-SS			20UJ,B	5U,B																
062041-001 TA 3/5-196-C02-110-SS	UJ	UJ	32UJ,B	5UJ,B																
062039-001 TA 3/5-196-C02-110-SD		J	20UJ,B	5U,B																
062048-001 TA 3/5-196-C07-160-SS		J	20UJ,B	5U,B																
062049-001 TA 3/5-196-C07-160-SD		J	UJ	5U,B																

Validated By: [signature] **Date:** 08/07/03

Site: Site 196 **ARCOC:** 606401, 606402, 606403 and 606404 **Data:** Organic

Sample ID	All VOC (8260B) TAL compounds except:	78-93-3 (2-butanone)	67-64-1 (acetone)	75-09-2 (methylene chloride)	All SVOC (8270C) TAL compounds except:	117-81-7 (bis(2-ethylhexyl)phthalate	MP34 (m,p-methylphenol)	87-86-5 (pentachlorophenol)	95-95-4 (2,4,5-trichlorophenol)	59-50-7 (4-chloro-3-methylphenol)	95-57-8 (2-chlorophenol)	108-95-2 (phenol)	95-48-7 (2-methylphenol)	88-75-5 (2-nitrophenol)	105-67-9 (2,4-dimethylphenol)	88-06-2 (2,4,6-trichlorophenol)	51-28-5 (2,4-dinitrophenol)	120-83-2 (2,4-dichlorophenol)	534-52-1 (4,6-dinitro-2-methylphenol)	TPH (8015)
062051-001 TA 3/5-190-OX-TB	P2	UJ,A,P2	20UJ,B,P2	6.1U,B,P2																
062435-001 TA 3/5-190-OX-EB	P2	UJ,A,P2	20UJ,B,P2	5.5U,B,P2																
062434-001 TA 3/5-190-OX-EB						10U,B	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	
062434-R01 TA 3/5-190-OX-EB-RE					UJ,HT	10UJ,B,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	All QC acceptance criteria were met. No data will be qualified.
062042-001 TA 3/5-196-C03-120-SS		J	20UJ,B	11U,B																
062043-001 TA 3/5-196-C04-130-SS			20UJ,B																	
062045-001 TA 3/5-196-C05-140-SS			29UJ,B																	
062046-001 TA 3/5-196-C06-150-SS			34UJ,B																	
062038-001 TA 3/5-196-C01-100-SS			20UJ,B	5U,B																
062041-001 TA 3/5-196-C02-110-SS	UJ	UJ	32UJ,B	5UJ,B																
062039-001 TA 3/5-196-C02-110-SD		J	20UJ,B	5U,B																
062048-001 TA 3/5-196-C07-160-SS		J	20UJ,B	5U,B																
062049-001 TA 3/5-196-C07-160-SD		J	UJ	5U,B																

Validated By: D Mal **Date:** 08/07/03

Site: Site 196 **ARCOC:** 606401, [illegible]02, 606403 and 606404 **Data:** [illegible]ic

Sample ID	All VOC (8260B) TAL compounds except:	78-93-3 (2-butanone)	67-64-1 (acetone)	75-09-2 (methylene chloride)	All SVOC (8270C) TAL compounds except:	117-81-7 (bis(2-ethylhexyl)phthalate	MP34 (m,p-methylphenol)	87-86-5 (pentachlorophenol)	95-95-4 (2,4,5-trichlorophenol)	59-50-7 (4-chloro-3-methylphenol)	95-57-8 (2-chlorophenol)	108-95-2 (phenol)	95-48-7 (2-methylphenol)	88-75-5 (2-nitrophenol)	105-67-9 (2,4-dimethylphenol)	88-06-2 (2,4,6-trichlorophenol)	51-28-5 (2,4-dinitrophenol)	120-83-2 (2,4-dichlorophenol)	534-52-1 (4,6-dinitro-2-methylphenol)	TPH (8015)
062051-001 TA 3/5-190-OX-TB	P2	UJ,A,P2	20UJ,B,P2	6.1U,B,P2																All QC acceptance criteria were met. No data will be qualified.
062435-001 TA 3/5-190-OX-EB	P2	UJ,A,P2	20UJ,B,P2	5.5U,B,P2																
062434-001 TA 3/5-190-OX-EB						10U,B	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	R,A1	
062434-R01 TA 3/5-190-OX-EB-RE					UJ,HT	10UJ,B,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	UJ,HT	
062042-001 TA 3/5-196-C03-120-SS		J	20UJ,B	11U,B																
062043-001 TA 3/5-196-C04-130-SS			20UJ,B																	
062045-001 TA 3/5-196-C05-140-SS			29UJ,B																	
062046-001 TA 3/5-196-C06-150-SS			34UJ,B																	
062038-001 TA 3/5-196-C01-100-SS			20UJ,B	5U,B																
062041-001 TA 3/5-196-C02-110-SS	UJ	UJ	32UJ,B	5UJ,B																
062039-001 TA 3/5-196-C02-110-SD		J	20UJ,B	5U,B																
062048-001 TA 3/5-196-C07-160-SS		J	20UJ,B	5U,B																
062049-001 TA 3/5-196-C07-160-SD		J	UJ	5U,B																

Validated By: [signature] **Date:** 08/07/03

Data Validation Summary

Site/Project: SIK 196 Project/Task #: 7219.02.02.05 # of Samples: 24 & 3 Matrix: Soil & H2O

AR/COC #: 606401, -402, -403, -404 Laboratory Sample IDs: FSF130271 - 001 thru - 027

Laboratory: STSL

SDG #: FSF130271

QC Element	Analysis									
	Organics TPH				Inorganics				RAD	Other
	VOC	SVOC	~~Pesticide/PCB~~	HPLC (HE)	ICP/AES	GFAA/AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓ / ✓ / UJ, HT	✓	NA						
2. Calibrations	J, UJ / J, UJ	✓	✓							
3. Method Blanks	U, B / U, B	✓ / U, B	✓							
4. MS/MSD	✓ / P2	✓	✓							
5. Laboratory Control Samples	✓ / UJ, A	✓	✓							
6. Replicates										
7. Surrogates	✓	✓	✓							
8. Internal Standards	J, UJ / ✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample										
11. ICP Serial Dilution										
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	TB, EB Field dup	EB Field dup	Field dup.							

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other: ______

Reviewed By: [signature] Date: 06.08.03

Volatile Organics (SW 846 Method 8260)

Site/Project: 31k 196 AR/COC #: 606401, -02, -03, -04 # of Samples: 9 Matrix: Soils

Laboratory: STSL SDG #: F3F130271 Laboratory Sample IDs: F3F130271 - 001 thru - 009

Methods: SW 846 8260B Batch #s: ② 3178293 (SA 1, 5-9) ① 3175173 (SA 2-4)

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05 1	Calib. RF 2	Calib. RSD/R² <20%/0.99 1	Calib. RSD/R² 2	CCV %D 20% 1	CCV %D 2	Method Blks 1.	Method Blks 2.	LCS 1.	LCSD 2	LCS RPD	MS 1	MSD 1	MS RPD 1	Field Dup. RPD	-027 Equip. Blanks	-025 Trip Blanks	MS 2	MSD 2	RPD 2
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓	✓	NA	✓	✓	76	82-129 78	✓
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																			✓	✓	
2	79-00-5	1,1,2-trichloroethane	✓	0.10																					
1	75-34-3	1,1-dichloroethane	✓	0.10																					
1	75-35-4	1,1-dichloroethene	✓	0.20																					
1	107-06-2	1,2-dichloroethane	✓	0.10							-21														
1	540-59-0	1,2-dichloroethene(total)	✓	0.01							✓														
1	78-87-5	1,2-dichloropropane	✓	0.01							✓														
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01							-34				71	(78-145)									
1	110-75-8	2-chloroethyl vinyl ether									✓				✓										
2	591-78-6	2-hexanone (MBK)	✓	0.01							✓														
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10							✓														
1	67-64-1	acetone(10xblk)	✓	0.01				34	33		-32	4.1J	25								6.0 JB	5.0 JB			
1	71-43-2	benzene	✓	0.50				✓	✓		✓	✓	✓								✓	✓			
1	75-27-4	bromodichloromethane	✓	0.20											83 (65-120)										
3	75-25-2	bromoform	✓	0.10											✓										
1	74-83-9	bromomethane	✓	0.10																					
1	75-15-0	carbon disulfide	✓	0.10																					
1	56-23-5	carbon tetrachloride	✓	0.10																					
2	108-90-7	chlorobenzene	✓	0.50																					
1	75-00-3	chloroethane	✓	0.01																					
1	67-66-3	chloroform	✓	0.20																					
1	74-87-3	chloromethane	✓	0.10																					
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20															32						
2	124-48-1	dibromochloromethane	✓	0.10															✓						
2	100-41-4	ethylbenzene	✓	0.10																					
1	75-09-2	methylene chloride (10xblk)	✓	0.01									4.5J								5.5 B	6.1 B			
2	100-42-5	styrene	✓	0.30									✓								✓	✓			
2	127-18-4	tetrachloroethene	✓	0.20																					
2	108-88-3	toluene(10xblk)	✓	0.40																					
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																					
1	79-01-6	trichloroethene	✓	0.30														41	✓18						
1	75-01-4	vinyl chloride	✓	0.10														✓ (65-129)							
2	1330-20-7	xylenes(total)	✓	0.30																					

Comments: 33 compounds
MB 33
LCS 37 compounds
MS/MSD 37

Notes: Shaded rows are RCRA compounds.
Form 1 SA1 ?
SA - 38 compounds SA - 33
m,p - xylene
o - xylene

Reviewed By: [signature] Date: 07.28.03

Form 1 MB only 33 SA 3175173 3178293

② 3178293 MS = 001

Volatile Organics

Site/Project: ______ AR/COC #: 606401, -02, -03, -04 Batch #s: ______

Laboratory: ______ SDG #: ______ # of Samples: ______ Matrix: ______

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
FSF130271 - 006	✓	✓	✓	> 1126432 801679		> 956717 699108		> 625549 443110	
				>25% <50%		>25% <50%		>25% <50%	

SMC 1: 4-Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8
4. 1,2-Dichloroethane-d4

IS 1: Fluorobenzene
IS 2: Chlorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments: 1 3175173 SA 234
MSF I Cal 06/23 → 06/23 10:10 → 13.35
CCV 6/23 17.33

2 3178293 SA 1, 5-9
MS4 I Cal 04/25 → 5/18 16:32 → 22:4
CCV 6/25 1.24

Volatile Organics (SW 846 Method 8260)

Site/Project: SIK 196 AR/COC #: 606404 # of Samples: 2 Matrix: H2O

Laboratory: STSL SDG #: F3F130271 Laboratory Sample IDs: F3F130271 - 025 (TB) & - 027 (EB)

Methods: SW846 8260B Batch #s: 3177229

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks	MBx 10		
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓											
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30																	
2	79-00-5	1,1,2-trichloroethane	✓	0.10																	
1	75-34-3	**1,1-dichloroethane**	✓	0.10																	ICal/CCV
1	75-35-4	**1,1-dichloroethene**	✓	0.20																	J
1	107-06-2	**1,2-dichloroethane**	✓	0.10				-22													
1	540-59-0	**1,2-dichloroethene(total)**	✓	0.01				✓													
1	78-87-5	**1,2-dichloropropane**	✓	0.01				✓													20U, B
1	78-93-3	**2-butanone (MEK) (10xblk)**	✓	0.01				-43		62	(73-150)										RL=20
1	110-75-8	2-chloroethyl vinyl ether						✓		✓											<10X
2	591-78-6	2-hexanone (MBK)	✓	0.01				-25													>DL <RL
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10				-25													>DL <RL
1	67-64-1	**acetone(10xblk)**	✓	0.01			33	-38.5	4.2J										42	25	
1	71-43-2	**benzene**	✓	0.50			✓	✓												27	20U, B
1	75-27-4	bromodichloromethane	✓	0.20																	
3	75-25-2	bromoform	✓	0.10																	
1	74-83-9	bromomethane	✓	0.10																	
1	75-15-0	carbon disulfide	✓	0.10																	
1	56-23-5	**carbon tetrachloride**	✓	0.10																	
2	108-90-7	**chlorobenzene**	✓	0.50																	
1	75-00-3	chloroethane	✓	0.01																	LT J
1	67-66-3	**chloroform**	✓	0.20																	~~ICal/CCV~~
1	74-87-3	chloromethane	✓	0.10																	
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20																	<10XB
2	124-48-1	dibromochloromethane	✓	0.10																	>RL
2	100-41-4	ethylbenzene	✓	0.10															45	25	6.1U, B
1	75-09-2	methylene chloride (10xblk)	✓	0.01					4.5J											27	~~[illegible] J~~
2	100-42-5	styrene	✓	0.30																	>RL
2	127-18-4	**tetrachloroethene**	✓	0.20																	
2	108-88-3	toluene(10xblk)	✓	0.40																	5.5U, B
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10																	
1	79-01-6	**trichloroethene**	✓	0.30																	
1	75-01-4	**vinyl chloride**	✓	0.10																	
2	1330-20-7	xylenes(total)	✓	0.30																	

Comments: SA 33 compounds
MB 63 compounds
LCS 37

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 07.24.03

Volatile Organics

Site/Project: ______ AR/COC #: (606401, -02, -03)-04 Batch #s: ______

Laboratory: ______ SDG #: ______ # of Samples: ______ Matrix: ______

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT

SMC 1: Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

IS 1: Fluorobenzene
IS 2: Chlorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments: 25 Sampled 6.11 16.00
Analysed 6.25 14.59 ok.

Additional compounds on TB & FB — not reported for soils

Volatile Organ (SW 846 Method 8260)

Site/Project: ______ AR/COC #: ______ # of Samples: ______ Matrix: ______

Laboratory: ______ Laboratory Report #: ______ Laboratory Sample IDs: ______

Methods: ______ Batch #s: ______

IS	CAS #	Name	TCL	Min RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
2	630-20-6	1,1,1,2-Tetrachloroethane	✓																	
1	71-55-6	1,1,1-Trichloroethane		0.10																
3	79-34-5	1,1,2,2-Tetrachloroethane		0.30																
2	79-00-5	1,1,2-Trichloroethane		0.10																
1	75-34-3	1,1-Dichloroethane		0.10																
1	75-35-4	1,1-Dichloroethene		0.20																
1	563-58-6	1,1-Dichoropropene	✓																	
3	87-61-6	1,2,3-Trichlorobenzene	✓						3.0J											
3	96-18-4	1,2,3-Trichloropropane	✓																	
3	120-82-1	1,2,4-Trichlorobenzene	✓						1.4J											
3	95-63-6	1,2,4-Trimethylbenzene	✓																	
3	96-12-8	1,2-Dibromo-3-chloropropane	✓																	
2	106-93-4	1,2-Dibromoethane (EDB)	✓																	
3	95-50-1	1,2-Dichlorobenzene	✓																	
1	107-06-2	1,2-Dichloroethane		0.10																
1	78-87-5	1,2-Dichloropropane		0.01																
3	108-67-8	1,3,5-Trimethylbenzene	✓																	
3	541-73-1	1,3-Dichlorobenzene	✓																	
2	142-28-9	1,3-Dichloropropane	✓	0.01																
3	106-46-7	1,4-Dichlorobenzene	✓																	
	107-04-0	1-Bromo-2-chloroethane																		
1	594-20-7	2,2-Dichloropropane	✓																	
1	78-93-3	2-Butanone (MEK) (10xblk)		0.01																
1	126-99-8	2-Chloro-1, 3-butadiene																		
1	110-75-8	2-Chloroethyl vinyl ether																		
3	95-49-8	2-Chlorotoluene	✓																	
2	591-78-6	2-Hexanone (MBK)		0.01																
3	106-43-4	4-Chlorotoluene	✓																	
3	99-87-6	4-Isopropyltoluene	✓																	
2	108-10-1	4-Methyl-2-pentanone (MIBK)		0.10																
1	67-64-1	acetone(10xblk)		0.01																
1	75-05-8	Acetonitrile																		
1	107-02-8	Acrolein																		
1	107-13-1	Acrylonitrile																		
1	107-05-1	Allyl chloride																		
1	71-43-2	Benzene		0.50																

Reviewed By: ______ Date: ______

Volatile Organics

Site/Project: ______ AR/COC #: ______ Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
3	108-86-1	Bromobenzene	✓																	
1	74-97-5	Bromochloromethane	✓																	
1	75-27-4	Bromodichloromethane		0.20																
3	75-25-2	Bromoform																		
1	74-83-9	Bromomethane		0.10																
1	75-15-0	Carbon disulfide		0.10																
1	56-23-5	Carbon tetrachloride		0.10																
2	108-90-7	Chlorobenzene		0.50																
1	75-00-3	Chloroethane		0.01																
1	67-66-3	Chloroform		0.20																
1	74-87-3	Chloromethane		0.10																
1	156-59-2	cis-1,2-Dichloroethene																		
1	10061-01-5	cis-1,3-Dichloropropene		0.20																
2	124-48-1	Dibromochloromethane		0.10																
1	74-95-3	Dibromomethane	✓																	
1	75-71-8	Dichlorodifluoromethane	✓																	
2	97-63-2	Ethyl methacrylate	✓																	
2	100-41-4	Ethylbenzene		0.10																
3	87-68-3	Hexachlorobutadiene	✓																	
1	74-88-4	Iodomethane																		
3	98-82-8	Isopropylbenzene	✓																	
1	80-62-6	Methyl methacrylate																		
1	1634-04-4	Methyl tert-butyl ether (MTBE)																		
1	75-09-2	Methylene chloride (10xblk)		0.01																
3	91-20-3	Naphthalene	✓						2.0J											
3	104-51-8	n-Butylbenzene	✓																	
3	103-65-1	n-Propylbenzene																		
2	95-47-6	o-Xylene																		
2	106-42-3, 108-38-3	p/m-Xylene																		
1	107-12-0	Propionitrile																		
3	135-98-8	sec-Butylbenzene	✓																	
2	100-42-5	Styrene		0.30																
3	98-06-6	tert-Butylbenzene	✓																	
2	127-18-4	Tetrachloroethene		0.20																
3	109-99-9	Tetrahydrofuran																		
2	108-88-3	toluene(10xblk)		0.40																
1	156-60-5	trans-1,2-Dichloroethene																		
2	10061-02-6	trans-1,3-Dichloropropene		0.10																
3	110-57-6	trans-1,4-dichloro-2-Butene																		
1	79-01-6	Trichloroethene		0.30																

Isobutyl Alc.

Semivolatile Organics (SW 846 Method 8270)

Site/Project: Site 196 AR/COC #: 606401, -02, -03, -04 Laboratory Sample IDs: FSF130271 - 010 thru - 018 (Soil)

Laboratory: STSL Laboratory Report #: SDG # FSF130271

Methods: SW846 8270C

# of Samples: ~~8~~ LT 9 Matrix: Soils Batch #s: 3169337

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/R² <20%/0.99	CCV %D 20%	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD (15 & 16, 17 & 18)	Equip. Blanks	Field Blanks		
3	BN	95-94-3	1,2,4,5-Tetrachlorobenzene	✓		NA	✓ LT ✓	✓ ✓	✓ ✓	✓		NA					LT ✓	✓	NA		
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
1	BN	95-50-1	1,2-Dichlorobenzene	✓	0.4			✓	✓ ✓												
4	BN	99-35-4	1,3,5-Trinitrobenzene	✓	✓			✓	✓												
1	BN	541-73-1	1,3-Dichlorobenzene	✓	0.6			✓	✓ ✓												
3	BN	99-65-0	1,3-Dinitrobenzene	✓				✓	✓												
1	BN	106-46-7	1,4-Dichlorobenzene	✓	0.5			✓	✓ ✓												
3	BN	130-15-4	1,4-Naphthoquinone	✓				✓	✓												
3	BN	134-32-7	1-Naphthylamine	✓				✓	✓												
3	A	58-90-2	2,3,4,6-Tetrachlorophenol	✓				✓	✓ ✓												
3	A	95-95-4	2,4,5-Trichlorophenol	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
3	A	88-06-2	2,4,6-Trichlorophenol	✓	0.2			✓	✓		✓			✓	✓	✓					
2	A	120-83-2	2,4-Dichlorophenol	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
2	A	105-67-9	2,4-Dimethylphenol	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
3	A	51-28-5	2,4-Dinitrophenol	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
3	BN	121-14-2	2,4-Dinitrotoluene	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
~~2~~	~~A~~	~~87-65-0~~	~~2,6-Dichlorophenol~~	✓				✓	✓												
3	BN	606-20-2	2,6-Dinitrotoluene	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
5	BN	53-96-3	2-Acetylaminofluorene	✓				✓	✓												
3	BN	91-58-7	2-Chloronaphthalene	✓	0.8			✓	✓ ✓												
1	A	95-57-8	2-Chlorophenol	✓	0.8			✓	✓ ✓		✓			✓	✓	✓					
2	BN	91-57-6	2-Methylnaphthalene	✓	0.4			✓	✓ ✓		✓			✓	✓	✓					
1	A	95-48-7	2-Methylphenol (o-cresol)	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
3	BN	91-59-8	2-Naphthylamine	✓				✓	✓												
3	BN	88-74-4	2-Nitroaniline	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
2	A	88-75-5	2-Nitrophenol	✓	0.1			✓	✓ ✓		✓			✓	✓	✓					

Notes: Shaded rows are RCRA compounds.

Comments: > 100 compounds Form 1 107

MB ~~?~~ LT > 100 compounds. in criteria

Reviewed By: [signature] Date: 08.06.03

Semivolatile Organics

Site/Project: ______ AR/COC #: 606401-02, -03, -04 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
						1 2	>.05 1 2	<20%/ /0.99 1 2	20% 1 2 3												
1	BN	109-06-8	2-Picoline	✓		NA	✓	✓ ✓	✓	✓		NA					✓	✓	NA		
5	BN	119-93-7	~~3,3'-Dimethylbenzidine~~	✓				✓	✓												
5	BN	91-94-1	3,3'-Dichlorobenzidine	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
1	A	108-39-4, 106-44-5	3,4-methylphenol (m/p cresol)	✓	0.6			✓	✓ ✓		✓			✓	✓	✓					
6	BN	56-49-5	3-Methylcholanthrene	✓				✓	✓												
3	BN	99-09-2	3-Nitroaniline	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
4	A	534-52-1	4,6-Dinitro-2-methylphenol	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
4	BN	92-67-1	4-Aminobiphenyl	✓				✓	✓												
4	BN	101-55-3	4-Bromophenyl-phenylether	✓	0.1			✓	✓ ✓		✓			✓	✓	✓					
2	A	59-50-7	4-Chloro-3-methylphenol	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
2	BN	106-47-8	4-Chloroaniline	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
3	BN	7005-72-3	4-Chlorophenyl-phenylether	✓	0.4			✓	✓ ✓		✓			✓	✓	✓					
1	A	106-44-5	4-Methylphenol (p-cresol)					-													
3	BN	100-01-6	4-Nitroaniline	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
3	A	100-02-7	4-Nitrophenol	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
5	BN	57-97-6	7,12-Dimethylbenzo(a)anthracene	✓				✓	✓												
3	BN	83-32-9	Acenaphthene	✓	0.9			✓	✓ ✓		✓			✓	✓	✓					
3	BN	208-96-8	Acenaphthylene	✓	0.9			✓	✓ ✓		✓			✓	✓	✓					
1	BN	98-86-2	Acetophenone	✓				✓	✓												
1	BN	62-53-3	Aniline	✓				✓	✓ ✓												
4	BN	120-12-7	Anthracene	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
5	BN	92-87-5	Benzidine	✓				✓	✓ ✓												
5	BN	56-55-3	Benzo(a)anthracene	✓	0.8			✓	✓ ✓		✓			✓	✓	✓					
6	BN	50-32-8	Benzo(a)pyrene	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
6	BN	205-99-2	Benzo(b)fluoranthene	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
6	BN	191-24-2	Benzo(g,h,i)perylene	✓	0.5			✓	✓ ✓		✓			✓	✓	✓					
6	BN	207-08-9	Benzo(k)fluoranthene	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
1	A	100-51-6	Benzyl Alcohol	✓				✓	✓ ✓												
2	BN	111-91-1	bis(2-Chloroethoxy)methane	✓	0.3			✓	✓ ✓		✓			✓	✓	✓					
1	BN	111-44-4	bis(2-Chloroethyl)ether	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					

Semiv[redacted]ile Organics

Site/Project: ____________ AR/COC #: 606401, -02, -03, -04 Batch #s: ____________

Laboratory: ____________ Laboratory Report #: ____________ # of Samples: ____________ Matrix: ____________

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Equip Field Blanks -RE		
						1 2	>.05 1 2	<20%/ /0.99 2	20% 1 2 3												
1	BN	108-60-1	bis(2-chloroisopropyl)ether	✓	0.01	NA	✓ ✓	✓ ✓	✓ ✓ ✓	✓	✓	NA		✓	✓	✓	✓	✓	✓		
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	✓	0.01			✓	✓ ✓		✓			✓	✓	✓		9.5J,B	8.7J,B		
5	BN	85-68-7	Butylbenzylphthalate	✓	0.01			✓	✓ ✓		✓			✓	✓	✓		✓	✓		
4	BN	86-74-8	Carbazole	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
5	BN	510-15-6	Chlorobenzilate	✓				✓	✓												
5	BN	218-01-9	Chrysene	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
4	BN	2303-16-4	Diallate	✓				✓	✓												
6	BN	53-70-3	Dibenz(a,h)anthracene	✓	0.4			✓	✓ ✓		✓			✓	✓	✓					
3	BN	132-64-9	Dibenzofuran	✓	0.8			✓	✓ ✓		✓			✓	✓	✓					
3	BN	84-66-2	Diethylphthalate	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
3	BN	131-11-3	Dimethylphthalate	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
4	BN	84-74-2	Di-n-butylphthalate	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
6	BN	117-84-0	Di-n-octylphthalate	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
4	A	88-85-7	Dinoseb	✓				✓	✓												
3	BN	122-39-4	Diphenylamine																		
1	BN	62-50-0	Ethyl Methanesulfonate	✓				✓	✓												
4	BN	206-44-0	Fluoranthene	✓	0.6			✓	✓ ✓		✓			✓	✓	✓					
3	BN	86-73-7	Fluorene	✓	0.9			✓	✓ ✓		✓			✓	✓	✓					
4	BN	118-74-1	Hexachlorobenzene	✓	0.1			✓	✓ ✓		✓			✓	✓	✓					
2	BN	87-68-3	Hexachlorobutadiene	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
3	BN	77-47-4	Hexachlorocyclopentadiene	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
1	BN	67-72-1	Hexachloroethane	✓	0.3			✓	✓ ✓		✓			✓	✓	✓					
2	BN	1888-71-7	Hexachloropropene	✓				✓	✓												
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.5			✓	✓ ✓		✓			✓	✓	✓					
4	BN	465-73-6	Isodrin	✓				✓	✓												
2	BN	78-59-1	Isophorone	✓	0.4			✓	✓ ✓		✓			✓	✓	✓					
3	BN	120-58-1	Isosafrole	✓				✓	✓												
5	BN	143-50-0	Kepone	✓				59	✓ 72												
1	BN	66-27-3	Methyl methanesulfonate	✓				✓	✓ ✓												

X 2,2'-oxybis (1-Chloropropane)

Semivolatile Organics

Site/Project: ______ AR/COC #: 606401, -02, -03, -04 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept 1 2	Calib. RF >.05 1 2	Calib. RSD/ R^2 <20% / 0.99 1 2	CCV %D 20% 1 2 3	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
2	BN	91-20-3	Naphthalene	✓	0.7	NA	✓ ✓	✓ ✓	✓ ✓ ✓	✓	✓	NA		✓	✓	✓	✓	✓	NA		
2	BN	98-95-3	Nitrobenzene	✓	0.2			✓	✓ ✓		✓			✓	✓	✓					
NIHO 3	BN	99-55-8	N-Nitro-o-toluidine	✓				✓	✓												
1	BN	55-18-5	N-Nitrosodiethylamine	✓				✓	✓												
1	BN	62-75-9	N-Nitrosodimethylamine	✓				✓	✓ ✓												
2	BN	924-16-3	N-Nitrosodi-n-butylamine	✓				✓	✓												
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	✓	0.01			✓	✓ ✓		✓			✓	✓	✓					
1	BN	621-64-7	N-Nitroso-di-n-propylamine	✓	0.5			✓	✓ ✓		✓			✓	✓	✓					
1	BN	10595-95-6	N-Nitrosomethylethylamine	✓				✓	✓												
1	BN	100-75-4	N-Nitrosopiperidine	✓				✓	✓												
1	BN	930-55-2	N-Nitrosopyrrolidine	✓				✓	✓												
1	BN	95-53-4	o-Toluidine	✓				✓	✓												
5	BN	60-11-7	p-Dimethylaminoazobenzene	✓				✓	✓												
3	BN	608-93-5	Pentachlorobenzene	✓				✓	✓												
1	BN	76-01-7	Pentachloroethane	✓				✓	✓												
4	BN	82-68-8	Pentachloronitrobenzene	✓				✓	✓												
4	A	87-86-5	Pentachlorophenol	✓	0.1			✓	✓ ✓		✓			✓	✓	✓					
4	BN	62-44-2	Phenacetin	✓				✓	✓												
4	BN	85-01-8	Phenanthrene	✓	0.7			✓	✓ ✓		✓			✓	✓	✓					
1	A	108-95-2	Phenol	✓	0.8			✓	✓ ✓		✓			✓	✓	✓					
4	BN	23950-58-5	Pronamide	✓				✓	✓		✓			✓	✓	✓					
5	BN	129-00-0	Pyrene	✓	0.6			✓	✓ ✓		✓										
1	BN	110-86-1	Pyridine	✓				✓	✓ ✓												
2	BN	94-59-7	Safrole	✓				✓	✓												

Comments:

Semivo[illegible]le Organics

P[illegible] of 5

Site/Project: ______ AR/COC #: 606 401, -402, -403, -404 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
All in	criteria							

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d6 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Comments:

I Cal ① Sa 10 → 18 excl. 16
~~MSJ. 04/10 → 06/18 13:40 → 16:31~~ incorrect
04/10 → 06/19 13:42 → 18:44
② Sa 16

CCV ① 10 11 12 13 14 15
04/10 → 06/19 13 42 → 18.44
6/19 16.21 (70)
② 17 18
6/20 18.31 (12) 6/20 19.07 (37)
③ SA 16
6/26 2.44 6/26 3.17
4/10 → 6/25 13.42 18.14

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
IN CRITERIA												

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

Additional Appendix IX compounds

1,2-Diphenylhydrazine
1,4-Dioxane
1-Methylnaphthalene
4-Nitroquinoline-1-oxide
Aramite
Benzoic Acid
Dimethoate
Disulfoton
p-Phenylenediamine
Ethyl Methacrylate
Famphur
Hexachlorophene
Methapyrilene
Methoxychlor
Methyl Methacrylate
Methyl Parathion
a,a-Dimethylphenethylamine
N-Nitrosomorpholine
Parathion
Phorate
Sulfotepp
Thionazin
Tributylphosphate
Triethylphosphorothionate

NO 20r 2 20

Page 1 of 5

Semivolatile Organics (SW 846 Method 8270)

Site/Project: Site 196 AR/COC #: 606404 Laboratory Sample IDs: F3F130271 - 026 (GB)

Laboratory: STSL Laboratory Report #: F3F130271

fails acid surrogates

Methods: SW846 8270C * missing ~~all~~ 4 ~~acid~~ compounds

# of Samples: 1 Matrix: H2O Batch #s: ✓ 3167494 ① ② x 3174314 7H1 2x HT

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	LCS	LCSD	LCSD RPD
							>.05 2	<20%/ 0.99 2	20% 2	① ②	1	1	1							2	2	2
3	BN	95-94-3	1,2,4,5-Tetrachlorobenzene							✓ ✓				NA								
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.2																	
1	BN	95-50-1	1,2-Dichlorobenzene	✓	0.4																	
4	BN	99-35-4	1,3,5-Trinitrobenzene																			
1	BN	541-73-1	1,3-Dichlorobenzene	✓	0.6																	
3	BN	99-65-0	1,3-Dinitrobenzene																			
1	BN	106-46-7	1,4-Dichlorobenzene	✓	0.5																	
3	BN	130-15-4	1,4-Naphthoquinone																			
3	BN	134-32-7	1-Naphthylamine																			
3	A	58-90-2	2,3,4,6-Tetrachlorophenol																			139 (0-20)
3	A	95-95-4	2,4,5-Trichlorophenol	✓	0.2																	130 (0-20)
3	A	88-06-2	2,4,6-Trichlorophenol	✓	0.2																	64 (0-20)
2	A	120-83-2	2,4-Dichlorophenol	✓	0.2																	
2	A	105-67-9	2,4-Dimethylphenol	✓	0.2																(10-123) 0	200 (0-20)
3	A	51-28-5	2,4-Dinitrophenol	✓	0.01								96	(0-20)								
3	BN	121-14-2	2,4-Dinitrotoluene	✓	0.2																	
2	A	87-65-0	2,6-Dichlorophenol																			
3	BN	606-20-2	2,6-Dinitrotoluene	✓	0.2																	
5	BN	53-96-3	2-Acetylaminofluorene																			
3	BN	91-58-7	2-Chloronaphthalene	✓	0.8																	43 (0-20)
1	A	95-57-8	2-Chlorophenol	✓	0.8																	
2	BN	91-57-6	2-Methylnaphthalene	✓	0.4																	34 (0-20)
1	A	95-48-7	2-Methylphenol (o-cresol)	✓	0.7																	
3	BN	91-59-8	2-Naphthylamine																			
3	BN	88-74-4	2-Nitroaniline	✓	0.01																	
2	A	88-75-5	2-Nitrophenol	✓	0.1																(10-115) 0	200 (0-20)

Notes: Shaded rows are RCRA compounds.

Comments: compounds 65
MB 65
LCS/LCSD 60

Reviewed By: [signature] Date: 08.06.03

Semivolatile Organics

Site/Project: ______ AR/COC #: 606404 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

IS	BNA	CAS #	NAME	T C L	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	LCW	LCSD	RPD
							>.05 1 2	<20% / 0.99 2	20% 1 2	1 2	1	1	1							2	2	2
1	BN	109-06-8	2-Picoline							✓ ✓												
5	BN	119-93-7	3,3'-Dimethylbenzidine																			
5	BN	91-94-1	3,3'-Dichlorobenzidine	X ✓	0.01																	58 (0-20)
1	A	108-39-4, 106-44-5	3,4-methylphenol (m,p-cresol)	✓	0.6																	
6	BN	56-49-5	3-Methylcholanthrene																			
3	BN	99-09-2	3-Nitroaniline	X ✓	0.01																(10-127) 0	200 (0-20)
4	A	534-52-1	4,6-Dinitro-2-methylphenol	X ✓	0.01								56 (0-20)									
4	BN	92-67-1	4-Aminobiphenyl																			
4	BN	101-55-3	4-Bromophenyl-phenylether	X ✓	0.1																	70 (0-20)
2	A	59-50-7	4-Chloro-3-methylphenol	X ✓	0.2																	
2	BN	106-47-8	4-Chloroaniline	X ✓	0.01																	
3	BN	7005-72-3	4-Chlorophenyl-phenylether	X ✓	0.4																	
1	A	106-44-5	4-Methylphenol (p-cresol)																			
3	BN	100-01-6	4-Nitroaniline	X ✓	0.01																(10-116) 0	200 (0-20)
3	A	100-02-7	4-Nitrophenol	X ✓	0.01								40 (0-20)									
5	BN	57-97-6	7,12-Dimethylbenzo(a)anthracene																			
3	BN	83-32-9	Acenaphthene	X ✓	0.9																	
3	BN	208-96-8	Acenaphthylene	X ✓	0.9																	
1	BN	98-86-2	Acetophenone																			
1	BN	62-53-3	Aniline																			
4	BN	120-12-7	Anthracene	X ✓	0.7																	
5	BN	92-87-5	Benzidine																			
5	BN	56-55-3	Benzo(a)anthracene	X ✓	0.8																	
6	BN	50-32-8	Benzo(a)pyrene	X ✓	0.7																	
6	BN	205-99-2	Benzo(b)fluoranthene	X ✓	0.7																	
6	BN	191-24-2	Benzo(g,h,i)perylene	X ✓	0.5																	
6	BN	207-08-9	Benzo(k)fluoranthene	✓	0.7																	
1	A	100-51-6	Benzyl Alcohol																			
2	BN	111-91-1	bis(2-Chloroethoxy)methane	X ✓	0.3																	
1	BN	111-[illegible]	bis(2-Chloroethyl)ether	X ✓	0.7																	

NJ 20F 2 FB

Semivolatile Organics

Page of 5

Site/Project: ______ AR/COC #: 606404 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	LCS	LCSD
							>.05 1 2	<20% / 0.99 1 2	20% 1 2	1 2	1	1	1							2	2
1	BN	108-60-1	bis(2-chloroisopropyl)ether *	X✓	0.01					✓ ✓											
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	X✓	0.01					12 4.3J											
5	BN	85-68-7	Butylbenzylphthalate	X✓	0.01					✓ ✓											
4	BN	86-74-8	Carbazole	X✓	0.01																
5	BN	510-15-6	Chlorobenzilate (p-)	X✓																	
5	BN	218-01-9	Chrysene	X✓	0.7																
4	BN	2303-16-4	Diallate																		
6	BN	53-70-3	Dibenz(a,h)anthracene	X✓	0.4																
3	BN	132-64-9	Dibenzofuran	X✓	0.8																
3	BN	84-66-2	Diethylphthalate	X✓	0.01					3.6J											
3	BN	131-11-3	Dimethylphthalate	X✓	0.01					✓											
4	BN	84-74-2	Di-n-butylphthalate	X✓	0.01																
6	BN	117-84-0	Di-n-octylphthalate	X✓	0.01																
4	A	88-85-7	Dinoseb																		
3	BN	122-39-4	Diphenylamine																		
1	BN	62-50-0	Ethyl Methanesulfonate																		
4	BN	206-44-0	Fluoranthene	X✓	0.6																
3	BN	86-73-7	Fluorene	X✓	0.9																
4	BN	118-74-1	Hexachlorobenzene	X✓	0.1																
2	BN	87-68-3	Hexachlorobutadiene	X✓	0.01																
3	BN	77-47-4	Hexachlorocyclopentadiene	X✓	0.01						✓ ~~27~~ LT		33	(0-20)							
1	BN	67-72-1	Hexachloroethane	X✓	0.3																
2	BN	1888-71-7	Hexachloropropene																		
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	X✓	0.5																
4	BN	465-73-6	Isodrin																		
2	BN	78-59-1	Isophorone	X✓	0.4																
3	BN	120-58-1	Isosafrole																		
5	BN	143-50-0	Kepone																		
1	BN	66-27-3	Methyl methanesulfonate																		

RPD 2

* 2,2-oxybis

Semivolatile Organics

Site/Project: ______ AR/COC #: 606 404 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	LCS	LCSD	RPD
							>.05 2	<20% / 0.99 2	20% 2	1 2	1	1	1							2	2	2
2	BN	91-20-3	Naphthalene	√	0.7					√ √												
2	BN	98-95-3	Nitrobenzene	√	0.2																	
3	BN	99-55-8	N-Nitro-o-toluidine																			
1	BN	55-18-5	N-Nitrosodiethylamine																			
1	BN	62-75-9	N-Nitrosodimethylamine																			
2	BN	924-16-3	N-Nitrosodi-n-butylamine																			
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	√	0.01																	
1	BN	621-64-7	N-Nitroso-di-n-propylamine	√	0.5																	
1	BN	10595-95-6	N-Nitrosomethylethylamine																			
1	BN	100-75-4	N-Nitrosopiperidine																			
1	BN	930-55-2	N-Nitrosopyrrolidine																			
1	BN	95-53-4	o-Toluidine																			
5	BN	60-11-7	p-Dimethylaminoazobenzene																			
3	BN	608-93-5	Pentachlorobenzene																			
1	BN	76-01-7	Pentachloroethane																			
4	BN	82-68-8	Pentachloronitrobenzene																			
4	A	87-86-5	Pentachlorophenol	√	0.1																110-120 6	169(0-20)
4	BN	62-44-2	Phenacetin																			
4	BN	85-01-8	Phenanthrene	√	0.7																	89(0-20)
1	A	108-95-2	Phenol	√	0.8					H5J												
4	BN	23950-58-5	Pronamide							√												
5	BN	129-00-0	Pyrene	√	0.6																	
1	BN	110-86-1	Pyridine																			
2	BN	94-59-7	Safrole																			

Comments:

Semiv[redacted]ile Organics

[redacted]

Site/Project: ______ AR/COC #: 606404 Batch #s: ______

Laboratory: ______ Laboratory Report #: ______ # of Samples: ______ Matrix: ______

requested Ical dated same as CCV.

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
LCSD	✓	✓	✓	✓	✓	0		
-026	✓	✓	✓	0	0	0		

SMC 1: Nitrobenzene-d5 (BN) SMC 2: 2-Fluorobiphenyl (BN) SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d6 (A) SMC 5: 2-Fluorophenol (A) SMC 6: 2,4,6-Tribromophenol (A)
SMC 7: 2-2-Chlorophenol-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT

IS 1: 1,4-Dichlorobenzene-d4 (BN) IS 2: Naphthalene-d8 (BN) IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN) IS 5: Chrysene-d12 (BN) IS 6: Perylene-d12 (BN)

Additional Appendix IX compounds

1,2-Diphenylhydrazine
1,4-Dioxane
1-Methylnaphthalene
4-Nitroquinoline-1-oxide
Aramite
Benzoic Acid
Dimethoate
Disulfoton
p-Phenylenediamine
Ethyl Methacrylate
Famphur
Hexachlorophene
Methapyrilene
Methoxychlor
Methyl Methacrylate
Methyl Parathion
a,a-Dimethylphenethylamine
N-Nitrosomorpholine
Parathion
Phorate
Sulfotepp
Thionazin
Tributylphosphate
Triethylphosphorothionate

(2) MSJ I Cal. CCV 6/26 ✓ 2.44 Not on TAL ~~3.77~~ ~~2.50~~

(2) All detects J, HT All NDs UJ, HT

Comments: 3174314 LCSD ~~All acids had P g~~ √

LCS/LCSD 0/60 out 5/60 out. 13/60 RPDs out of criteria 4 0% Rec LCSO

(1) 65 compounds.

3167494 SA All Acids

All Acid ~~UJ~~ LT, HT. R, AI

LCS/LCSD 0/60 out 0/60 out 4/60 compounds RPD out of criteria (all acids)

√ ~~Add P to already qual data~~

Inst. MSK I Cal. 03/30 → 06/18
2,4 Dinitrophenol RSD 23 ✓
CCV 6/19 11.55 ~~12.85~~ not on TAL LT
(LCW, LCSO) only.

Inst MSJ I Cal. 4/10 → 6/19 13:4
CCV 6/19 14.47 16.21 ✓ 18:4

(1) SA -026

NO 2 of 2

Organics (supplemental)

Site/Project: Site 196 AR/COC #: 606401, -403, -404 # of Samples: Matrix: Soil

Laboratory: STSL Laboratory Report #: F3F130271 Laboratory Sample IDs: F3F130271 - 013, -019, -020, -021, -022, -023, -024

Methods: SW846 8015 (mod) Batch #s: 3170303

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks	Surrogate o-Terphenyl	
						>.05	<20% / 0.99	20%												
		TPH (as diesel)			NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	✓	NA	NA	181	MSD
																			(10 - 150)	
Not requested		Kerosene				✓	✓		✓											
Not validated		mineral Spirits				✓	✓		✓											
		INST ID	GCE																	
		I CAL	06/19	→	06/19			4:45	→	13:34										
		Low	Level		Std		100	ug/ml	(100		ppm)	→			10 000	ug/ml			3 Stds	Kerosene Mineral Spirits
					Diesel		Ox	= 1.9		Rx	=	25			ug/kg	(ppm)				
					Kerosene			25				25								
					Mineral	Spirits		25				25								
		CCV 1000 ug/ml.																		

Comments:

Notes: Shaded rows are RCRA compounds.

Dkhal 07/28/03

RECORDS CENTER CODE: ______

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: Site 196

PROJECT/TASK: 7219_02.02.05

SNL TASK LEADER: Langkopf

ORG/MS/CF0#: 6133/1087/CF042-03

SMO PROJECT LEAD: Palencia

SAMPLE SHIP DATE: 6/12/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
606401	STSL	F3F130271A		7/2/2003	X			
606402	STSL	F3F130271B		7/2/2003	X			
606403	STSL	F3F130271C		7/2/2003	X			
606404	STSL	F3F130271D		7/2/2003	X			

DATA PACKAGE TAT:		RUSH	x	NORMAL
CORRECTIONS REQUESTED BY/DATE:				
PROBLEM #/DATE CORRECTION RECEIVED:				
CVR COMPLETED BY/DATE:	W. Palencia		7/8/03	
FINAL TRANSMITTED TO/DATE:	Griffith		7/8/03	
SENT TO VALIDATION BY/DATE:	J. Conn		7/9/03	
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:	NT		08.07.03	
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE	J. Conn		7/9/03	
CD RECEIVED BY/DATE				
TO ERDMS OR RECORDS CENTER BY/DATE:				

COMMENTS:

Contract Verification Review (CVR)

Project Leader LANGKOPF | Project Name SITE 196 | Case No. 7219_02.02.05

AR/COC No. 606401, 606402, 606403 & 606404 | Analytical Lab SEVERN TRENT | SDG No. F3F130271A—D

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met		X	SVOC SAMPLE #062434-001 RE-EXTRACTED PAST HOLDING TIME DUE TO SURROGATE FALURES	X	
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples		X	2-BUTANONE & BROMODICHLOROMETHANE FAILED RECOVERY LIMITS FOR VOC LCS(soil) 2-BUTANONE FAILED RECOVERY LIMITS FOR VOC LCS(aq)
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	SURROGATE FOR TPH MSD OUTSIDE RECOVERY LIMITS
c) Matrix spike recovery data reported and met		X	TRICHLOROETHYLENE FAILED RECOVERY LIMITS FOR VOC MSD 1,1,1-TRICHLOROETHANE FAILED RECOVERY LIMITS FOR VOC MS/MSD
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	X		
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	RPD FOR CIS-1,3-DICHLOROPROPENE OUTSIDE ACCEPTANCE LIMITS
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	SEVERAL ANALYTES DETECTED IN VOC & SVOC METHOD BLANKS
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	ACETONE & METHYLENE CHLORIDE DETECTED IN VOC TRIP BLANK & EQUIPMENT BLANK BIS(2-ETHYLHEXYL) PHTHALATE DETECTED IN SVOC EQUIPMENT BLANK
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second c[illegible]n confirmation data provided for methods 8330 (high explosives) and 80[illegible]	N/A		

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
4.1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		
e) Instrument run logs provided	X		
4.2 GC/HPLC (8330 and 8010 and 8082)			
a) Initial calibration provided	X		
b) Continuing calibration provided	X		
c) Instrument run logs provided	X		
4.3 Inorganics (metals)			
a) Initial calibration provided	N/A		
b) Continuing calibration provided	N/A		
c) ICP interference check sample data provided	N/A		
d) ICP serial dilution provided	N/A		
e) Instrument run logs provided	N/A		
4.4 Radiochemistry			
a) Instrument run logs provided	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

If no, provide: nonconformance report or correction request number ________ and date correction request was submitted:-______________

Reviewed by: W. Palencia Date: 7-8-2003 Closed by:________________ Date:____________

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No. N/A

SMO Use

AR/COC 606401

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6/12/03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23401	SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO 21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		SEE ATTACHED Bottle ORDER
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓062038-001	TA 3/5-196-C01-100-SS	100	196	6/11/03	1335	S	SS	125ml	4c	G	SA	VOC(8260)	
✓062038-002	TA 3/5-196-C01-100-SS	100	196	6/11/03	1335	S	AG	250ml	4c	G	SA	SVOC(8270)	
✓062038-003	TA 3/5-196-C01-100-SS	100	196	6/11/03	1335	S	AG	125ml	4c	G	SA	TPH	
✓062041-001	TA 3/5-196-C02-110-SS	110	196	6/11/03	1400	S	SS	125ml	4c	G	SA	VOC(8260)	
✓062041-002	TA 3/5-196-C02-110-SS	110	196	6/11/03	1415	S	AG	250ml	4c	G	SA	SVOC(8270)	
✓062041-003	TA 3/5-196-C02-110-SS	110	196	6/11/03	1415	S	AG	125ml	4c	G	SA	TPH	
✓062039-001	TA 3/5-196-C02-110-SD	110	196	6/11/03	1400	S	SS	125ml	4c	G	~~SA~~ DU	VOC(8260)	
✓062039-002	TA 3/5-196-C02-110-SD	110	196	6/11/03	1415	S	AG	250ml	4c	G	~~SA~~ DU	SVOC(8270)	
✓062039-003	TA 3/5-196-C02-110-SD	110	196	6/11/03	1415	S	AG	125ml	4c	G	~~SA~~ DU	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/13/03
Entered by: JAY
QC inits. LCY

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	[initials]	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SG	Gram 6133/505-284-2588

		Org.	Date	Time			Org.	Date	Time
1.Relinquished by	[signature]	6134	6-12-03	0905	4.Relinquished by				
1. Received by	[signature]	6133	6/12/03	0905	4. Received by				
2.Relinquished by	[signature]	6133	6/12/03	1000	5.Relinquished by				
2. Received by					5. Received by				
3.Relinquished by					6.Relinquished by				
3. Received by					6. Received by				

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No.

SMO Use

AR/COC 606402

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6/12/03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23401	SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO 21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		SEE ATTACHED Bottle order
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓ 062042-001	TA 3/5-196-C03-120-SS	120	196	6/11/03 1430	S	SS	125ml	4c	G	SA	VOC(8260)	
✓ 062042-002	TA 3/5-196-C03-120-SS	120	196	6/11/03 1430	S	AG	250ml	4c	G	SA	SVOC(8270)	
✓ 062043-001	TA 3/5-196-C04-130-SS	130	196	6/11/03 1450	S	SS	125ml	4c	G	SA	VOC(8260)	
✓ 062043-002	TA 3/5-196-C04-130-SS	130	196	6/11/03 1450	S	AG	250ml	4c	G	SA	SVOC(8270)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

☐ Negotiated TAT

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/13/03
Entered by: JAC
QC inits. [illegible]

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No

*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]		Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SRG	Gram 6133/505-284-2588

1.Relinquished by [signature]	Org. 6134 Date 6-12-03 Time 0905	4.Relinquished by	Org.	Date	Time		
1. Received by [signature]	Org. 6133 Date 6/12/03 Time 0905	4. Received by	Org.	Date	Time		
2.Relinquished by	Org. Date Time	5.Relinquished by	Org.	Date	Time		
2. Received by	Org. Date Time	5. Received by	Org.	Date	Time		
3.Relinquished by	Org. Date Time	6.Relinquished by	Org.	Date	Time		
3. Received by	Org. Date Time	6. Received by	Org.	Date	Time		

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab Batch No. N/A

SMO Use

AR/COC 606403

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	06/12/03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23401	SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO 21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		SEE ATTACHED Bottle order
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV (available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓ 062045-001	TA 3/5-196-C05-140-SS	140	196	6/11/03	1510	S	SS	125ml	4c	G	SA	VOC(8260)	
✓ 062045-002	TA 3/5-196-C05-140-SS	140	196	6/11/03	1510	S	AG	250ml	4c	G	SA	SVOC(8270)	
✓ 062045-003	TA 3/5-196-C05-140-SS	140	196	6/11/03	1510	S	AG	125ml	4c	G	SA	TPH	
✓ 062046-001	TA 3/5-196-C06-150-SS	150	196	6/11/03	1520	S	SS	125ml	4c	G	SA	VOC(8260)	
✓ 062046-002	TA 3/5-196-C06-150-SS	150	196	6/11/03	1545	S	AG	250ml	4c	G	SA	SVOC(8270), TPH	

RMMA ☐ Yes ☑ No Ref. No.
Sample Disposal ☐ Return to Client ☑ Disposal by lab
Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT
Return Samples By:

Sample Tracking — Smo Use
Date Entered (mm/dd/yy) 06/13/03
Entered by: JAC
QC inits. LCY

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SG	Gram 6133/505-284-2588

	Org.	Date	Time		Org.	Date	Time
1. Relinquished by [signature]	6134	6-12-03	0905	4. Relinquished by			
1. Received by [signature]	6133	6/12/03	0905	4. Received by			
2. Relinquished by [signature]	6133	6/12/03	1030	5. Relinquished by			
2. Received by				5. Received by			
3. Relinquished by				6. Relinquished by			
3. Received by				6. Received by			

Internal Lab

Batch No. N/A

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC **606404**

SMO Use

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6/12/03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23401	SMO Authorization:	
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO 21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis	SEE ATTACHED Bottle ORDER	
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
✓062048-001	TA 3/5-196-C07-160-SS	160	196	6/11/03	1615	S	SS	125ml	4c	G	SA	VOC(8260)	
✓062048-002	TA 3/5-196-C07-160-SS	160	196	6/11/03	1630	S	AG	250ml	4c	G	SA	SVOC(8270	
✓062048-003	TA 3/5-196-C07-160-SS	160	196	6/11/03	1630	S	AG	125ml	4c	G	SA	TPH	
✓062049-001	TA 3/5-196-C07-160-SD	160	196	6/11/03	1630	S	SS	125ml	4c	G	~~SA~~ DU	VOC(8260)	
✓062049-002	TA 3/5-196-C07-160-SD	160	196	6/11/03	1630	S	AG	250ml	4c	G	DU ~~SA~~	SVOC(8270	
✓062049-003	TA 3/5-196-C07-160-SD	160	196	6/11/03	1630	S	AG	125ml	4c	G	~~SA~~ DU	TPH	
~~062050-001~~	~~TA 3/5-196-C08-170-SS~~	~~170~~	~~196~~			~~S~~	~~SS~~	~~125ml~~	~~4c~~	~~G~~	~~SA~~	~~VOC(8260)~~	
~~062050-002~~	~~TA 3/5-196-C08-170-SS~~	~~170~~	~~196~~			~~S~~	~~AG~~	~~250ml~~	~~4c~~	~~G~~	~~SA~~	~~SVOC(8270~~	
~~062050-003~~	~~TA 3/5-196-C08-170-SS~~	~~170~~	~~196~~			~~S~~	~~AG~~	~~125ml~~	~~4c~~	~~G~~	~~SA~~	~~TPH~~	
✓062051-001	TA 3/5-190-0X-TB		196	6/11/03	1600	L	G	3x40ml	HCL	G	TB	VOC(8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/13/03
Entered by: JAC
QC inits. ECL

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SLG	Gram 6133/505-284-2588

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-12-03	0905	4.Relinquished by			
1. Received by [signature]	6133	6/12/03	0905	4. Received by			
2.Relinquished by [signature]	6133	6/13/03	1030	5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

OFF-SITE LABORATORY
Analysis Request And Chain Of Custody (Continuation)

AR/COC- 606404

Project Name: SWMU 196 | Project/Task Manger: Brenda Langkopf | Project/Task No.: 7219.02.02.05

Location: Tech Area

Building: Room

Reference LOV (available at SMO)

Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062434-001	TA 3/5-190-0X-EB		196	6/11/03 1605	L	AG	2x1lt	4c	G	EB	SVOC(8270	
062435-001	TA 3/5-190-0X-EB		196	6/11/03 1610	L	G	3x40ml	HCL	G	EB	VOC(8260)	

Abnormal Conditions on Receipt

LAB USE

Recipient Initials______

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
Phone: 505-299-5201
Fax: 505-299-6744
Email: minteer@aol.com

MEMORANDUM

DATE: August 6, 2003

TO: File

FROM: Kenneth Salaz

SUBJECT: Organic Data Review and Validation - SNL
SWMU Site 196, ARCOC #606405/06/07/13/14/15,
STSL Lot #F3F170279, Case No. 7219.02.02.06

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM ER Project AOP 00-03.

Summary

All samples were prepared and analyzed with approved procedures using methods EPA8260B VOCs, EPA8270C SVOCs, and EPA8015 TPH. Problems were identified with the data package that result in the qualification of data.

1. VOC Analyses: For the aqueous and soil samples, the initial calibration relative standard deviations (RSDs) of acetone were greater than (>) 20% but less than (<) 0.01. The associated results of all samples except F3F170279-020, which is a trip blank (TB), were detects and, thus, will be qualified "J." It should be noted that these sample results required further qualification (see #2 below).

2. VOC Analyses: In the method blank for the aqueous and soil samples, acetone was detected. The associated results of all samples except F3F170279-020, which is a TB, were detects, <10X the blank concentration, < the reporting limit (RL). Thus, these sample results will be qualified "U,B" at the RL (20 ug/L or ug/kg). In the method blank for the soil samples, methylene chloride and trichloroethene were detected. All associated sample results which were detects <10X the blank concentration were also < the RL. Thus, these sample results will be qualified "U,B" at the RL (5 ug/kg).

   SVOC Analyses: In the method blank for the equipment blanks (EBs), bis(2-ethylhexyl)phthalate was detected. The associated result of sample F3F170279-034 was a detect, <10X the blank concentration, and < the RL. Thus, this sample result will be qualified "U,B" at the RL (10 ug/L).

3. VOC Analyses: For the EBs and TBs, no LCSD, MSD, or any other measure of precision was performed. Thus, all results for this sample will be qualified "P2."

Data are acceptable. QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times/Preservation

All Analyses: All samples were analyzed within the method specified holding times and properly preserved.

Calibration

VOC Analyses: The initial and continuing calibrations met QC acceptance criteria except as noted above in the Summary section and the following. For the soil samples, the continuing calibration verification (CCV) percent differences (%Ds) of 2-butanone and bromoform were >20% but <40%. However, all associated sample results were non-detect (ND) and, thus, will not be qualified.

SVOC/TPH Analyses: The initial and continuing calibrations met all QC acceptance criteria.

Blanks

VOC Analyses: No target analytes were detected in the blanks except as noted above in the Summary section and the following. In the MB for the EBs and TBs, methylene chloride was detected. In the TB, 1,2-dichloropropene was detected. However, all associated sample results were ND and, thus, will not be qualified.

SVOC Analyses: No target analytes were detected in the blanks except as noted above in the Summary section.

TPH Analysis: No target analytes were detected in the blank.

Surrogates

VOC/SVOC Analyses: All surrogate percent recoveries (%Rs) met QC acceptance criteria.

TPH Analysis: Surrogate %Rs met QC acceptance criteria except for the following. The surrogate %R for the MSD was > the QC acceptance limit. No sample data will be qualified as a result.

Internal Standards (ISs)

All Analyses: The IS areas and retention times (RTs) met all QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analyses

VOC Analyses: No MS/MSD were analyzed for the EBs and TBs, as noted above in the summary section. The MS/MSD analyses for the soil samples met QC acceptance criteria except for the following. The MSD %Rs of dibromochloromethane and trans-1,3-dichloroprpene were > the QC acceptance limits. However, all associated sample results were ND, and the MS %R and MSD RPD met QC acceptance criteria. Thus, no sample data will be qualified.

SVOC Analyses: No MS/MSD were analyzed for the EBs. An LCSD was analyzed as a measure of precision. No sample data will be qualified as a result. The MS/MSD analyses for the soil samples met all QC acceptance criteria. It should be noted that they were performed on an SNL sample of similar matrix from another SDG. No sample data will be qualified as a result.

TPH Analysis: The MS/MSD analyses met all QC acceptance criteria. It should be noted that they were performed on an SNL sample of similar matrix from another SDG. No sample data will be qualified as a result.

Laboratory Control Sample (LCS/LCSD) Analyses

VOC/TPH Analyses: The LCS analyses met all QC acceptance criteria. No LCSD analyses were performed. No sample data will be qualified as a result.

SVOC Analyses: The LCS/LCSD analyses for the EBs met all QC acceptance criteria. The LCS analysis for the soil samples met all QC acceptance criteria. No LCSD analysis was performed. No sample data will be qualified as a result.

Confirmation Analyses

All Analyses: No confirmation analyses were required for these methods.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported. No samples were diluted.

Other QC

VOC Analyses: A field duplicate, TBs, and EBs were submitted. However, there are no "required" review criteria for field duplicate analyses comparability. No field blank (FB) was submitted on the ARCOC.

SVOC Analyses: A field duplicate and EBs were submitted. However, there are no "required" review criteria for field duplicate analyses comparability. No FB was submitted on the ARCOC.

TPH Analysis: A field duplicate was submitted. However, there are no "required" review criteria for field duplicate analyses comparability. However, there are no "required" review criteria for field duplicate analyses comparability. No EB or FB was submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Sample Findings Summary

Site: SWMU Site 196

AR/COC: 606405/06/07/13/14/15

Data Type: Organic

Sample ID	VOCs	EPA8260B (All VOCs, except...)	67-64-1 (acetone)	75-09-2 (methylene chloride)	79-01-6 (trichloroethene)	SVOCs	117-81-7 (bis(2-ethylhexyl)phthalate)										
062052-001 TA 3/5-196-C09-180-SS			20UJ,B	5U,B	5U,B												
062053-001 TA 3/5-196-C10-190-SS			20UJ,B														
062055-001 TA 3/5-196-C11-200-SS			20UJ,B	5U,B	5U,B												
062056-001 TA 3/5-196-C11-200-SD			20UJ,B	5U,B	5U,B												
062057-001 TA 3/5-196-C12-210-SS			20UJ,B	5U,B	5U,B												
062058-001 TA 3/5-196-C13-220-SS			20UJ,B	5U,B													
062059-001 TA 3/5-196-C14-230-SS			20UJ,B	5U,B	5U,B												
062255-001 TA 3/5-190-0X-TB		P2	P2	P2	P2												
062437-001 TA 3/5-190-0X-EB		P2	20UJ,B,P2	P2	P2												
062470-001 TA 3/5-196-C17-260-SS			20UJ,B	5U,B	5U,B												
062473-001 TA 3/5-196-C19-280-SS			20UJ,B	5U,B													
062476-001 TA 3/5-196-C21-300-SS			20UJ,B	5U,B													
062479-001 TA 3/5-190-0X-TB		P2	20UJ,B,P2	P2	P2												
062484-001 TA 3/5-190-0X-EB		P2	20UJ,B,P2	P2	P2												
062485-001 TA 3/5-190-0X-EB							10U,B										

Validated By: Mr. Kenneth Salaz

Date: 08/06/03

Data Validation Summary

Site/Project: SWMU Site 196 Project/Task #: 7219.02.02.~~06~~05 # of Samples: 34 Matrix: 28 soil / 6 aqueous

AR/COC #: 606405/06/07/13/14/15 Laboratory Sample IDs: F3F170279-001 to -034

Laboratory: STSL

SDG #: F3F170279
(Lot #)

QC Element	Analysis									
	Organics				Inorganics				RAD	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓								✓
2. Calibrations	J	✓								✓
3. Method Blanks	U,B	10U,B								✓
4. MS/MSD	P2	✓								✓
5. Laboratory Control Samples	✓	✓								✓
6. Replicates					NA					NA
7. Surrogates	✓	✓								
8. Internal Standards	✓	✓								
9. TCL Compound Identification	✓	✓								
10. ICP Interference Check Sample										
11. ICP Serial Dilution										
12. Carrier/Chemical Tracer Recoveries										
13. Other QC	✓	✓								

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other:

Reviewed By: [signature] Date: 8/6/03

Volatile Organics (SW 846 Method 8260)

Site/Project: SWMU Site 196　　AR/COC #: 606405/06/07/13/14/15　　# of Samples: 4　　Matrix: aqueous

Laboratory: STSL　　SDG #: F3F170279　　Laboratory Sample IDs: F3F170279-020(TB), -022(EB), -032(TB), -033(EB)

Methods: EPA8260B　　Batch #s: 3177460

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20%/0.99	CCV %D 20%	Method Blks (µg/L)	LCS	① LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓							NA	NA	NA		
2	79-34-5	1,1,2,2-tetrachloroethane		0.30																
2	79-00-5	1,1,2-trichloroethane		0.10																
1	75-34-3	1,1-dichloroethane		0.10																
1	75-35-4	1,1-dichloroethene		0.20																
1	107-06-2	1,2-dichloroethane		0.10																
1	540-59-0	1,2-dichloroethene(total)		0.01																
1	78-87-5	1,2-dichloropropane		0.01																
1	78-93-3	2-butanone (MEK) (10xblk)	✓	0.01		✓	✓	✓	✓											
~~1~~	~~110-75-8~~	~~2-chloroethyl vinyl ether~~																		
2	591-78-6	2-hexanone (MBK)	✓	0.01		✓	✓	✓	✓											
2	108-10-1	4-methyl-2-pentanone (MIBK)		0.10			✓	✓	✓											
1	67-64-1	acetone(10xblk)		0.01			33.7	~~5~~ ✓	5.7											
1	71-43-2	benzene		0.50			✓	✓	✓				NA							
1	75-27-4	bromodichloromethane		0.20																
3	75-25-2	bromoform		0.10																
1	74-83-9	bromomethane		0.10																
1	75-15-0	carbon disulfide		0.10																
1	56-23-5	carbon tetrachloride		0.10																
2	108-90-7	chlorobenzene		0.50																
1	75-00-3	chloroethane		0.01																
1	67-66-3	chloroform		0.20																
1	74-87-3	chloromethane		0.10																
1	10061-01-5	cis-1,3-dichloropropene		0.20																
2	124-48-1	dibromochloromethane		0.10																
2	100-41-4	ethylbenzene		0.10					✓											
1	75-09-2	methylene chloride (10xblk)		0.01					4.7											
2	100-42-5	styrene		0.30					✓											
2	127-18-4	tetrachloroethene		0.20																
2	108-88-3	toluene(10xblk)		0.40																
2	10061-02-6	trans-1,3-dichloropropene		0.10																
1	79-01-6	trichloroethene		0.30																
1	75-01-4	vinyl chloride		0.10																
2	1330-20-7	xylenes(total)	✓	0.30	✓	✓	✓	✓	✓							✓	✓	✓		

Comments:
① No LCSD, MS/MSD, or any other measure of precision performed.

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature]　　Date: 8/6/03

Volatile Organics (SW 846 Method 8260)

Site/Project: SWMU Site 196 AR/COC #: 606405/06/07/13/14/15 # of Samples: 10 Matrix: soil

Laboratory: STSL SDG #: F3F170279 Laboratory Sample IDs: F3F170279-001, -4, -7, -10, -13, -016, -017, -023, -026, -029

Methods: EPA8260B Batch #s: 3178061

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blks (µg/kg)	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	① Equip. Blanks	Trip Blanks	EB	TB (µg/L)
1	71-55-6	1,1,1-trichloroethane	✓	0.10	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓	✓	✓
2	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30						✓										
2	79-00-5	1,1,2-trichloroethane	✓	0.10						✓										
1	75-34-3	**1,1-dichloroethane**	✓	0.10						✓										
1	75-35-4	**1,1-dichloroethene**	✓	0.20						✓										
1	107-06-2	**1,2-dichloroethane**	✓	0.10						✓										
1	540-59-0	**1,2-dichloroethene(total)**	✓	0.01						✓										↓
1	78-87-5	**1,2-dichloropropane**	✓	0.01				↓		✓										4.3
1	78-93-3	**2-butanone (MEK) (10xblk)**	✓	0.01			↓	-28.5	↓	✓			↓	↓	↓		↓	↓	↓	✓
~~1~~	~~110-75-8~~	~~2-chloroethyl vinyl ether~~																		
2	591-78-6	2-hexanone (MBK)	✓	0.01			✓	✓	✓	✓			✓	✓	✓		✓	✓	✓	✓
2	108-10-1	4-methyl-2-pentanone (MIBK)	✓	0.10			✓		✓	✓			✓	✓	✓					
1	67-64-1	**acetone(10xblk)**	✓	0.01			33.0		4.7	✓										
1	71-43-2	**benzene**	✓	0.50			✓		✓	✓										
1	75-27-4	bromodichloromethane	✓	0.20				↓		✓										
3	75-25-2	bromoform	✓	0.10				26.1		✓										
1	74-83-9	bromomethane	✓	0.10				✓		✓										
1	75-15-0	carbon disulfide	✓	0.10						✓										
1	56-23-5	**carbon tetrachloride**	✓	0.10						✓										
2	108-90-7	**chlorobenzene**	✓	0.50						✓										
1	75-00-3	chloroethane	✓	0.01						✓										
1	67-66-3	**chloroform**	✓	0.20						✓										
1	74-87-3	chloromethane	✓	0.10						✓										
1	10061-01-5	cis-1,3-dichloropropene	✓	0.20						✓										
2	124-48-1	dibromochloromethane	✓	0.10						✓				139						
2	100-41-4	ethylbenzene	✓	0.10					↓	✓				✓						
1	75-09-2	methylene chloride (10xblk)	✓	0.01					3.0	✓										
2	100-42-5	styrene	✓	0.30					✓	✓										
2	127-18-4	**tetrachloroethene**	✓	0.20						✓				↓						
2	108-88-3	toluene(10xblk)	✓	0.40						✓										
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10					↓	✓				147						
1	79-01-6	**trichloroethene**	✓	0.30					0.39	✓				✓						
1	75-01-4	**vinyl chloride**	✓	0.10					✓	✓										
2	1330-20-7	xylenes(total)	✓	0.30	↓	↓	↓	↓	✓	✓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

Comments:
① 1st EB + TB apply to all samples except -023, -026, & -029 (2nd applies to these). Field dup. submitted. No QC criteria.

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 8/6/03

Volatile Organics

Site/Project: SWMU Site 196 AR/COC #: 606405/06/07/13/14/15 Batch #s: 3178061

Laboratory: STJL SDG #: F3F170275 # of Samples: 10 Matrix: soil

Surrogate Recovery and Internal Standard Outliers (SW 846 Method 8260)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
All									
Passed									

SMC 1: Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

IS 1: Fluorobenzene
IS 2: Chlorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments:

Semivolatile Organics (SW 846 Method 8270)

Site/Project: SWMU Site 196 AR/COC #: 606405/06/07/13/14/15 Laboratory Sample IDs: F3F170279-021(EB) + -034(SB)

Laboratory: STSL Laboratory Report #: F3F170279

Methods: EPA8270C

# of Samples: 2 Matrix: aqueous Batch #s: 3169393

IS	BNA	CAS #	NAME (*)	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS ①	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
3	BN	95-94-3	1,2,4,5-Tetrachlorobenzene	✓		NA	✓	✓	✓					NA	NA	NA	NA	NA	NA		
2	BN	120-82-1	1,2,4-Trichlorobenzene		0.2					✓	✓	✓	✓								
1	BN	95-50-1	1,2-Dichlorobenzene		0.4																
4	BN	99-35-4	1,3,5-Trinitrobenzene																		
1	BN	541-73-1	1,3-Dichlorobenzene		0.6																
3	BN	99-65-0	1,3-Dinitrobenzene																		
1	BN	106-46-7	1,4-Dichlorobenzene		0.5																
3	BN	130-15-4	1,4-Naphthoquinone																		
3	BN	134-32-7	1-Naphthylamine																		
3	A	58-90-2	2,3,4,6-Tetrachlorophenol																		
3	A	95-95-4	2,4,5-Trichlorophenol		0.2					✓	✓	✓	✓								
3	A	88-06-2	2,4,6-Trichlorophenol		0.2					✓	✓	✓	✓								
2	A	120-83-2	2,4-Dichlorophenol		0.2					✓	✓	✓	✓								
2	A	105-67-9	2,4-Dimethylphenol		0.2					✓	✓	✓	✓								
3	A	51-28-5	2,4-Dinitrophenol		0.01					✓	✓	✓	✓								
3	BN	121-14-2	2,4-Dinitrotoluene		0.2					✓	✓	✓	✓								
2	A	87-65-0	2,6-Dichlorophenol																		
3	BN	606-20-2	2,6-Dinitrotoluene		0.2					✓	✓	✓	✓								
5	BN	53-96-3	2-Acetylaminofluorene																		
3	BN	91-58-7	2-Chloronaphthalene		0.8																
1	A	95-57-8	2-Chlorophenol		0.8					✓	✓	✓	✓								
2	BN	91-57-6	2-Methylnaphthalene		0.4					✓	✓	✓	✓								
1	A	95-48-7	2-Methylphenol (o-cresol)		0.7					✓	✓	✓	✓								
3	BN	91-59-8	2-Naphthylamine																		
3	BN	88-74-4	2-Nitroaniline		0.01					✓	✓	✓	✓								
2	A	88-75-5	2-Nitrophenol	✓	0.1	✓	✓	✓	✓	✓	✓	✓	✓								

Comments: ① No MS/MSD analyzed. LCSD analyzed as a measure of precision. **Notes:** Shaded rows are RCRA compounds.

(*) Only normal target analyte list (TAL), not App. IX, compounds were requested.

Reviewed By: [signature] Date: 8/6/03

Semivolatile Organics

Site/Project: ____________ AR/COC #: 606405/06/07/13/14/15 Batch #s: 3169393

Laboratory: ____________ Laboratory Report #: F34170279 # of Samples: ________ Matrix: ________

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
1	BN	109-06-8	2-Picoline	✓		NA	✓	✓	✓					NA	NA	NA	NA	NA	NA		
5	BN	119-93-7	3,3'-Dimethylbenzidine																		
5	BN	91-94-1	3,3'-Dichlorobenzidine		0.01					✓	✓	✓	✓								
1	A	N22	3,4-methylphenol (m,p-cresol)		0.6					✓	✓	✓	✓								
6	BN	56-49-5	3-Methylcholanthrene																		
3	BN	99-09-2	3-Nitroaniline		0.01					✓	✓	✓	✓								
4	A	534-52-1	4,6-Dinitro-2-methylphenol		0.01					✓	✓	✓	✓								
4	BN	92-67-1	4-Aminobiphenyl																		
4	BN	101-55-3	4-Bromophenyl-phenylether		0.1					✓	✓	✓	✓								
2	A	59-50-7	4-Chloro-3-methylphenol		0.2					✓	✓	✓	✓								
2	BN	106-47-8	4-Chloroaniline		0.01					✓	✓	✓	✓								
3	BN	7005-72-3	4-Chlorophenyl-phenylether	✓	0.4		✓	✓	✓	✓	✓	✓	✓								
~~1~~	~~A~~	~~106-44-5~~	~~4-Methylphenol (p-cresol)~~																		
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	✓	✓	✓	✓	✓								
3	A	100-02-7	4-Nitrophenol		0.01					✓	✓	✓	✓								
5	BN	57-97-6	7,12-Dimethylbenzo(a)anthracene																		
3	BN	83-32-9	Acenaphthene		0.9					✓	✓	✓	✓								
3	BN	208-96-8	Acenaphthylene		0.9					✓	✓	✓	✓								
1	BN	98-86-2	Acetophenone																		
1	BN	62-53-3	Aniline																		
4	BN	120-12-7	Anthracene		0.7					✓	✓	✓	✓								
5	BN	92-87-5	Benzidine																		
5	BN	56-55-3	Benzo(a)anthracene		0.8					✓	✓	✓	✓								
6	BN	50-32-8	Benzo(a)pyrene		0.7					✓	✓	✓	✓								
6	BN	205-99-2	Benzo(b)fluoranthene		0.7					✓	✓	✓	✓								
6	BN	191-24-2	Benzo(g,h,i)perylene		0.5					✓	✓	✓	✓								
6	BN	207-08-9	Benzo(k)fluoranthene		0.7					✓	✓	✓	✓								
1	A	100-51-6	Benzyl Alcohol																		
2	BN	111-91-1	bis(2-Chloroethoxy)methane		0.3					✓	✓	✓	✓								
1	BN	111-44-4	bis(2-Chloroethyl)ether	✓	0.7	✓	✓	✓	✓	✓	✓	✓	✓								

Semivo[illegible]e Organics

Site/Project: ______ AR/COC #: 006405/06/07/13/14/15 Batch #s: 3169373

Laboratory: ______ Laboratory Report #: F35170279 # of Samples: ______ Matrix: ______

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20% / 0.99	CCV %D 20%	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
1	BN	108-60-1	bis(2-chloroisopropyl)ether	✓	0.01	NA	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA		
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01					4.3	✓	✓	✓								
5	BN	85-68-7	Butylbenzylphthalate		0.01					✓	✓	✓	✓								
4	BN	86-74-8	Carbazole		0.01					✓	✓	✓	✓								
5	BN	510-15-6	Chlorobenzilate																		
5	BN	218-01-9	Chrysene		0.7					✓	✓	✓	✓								
4	BN	2303-16-4	Diallate																		
6	BN	53-70-3	Dibenzo(a,h)anthracene		0.4					✓	✓	✓	✓								
3	BN	132-64-9	Dibenzofuran		0.8					✓	✓	✓	✓								
3	BN	84-66-2	Diethylphthalate		0.01					✓	✓	✓	✓								
3	BN	131-11-3	Dimethylphthalate		0.01					✓	✓	✓	✓								
4	BN	84-74-2	Di-n-butylphthalate		0.01					✓	✓	✓	✓								
6	BN	117-84-0	Di-n-octylphthalate		0.01					✓	✓	✓	✓								
4	A	88-85-7	Dinoseb	✓			✓	✓	✓												
~~3~~	~~BN~~	~~122-39-4~~	~~Diphenylamine~~																		
1	BN	62-50-0	Ethyl Methanesulfonate	✓			✓	✓	✓												
4	BN	206-44-0	Fluoranthene		0.6					✓	✓	✓	✓								
3	BN	86-73-7	Fluorene		0.9					✓	✓	✓	✓								
4	BN	118-74-1	**Hexachlorobenzene**		0.1					✓	✓	✓	✓								
2	BN	87-68-3	Hexachlorobutadiene		0.01					✓	✓	✓	✓								
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01					✓	✓	✓	✓								
1	BN	67-72-1	**Hexachloroethane**		0.3					✓	✓	✓	✓								
2	BN	1888-71-7	Hexachloropropene																		
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene		0.5					✓	✓	✓	✓								
4	BN	465-73-6	Isodrin																		
2	BN	78-59-1	Isophorone		0.4					✓	✓	✓	✓								
3	BN	120-58-1	Isosafrole				✓	✓													
5	BN	143-50-0	Kepone				0.03	59.2													
1	BN	66-27-3	Methyl methanesulfonate	✓		✓	✓	✓													

Semivolatile Organics

Site/Project: ____ AR/COC #: 606405/06/07/13/14/15 Batch #s: 3169393

Laboratory: ____ Laboratory Report #: F3F170279 # of Samples: ____ Matrix: ____

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks		
							>.05	<20% / 0.99	20%												
2	BN	91-20-3	Naphthalene	✓	0.7	NA	✓	✓	✓	✓	✓	✓	✓	NA	NA	NA	NA	NA	NA		
2	BN	98-95-3	Nitrobenzene		0.2					✓	✓	✓	✓								
3	BN	99-55-8	5-Nitro-o-toluidine																		
1	BN	55-18-5	N-Nitrosodiethylamine																		
1	BN	62-75-9	N-Nitrosodimethylamine																		
2	BN	924-16-3	N-Nitrosodi-n-butylamine																		
4	BN	86-30-6	N-Nitrosodiphenylamine (1)		0.01					✓	✓	✓	✓								
1	BN	621-64-7	N-Nitroso-di-n-propylamine		0.5					✓	✓	✓	✓								
1	BN	10595-95-6	N-Nitrosomethylethylamine																		
1	BN	100-75-4	N-Nitrosopiperidine																		
1	BN	930-55-2	N-Nitrosopyrrolidine																		
1	BN	95-53-4	o-Toluidine																		
5	BN	60-11-7	p-Dimethylaminoazobenzene																		
3	BN	608-93-5	Pentachlorobenzene																		
1	BN	76-01-7	Pentachloroethane																		
4	BN	82-68-8	Pentachloronitrobenzene																		
4	A	87-86-5	Pentachlorophenol		0.1					✓	✓	✓	✓								
4	BN	62-44-2	Phenacetin																		
4	BN	85-01-8	Phenanthrene		0.7					✓	✓	✓	✓								
1	A	108-95-2	Phenol		0.8					✓	✓	✓	✓								
4	BN	23950-58-5	Pronamide																		
5	BN	129-00-0	Pyrene		0.6					✓	✓	✓	✓								
1	BN	110-86-1	Pyridine																		
2	BN	94-59-7	Safrole	✓		✓	✓	✓	✓												

Comments:

Semivo[illegible]e Organics

Site/Project: Swmu Site 196 AR/COC #: 606405/06/07/13/14/15 Batch #s: 3169393

Laboratory: STSL Laboratory Report #: F3F170279 # of Samples: 2 Matrix: aqueous

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
All								
Passed								

Comments:

SMC 1: Nitrobenzene-d5 (BN)
SMC 2: 2-Fluorobiphenyl (BN)
SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d6 (A)
SMC 5: 2-Fluorophenol (A)
SMC 6: 2,4,6-Tribromophenol (A)
~~SMC 7: 2-2-Chlorophenol-d4 (A)~~
~~SMC 8: 1,2-Dichlorobenzene-d4 (BN)~~

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
All												
Passed												

IS 1: 1,4-Dichlorobenzene-d4 (BN)
IS 2: Naphthalene-d8 (BN)
IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN)
IS 5: Chrysene-d12 (BN)
IS 6: Perylene-d12 (BN)

Semivolatile Organics (SW 846 Method 8270)

Site/Project: SWMU Site 196 AR/COC #: 606405/06/07/13/14/15 Laboratory Sample IDs: F3F170279-002, -005, -008, -011, -014, -018, -024, " -027, -030

Laboratory: STSL Laboratory Report #: F3F170279

Methods: EPA 8270C

# of Samples: 9 Matrix: soil Batch #s: 3169156

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	① MS	MSD	MS RPD	② Field Dup. RPD	Equip. Blanks	Equip. ~~Field~~ Blanks		
							>.05	<20% / 0.99	20%												
3	BN	95-94-3	1,2,4,5-Tetrachlorobenzene	✓		NA	✓	✓	✓	✓							NA				
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	BN	95-50-1	1,2-Dichlorobenzene	✓	0.4		✓	✓													
4	BN	99-35-4	1,3,5-Trinitrobenzene	✓			✓	✓													
1	BN	541-73-1	1,3-Dichlorobenzene	✓	0.6		✓	✓													
3	BN	99-65-0	1,3-Dinitrobenzene	✓			✓	✓													
1	BN	106-46-7	1,4-Dichlorobenzene	✓	0.5		✓	✓													
3	BN	130-15-4	1,4-Naphthoquinone	✓			✓	✓													
3	BN	134-32-7	1-Naphthylamine	✓			✓	✓													
3	A	58-90-2	2,3,4,6-Tetrachlorophenol	✓			✓	✓													
3	A	95-95-4	2,4,5-Trichlorophenol	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
3	A	88-06-2	2,4,6-Trichlorophenol	✓	0.2		✓	✓			✓	"	"	✓	✓	✓					
2	A	120-83-2	2,4-Dichlorophenol	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓					
2	A	105-67-9	2,4-Dimethylphenol	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓					
3	A	51-28-5	2,4-Dinitrophenol	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓					
3	BN	121-14-2	2,4-Dinitrotoluene	✓	0.2		✓	✓			✓	"	"	✓	✓	✓		↓	↓		
2	A	87-65-0	2,6-Dichlorophenol	✓			✓	✓													
3	BN	606-20-2	2,6-Dinitrotoluene	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
5	BN	53-96-3	2-Acetylaminofluorene	✓			✓	✓													
3	BN	91-58-7	2-Chloronaphthalene	✓	0.8		✓	✓													
1	A	95-57-8	2-Chlorophenol	✓	0.8		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
2	BN	91-57-6	2-Methylnaphthalene	✓	0.4		✓	✓			✓	NA	NA	✓	✓	✓					
1	A	95-48-7	2-Methylphenol (o-cresol)	✓	0.7		✓	✓			✓	NA	NA	✓	✓	✓		↓	↓		
3	BN	91-59-8	2-Naphthylamine	✓			✓	✓													
3	BN	88-74-4	2-Nitroaniline	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
2	A	88-75-5	2-Nitrophenol	✓	0.1	↓	✓	✓	↓	↓	✓	NA	NA	✓	✓	✓	↓	✓	✓		

Notes: Shaded rows are RCRA compounds.

Comments: ① MS/MSD performed on a sample from Lot # F3F170271, which was from an SWL sample of similar matrix from another SWL.
② field dup. submitted. No QC criteria.

Reviewed By: [signature] Date: 8/6/03

Semivolatile Organics

Site/Project: SWMU Site 196 AR/COC #: 606405/06/07/13/14/15 Batch #s: 316915[?]

Laboratory: STSL Laboratory Report #: F3F170279 # of Samples: 9 Matrix: soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	① CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Equip. ~~Field~~ Blanks		
							>.05	<20% / 0.99	20%												
1	BN	109-06-8	2-Picoline	✓		NA	✓	✓	✓	✓							NA				
5	BN	119-93-7	3,3'-Dimethylbenzidine	✓			✓	✓													
5	BN	91-94-1	3,3'-Dichlorobenzidine	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	A	N22	3,4-methylphenol (m,p-cresol)	✓	0.6		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
6	BN	56-49-5	3-Methylcholanthrene	✓			✓	✓													
3	BN	99-09-2	3-Nitroaniline	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
4	A	534-52-1	4,6-Dinitro-2-methylphenol	✓	0.01		✓	✓			✓	"	"	✓	✓	✓		✓	✓		
4	BN	92-67-1	4-Aminobiphenyl	✓			✓	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether	✓	0.1		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
2	A	59-50-7	4-Chloro-3-methylphenol	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓					
2	BN	106-47-8	4-Chloroaniline	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓					
3	BN	7005-72-3	4-Chlorophenyl-phenylether	✓	0.4		✓	✓	↓	↓	✓	"	"	✓	✓	✓		↓	↓		
~~1~~	~~A~~	~~106-44-5~~	~~4-Methylphenol (p-cresol)~~																		
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	✓	✓	✓	NA	NA	✓	✓	✓		✓	✓		
3	A	100-02-7	4-Nitrophenol	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
5	BN	57-97-6	7,12-Dimethylbenzo(a)anthracene	✓			✓	✓													
3	BN	83-32-9	Acenaphthene	✓	0.9		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
3	BN	208-96-8	Acenaphthylene	✓	0.9		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	BN	98-86-2	Acetophenone	✓			✓	✓													
1	BN	62-53-3	Aniline	✓			✓	✓													
4	BN	120-12-7	Anthracene	✓	0.7		✓	✓	↓		✓	NA	NA	✓	✓	✓		✓	✓		
5	BN	92-87-5	Benzidine	✓			✓	✓	21.2												
5	BN	56-55-3	Benzo(a)anthracene	✓	0.8		✓	✓	✓		✓	NA	NA	✓	✓	✓		✓	✓		
6	BN	50-32-8	Benzo(a)pyrene	✓	0.7		✓	✓			✓	"	"	✓	✓	✓					
6	BN	205-99-2	Benzo(b)fluoranthene	✓	0.7		✓	✓			✓	NA	NA	✓	✓	✓					
6	BN	191-24-2	Benzo(g,h,i)perylene	✓	0.5		✓	✓			✓	"	"	✓	✓	✓					
6	BN	207-08-9	Benzo(k)fluoranthene	✓	0.7		✓	✓			✓	NA	NA	✓	✓	✓		↓	↓		
1	A	100-51-6	Benzyl Alcohol	✓			✓	✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane	✓	0.3		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	BN	111-44-4	bis(2-Chloroethyl)ether	✓	0.7	↓	✓	✓	↓	↓	✓	NA	NA	✓	✓	✓		✓	✓		

① 2nd CCV applies to sample -014 only.

Semivolatile Organics

Site/Project: [illegible] Site 156 AR/COC #: 606405/06/07/13/14/15 Batch #s: 316915?

Laboratory: STSL Laboratory Report #: F35170279 # of Samples: 9 Matrix: soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	① Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Equip. ~~Field~~ Blanks		
							>.05	<20% / 0.99	20%												
1	BN	108-60-1	bis(2-chloroisopropyl)ether	✓	0.01	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓		
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate	✓	0.01		✓	✓		~~[illegible]~~ 4.3 ✓	✓	"	"	✓	✓	✓					
5	BN	85-68-7	Butylbenzylphthalate	✓	0.01		✓	✓		✓	✓	NA	NA	✓	✓	✓					
4	BN	86-74-8	Carbazole	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓					
5	BN	510-15-6	Chlorobenzilate	✓			✓	✓													
5	BN	218-01-9	Chrysene	✓	0.7		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
4	BN	2303-16-4	Diallate	✓			✓	✓													
6	BN	53-70-3	Dibenzo(a,h)anthracene	✓	0.4		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
3	BN	132-64-9	Dibenzofuran	✓	0.8		✓	✓			✓	NA	NA	✓	✓	✓					
3	BN	84-66-2	Diethylphthalate	✓	0.01		✓	✓			✓	"	"	✓	✓	✓					
3	BN	131-11-3	Dimethylphthalate	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓					
4	BN	84-74-2	Di-n-butylphthalate	✓	0.01		✓	✓			✓	"	"	✓	✓	✓					
6	BN	117-84-0	Di-n-octylphthalate	✓	0.01		✓	✓			✓			✓	✓	✓					
4	A	88-85-7	Dinoseb	✓			✓	✓													
~~3~~	~~BN~~	~~122-39-4~~	~~Diphenylamine~~																		
1	BN	62-50-0	Ethyl Methanesulfonate	✓			✓	✓	✓	✓											
4	BN	206-44-0	Fluoranthene	✓	0.6		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
3	BN	86-73-7	Fluorene	✓	0.9		✓	✓			✓	NA	NA	✓	✓	✓					
4	BN	118-74-1	**Hexachlorobenzene**	✓	0.1		✓	✓			✓	"	"	✓	✓	✓					
2	BN	87-68-3	Hexachlorobutadiene	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓					
3	BN	77-47-4	Hexachlorocyclopentadiene	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓					
1	BN	67-72-1	**Hexachloroethane**	✓	0.3		✓	✓			✓	NA	NA	✓	✓	✓					
2	BN	1888-71-7	Hexachloropropene	✓			✓	✓													
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.5		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
4	BN	465-73-6	Isodrin	✓			✓	✓													
2	BN	78-59-1	Isophorone	✓	0.4		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
3	BN	120-58-1	Isosafrole	✓			✓	✓													
5	BN	143-50-0	Kepone	✓			~~0.02~~ 0.03	~~59.2~~ 74.7	~~✓~~ 21.9												
1	BN	66-27-3	Methyl methanesulfonate	✓			✓	✓	✓	✓											

① 2nd ICAL + CCV entries apply to sample - OM only.

Semivolatile Organics

Site/Project: Summ Site 196 AR/COC #: 606465/06/07/13/14/15 Batch #s: 316956

Laboratory: STSL Laboratory Report #: E35170279 # of Samples: 9 Matrix: soil

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Equip. ~~Field~~ Blanks		
							>.05	<20% / 0.99	20%												
2	BN	91-20-3	Naphthalene	✓	0.7	NA	✓	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	✓	✓		
2	BN	98-95-3	**Nitrobenzene**	✓	0.2		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
3	BN	99-55-8	5-Nitro-o-toluidine (N-)	✓			✓	✓													
1	BN	55-18-5	N-Nitrosodiethylamine	✓			✓	✓													
1	BN	62-75-9	N-Nitrosodimethylamine	✓			✓	✓													
2	BN	924-16-3	N-Nitrosodi-n-butylamine	✓			✓	✓													
4	BN	86-30-6	N-Nitrosodiphenylamine (1)	✓	0.01		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	BN	621-64-7	N-Nitroso-di-n-propylamine	✓	0.5		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	BN	10595-95-6	N-Nitrosomethylethylamine	✓			✓	✓													
1	BN	100-75-4	N-Nitrosopiperidine	✓			✓	✓													
1	BN	930-55-2	N-Nitrosopyrrolidine	✓			✓	✓													
1	BN	95-53-4	o-Toluidine	✓			✓	✓													
5	BN	60-11-7	p-Dimethylaminoazobenzene	✓			✓	✓													
3	BN	608-93-5	Pentachlorobenzene	✓			✓	✓													
1	BN	76-01-7	Pentachloroethane	✓			✓	✓													
4	BN	82-68-8	Pentachloronitrobenzene	✓			✓	✓													
4	A	87-86-5	**Pentachlorophenol**	✓	0.1		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
4	BN	62-44-2	Phenacetin	✓			✓	✓													
4	BN	85-01-8	Phenanthrene	✓	0.7		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	A	108-95-2	Phenol	✓	0.8		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
4	BN	23950-58-5	Pronamide	✓			✓	✓													
5	BN	129-00-0	Pyrene	✓	0.6		✓	✓			✓	NA	NA	✓	✓	✓		✓	✓		
1	BN	110-86-1	Pyridine	✓			✓	✓													
2	BN	94-59-7	Safrole	✓		✓	✓	✓	✓	✓											
																	✓				

Comments:

Semivolatile Organics

Site/Project: SWMU Site 196 AR/COC #: 606405/06/07/13/14/15 Batch #s: ~~316593~~ 3169156

Laboratory: STSL Laboratory Report #: E3F170279 # of Samples: 9 Matrix: Soil

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
All							NA	NA
Passed								

SMC 1: Nitrobenzene-d5 (BN)
SMC 2: 2-Fluorobiphenyl (BN)
SMC 3: p-Terphenyl-d14 (BN)
SMC 4: Phenol-d6 (A)
SMC 5: 2-Fluorophenol (A)
SMC 6: 2,4,6-Tribromophenol (A)
~~SMC 7: 2-2-Chlorophenol-d4 (A)~~
~~SMC 8: 1,2-Dichlorobenzene-d4 (BN)~~

Comments:

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
All												
Passed												

IS 1: 1,4-Dichlorobenzene-d4 (BN)
IS 2: Naphthalene-d8 (BN)
IS 3: Acenaphthene-d10 (BN)
IS 4: Phenathrene-d10 (BN)
IS 5: Chrysene-d12 (BN)
IS 6: Perylene-d12 (BN)

Organics (supplemental)

Site/Project: SWMU Site 96 AR/COC #: 606405/06/07/13/14/15 # of Samples: 9 Matrix: Soil

Laboratory: STSL Laboratory Report #: F3F170279 Laboratory Sample IDs: F3F170279-03,-06, -09, -12, -15, -19, -25, -28, -31

Methods: EPA8015 Mod. (TPH) Batch #s: 3170100

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/ R^2	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
						>.05	<20% / 0.99	20%												
		TPH	✓		NA	NA	✓	✓	✓	✓	NA	NA	✓	✓	✓	NA	NA	NA		
		Surrogate %Rs:			All Passed, except MSD (o-terphenyl = 181) for TPH															

Notes: Shaded rows are RCRA compounds.

Comments: ① MS/MSD for TPH performed on an SVL sample of similar matrix from another SDG.

Reviewed By: [signature] Date: 8/6/03

RECORDS CENTER CODE: ____________

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: SWMU Site 196
PROJECT/TASK: 7219_02.02.05
SNL TASK LEADER: Langkopf
ORG/MS/CF0#: 6133/1087/CF042-03
SMO PROJECT LEAD: Palencia
SAMPLE SHIP DATE: 6/16/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
606405	STSL	F3F170279A		7/16/2003	X			
606406	STSL	F3F170279B		7/16/2003	X			
606407	STSL	F3F170279C		7/16/2003	X			
606413	STSL	F3F170279D		7/16/2003	X			
606414	STSL	F3F170279E		7/16/2003	X			
606415	STSL	F3F170279F		7/16/2003	X			

DATA PACKAGE TAT:		RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:				
PROBLEM #/DATE CORRECTION RECEIVED:				
CVR COMPLETED BY/DATE:	W. Palencia		7/17/03	
FINAL TRANSMITTED TO/DATE:	Griffith		7/17/03	
SENT TO VALIDATION BY/DATE:	J. Conn		7/21/03	
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:				
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE	J. Conn		7/21/03	
CD RECEIVED BY/DATE				
TO ERDMS OR RECORDS CENTER BY/DATE:				

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

AR/COC 606405

SMO Use

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6-16-03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23506	SMO Authorization:	[illegible]
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		See attached
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		bottle order
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062052-001	TA 3/5-196-C09-180-SS	180	196	6/12/03	1205	S	AG	125ml	4c	G	SA	VOC(8260)	
062052-002	TA 3/5-196-C09-180-SS	180	196	6/12/03	1205	S	AG	250ml	4c	G	SA	SVOC(8270	
062052-003	TA 3/5-196-C09-180-SS	180	196	6/12/03	1205	S	AG	125ml	4c	G	SA	TPH	
062053-001	TA 3/5-196-C10-190-SS	190	196	6/12/03	1225	S	AG	125ml	4c	G	SA	VOC(8260)	
062053-002	TA 3/5-196-C10-190-SS	190	196	6/12/03	1225	S	AG	250ml	4c	G	SA	SVOC(8270	
062053-003	TA 3/5-196-C10-190-SS	190	196	6/12/03	1225	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/19/03
Entered by: RK
QC inits. JAC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
See CoC 606407 for TB
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SG	Gram 6133/505-284-2588

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-16-03	1005	4.Relinquished by			
1. Received by [signature]	6133	6/16/03	1015	4. Received by			
2.Relinquished by [signature]	6133	6-16-03	1100	5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC 606406

Internal Lab

Batch No. N/A

SMO Use

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6-16-03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23506	SMO Authorization:	SMO
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO21677
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		See attached bottle order
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Building | Room

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062055-001	TA 3/5-196-C11-200-SS	200	196	6/12/03	1255	S	AG	125ml	4c	G	SA	VOC(8260)	
062055-002	TA 3/5-196-C11-200-SS	200	196	6/12/03	1255	S	AG	250ml	4c	G	SA	SVOC(8270	
062055-003	TA 3/5-196-C11-200-SS	200	196	6/12/03	1255	S	AG	125ml	4c	G	SA	TPH	
062056-001	TA 3/5-196-C11-200-SD	200	196	6/12/03	1255	S	AG	125ml	4c	G	SA	VOC(8260)	
062056-002	TA 3/5-196-C11-200-SD	200	196	6/12/03	1255	S	AG	250ml	4c	G	SA	SVOC(8270	
062056-003	TA 3/5-196-C11-200-SD	200	196	6/12/03	1255	S	AG	125ml	4c	G	SA	TPH	
062057-001	TA 3/5-196-C12-210-SS	210	196	6/12/03	1320	S	AG	125ml	4c	G	SA	VOC(8260)	
062057-002	TA 3/5-196-C12-210-SS	210	196	6/12/03	1320	S	AG	250ml	4c	G	SA	SVOC(8270	
062057-003	TA 3/5-196-C12-210-SS	210	196	6/12/03	1320	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/19/03
Entered by: RIC
QC Inits. TAC

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	RL	Weston Solutions/6135/505-844-4013
S Griffith	[signature]	SG	Gram 6133/505-284-2588

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
See COC 606407 for TB
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-16-03	1015	4.Relinquished by			
1. Received by [signature]	6133	6/16/03	1015	4. Received by			
2.Relinquished by [signature]	6133	6-16-03	1100	5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606407

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6-16-03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	33506	SMO Authorization:	[illegible]
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		See Attached
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		Bottle Order
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062058-001	TA 3/5-196-C13-220-SS	220	196	6/12/03	1410	S	AG	125ml	4c	G	SA	VOC(8260)	
062059-001	TA 3/5-196-C14-230-SS	230	196	6/12/03	1435	S	AG	125ml	4c	G	SA	VOC(8260)	
062059-002	TA 3/5-196-C14-230-SS	230	196	6/12/03	1435	S	AG	250ml	4c	G	SA	SVOC(8270	
062059-003	TA 3/5-196-C14-230-SS	230	196	6/12/03	1435	S	AG	125ml	4c	G	SA	TPH	
062255-001	TA3/5-190-OX-EB		↕	↕	1600	L	G	3x40ml	HCL	G	TB	VOC (8260)	
062436-001	TA3/5-190-OX-EB		↕	↕	1550	L	AG	2x1 lt	4c	G	EB	SVOC (8270)	
062437-001	TA3/5-190-OX-EB		↕	↕	1550	L	G	3x40ml	HCL	G	EB	VOC (8260)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/19/03
Entered by: RC
QC inits. JAC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
	R Lynch	[signature]	[illegible]	Weston Solutions/6135/505-844-4013
	S Griffith	[signature]	SRG	Gram 6133/505-284-2588

		Org.	Date	Time		Org.	Date	Time
1.Relinquished by	[signature]	6134	6-16-03	1015	4.Relinquished by			
1. Received by	[signature] SMO	6133	6/16/03	1015	4. Received by			
2.Relinquished by	[signature] SMO	6133	6/16/03	1150	5.Relinquished by			
2. Received by					5. Received by			
3.Relinquished by					6.Relinquished by			
3. Received by					6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

AR/COC 606413

Internal Lab

Batch No. N/A

SMO Use

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6-16-03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23506	SMO Authorization:	[illegible] SMO
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO21673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062470-001	TA 3/5-196-C17-260-SS	260	196	6/13/03	1400	S	AG	125ml	4c	G	SA	VOC(8260)	
062470-002	TA 3/5-196-C17-260-SS	260	196	6/13/03	1400	S	AG	250ml	4c	G	SA	SVOC(8270	
062470-003	TA 3/5-196-C17-260-SS	260	196	6/13/03	1400	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking Smo Use
Date Entered(mm/dd/yy) 06/19/03
Entered by: RK
QC inits. JRC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	R	Weston Solutions/6135/505-844-4013
~~S Griffith~~			~~Crum 6133/505-284-2588~~

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6/16/03	1020	4.Relinquished by			
1. Received by [signature] SMO	6133	6/16/03	1020	4. Received by			
2.Relinquished by [signature] SMO	6133	6/16/03	1100	5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Page 1 of 1

Batch No. N/A

SMO Use

AR/COC **606414**

Dept. No./Mail Stop:	6133/1087	Date Samples Shipped:	6-16-03	Project/Task No.:	7219.02.02.05
Project/Task Manager:	Brenda Langkopf	Carrier/Waybill No.	23506	SMO Authorization:	[illegible]
Project Name:	SWMU 196	Lab Contact:	Mark Loeb 800-333-3305	Contract #:	PO2 1673
Record Center Code:		Lab Destination:	Severn Trent-St.Louis		SOW Attached Bottle Order
Logbook Ref. No.:	ER-047	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF 042-03	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area TA-V				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062473-001	TA 3/5-196-C19-280-SS	280	196	6/13/03	1515	S	AG	125ml	4c	G	SA	VOC(8260)	
062473-002	TA 3/5-196-C19-280-SS	280	196	6/13/03	1515	S	AG	250ml	4c	G	SA	SVOC(8270	
062473-003	TA 3/5-196-C19-280-SS	280	196	6/13/03	1515	S	AG	125ml	4c	G	SA	TPH	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT

Return Samples By:

Sample Tracking — Smo Use
Date Entered(mm/dd/yy) 06/19/03
Entered by: RK
QC inits. JPC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588

*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]	[illegible]	Weston Solutions/6135/505-844-4013
~~S Griffith~~			~~Gram 6133/505-284-2588~~

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by [signature]	6134	6-16-03	1020	4.Relinquished by			
1. Received by [signature]	6133	6/16/03	1020	4. Received by			
2.Relinquished by [signature]	6133	6-16-03	1100	5.Relinquished by			
2. Received by				5. Received by			
3.Relinquished by				6.Relinquished by			
3. Received by				6. Received by			

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

Page 1 of 1

AR/COC **606415**

SMO Use

Dept. No./Mail Stop: 6133/1087
Project/Task Manager: Brenda Langkopf
Project Name: SWMU 196
Record Center Code:
Logbook Ref. No.: ER-047
Service Order No. CF 042-03
Location: Tech Area TA-V
Building: Room

Date Samples Shipped: 6-16-03
Carrier/Waybill No. 23506
Lab Contact: Mark Loeb 800-333-3305
Lab Destination: Severn Trent-St.Louis
SMO Contact/Phone: Pam Puissant/505-844-3185
Send Report to SMO: Wendy Palencia/505-844-3132

Project/Task No.: 7219.02.02.05
SMO Authorization: [signature]
Contract #: PO21673

SEE ATTACHED BOTTLE ORDER

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

Bill To: Sandia National Labs (Accounts Payable)
P.O. Box 5800 MS 0154
Albuquerque, NM 87185-0154

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected		Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
062476-001	TA 3/5-196-C21-300-SS	300	196	6/13/03	1645	S	AG	125ml	4c	G	SA	VOC(8260)	
062476-002	TA 3/5-196-C21-300-SS	300	196	6/13/03	1645	S	AG	250ml	4c	G	SA	SVOC(8270	
062476-003	TA 3/5-196-C21-300-SS	300	196	6/13/03	1645	S	AG	125ml	4c	G	SA	TPH	
062479-001	TA 3/5-190-0X-TB		196	6/13/03	1650	L	G	3x40ml	HCL	G	TB	VOC(8260)	
062484-001	TA 3/5-190-0X-EB		196	6/13/03	1650	L	G	3x40ml	HCL	G	EB	VOC(8260)	
062485-001	TA 3/5-190-0X-EB		196	6/13/03	1650	L	AG	2x1lt	4c	G	EB	SVOC(8270	

RMMA ☐ Yes ☑ No Ref. No.
Sample Disposal ☐ Return to Client ☑ Disposal by lab
Turnaround Time ☐ 7 Day ☐ 15 Day ☑ 30 Day ☐ Negotiated TAT
Return Samples By:

Sample Tracking Smo Use
Date Entered(mm/dd/yy) 06/19/03
Entered by: RK
QC inits. JAC

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to:
Stacy Griffith
Dept.6133 Mail Stop 1087
Phone 505-284-2588
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members

Name	Signature	Init	Company/Organization/Phone/Cellular
J Lee	[signature]	JDL	Weston Solutions/6135/505-284-3309
R Lynch	[signature]		Weston Solutions/6135/505-844-4013
~~S Griffith~~			~~Gram 6133/505-284-2588~~

1.Relinquished by [signature]	Org. 6134	Date 6/16/03	Time 1020	4.Relinquished by	Org.	Date	Time
1. Received by [signature]	Org. 6133	Date 6/16/03	Time 1020	4. Received by	Org.	Date	Time
2.Relinquished by [signature]	Org. 6133	Date 6/16/03	Time 1100	5.Relinquished by	Org.	Date	Time
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

Contract Verification Review (CVR)

Project Leader LANGKOPF

Project Name SWMU SITE 196

Case No. 7219_02.02.05

AR/COC No. 606405, 606406, 606407, 606413, 606414 & 606415

Analytical Lab SEVERN TRENT

SDG No. F3F170279A—F

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
1.1	All items on COC complete - data entry clerk initialed and dated	X				
1.2	Container type(s) correct for analyses requested	X				
1.3	Sample volume adequate for # and types of analyses requested	X				
1.4	Preservative correct for analyses requested	X				
1.5	Custody records continuous and complete	X				
1.6	Lab sample number(s) provided and SNL sample number(s) cross referenced and correct	X				
1.7	Date samples received	X				
1.8	Condition upon receipt information provided	X				

2.0 Analytical Laboratory Report

Line No.	Item	Complete? Yes	Complete? No	If no, explain	Resolved? Yes	Resolved? No
2.1	Data reviewed, signature	X				
2.2	Method reference number(s) complete and correct	X				
2.3	QC analysis and acceptance limits provided (MB, LCS, Replicate)	X				
2.4	Matrix spike/matrix spike duplicate data provided (if requested)	X				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	SURROGATES FOR VOC & TPH MSD FAILED RECOVERY LIMITS
c) Matrix spike recovery data reported and met		X	DIBROMOCHLOROMETHANE & TRANS-1,3-DICHLOROPROPANE FAILED RECOVERY LIMITS FOR VOC MSD
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
b) Matrix spike duplicate RPD data reported and met for all organic samples	X		
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	SEVERAL ANALYTES DETECTED IN VOC METHOD BLANKS BIS(2-ETHYLHEXYL)PHTHALATE DETECTED IN SVOC BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	ACETONE & 1,2-DICHLOROPROPANE DETECTED IN VOC TRIP BLANK ACETONE DETECTED IN VOC EQUIPMENT BLANK BIS(2-ETHYLHEXYL)PHTHALATE DETECTED IN SVOC EQUIPMENT BLANK
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		

4.0 Calibration and Validation Documentation

Item	Yes	No	Comments
4.1 GC/MS (8260, 8270, etc.)			
a) 12-hour tune check provided	X		
b) Initial calibration provided	X		
c) Continuing calibration provided	X		
d) Internal standard performance data provided	X		
e) Instrument run logs provided	X		
4.2 GC/HPLC (8330 and 8010 and 8082)			
a) Initial calibration provided	X		
b) Continuing calibration provided	X		
c) Instrument run logs provided	X		
4.3 Inorganics (metals)			
a) Initial calibration provided	N/A		
b) Continuing calibration provided	N/A		
c) ICP interference check sample data provided	N/A		
d) ICP serial dilution provided	N/A		
e) Instrument run logs provided	N/A		
4.4 Radiochemistry			
a) Instrument run logs provided	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes No

Based on the review, this data package is complete. Yes No

If no, provide: nonconformance report or correction request number ________ and date correction request was submitted:-______________

Reviewed by: W. Palencia Date: 7-17-2003 Closed by:________________ Date:____________

Attachment E

ATTACHMENT E
SWMU 196
Risk Assessment Report

TABLE OF CONTENTS

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LIST OF TABLES

LIST OF TABLES (Concluded)

LIST OF FIGURES

SWMU 196: RISK ASSESSMENT REPORT

I. Site Description and History

SWMU 196, the Building 6597 Cistern, is located in TA-V at SNL/NM within the boundaries of Kirtland Air Force Base (Figures 1.1-1 and 1.1-2). SWMU 196 encompasses approximately 1,600 square feet (0.037 acres), consisting of the Cistern and a 6-foot-high chain link fence, and is surrounded by a gravel lot.

The area is located on the broad pediment that gently slopes west toward the Rio Grande. The topography at TA-V is nearly flat with elevations ranging from approximately 5,450 feet above mean sea level (amsl) on the eastern side to 5,425 feet amsl on the western side. The annual precipitation for the area, measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). During most rainfall events, rainfall quickly infiltrates the soil at TA-V; however, virtually all of the moisture subsequently undergoes evapotranspiration.

Based upon data from the 13 groundwater monitoring wells at TA-V, the regional groundwater aquifer is approximately 500 feet below ground surface (bgs) (SNL/NM April 2004). The closest groundwater monitoring well, also the closest downgradient well, is TAV-MW1, located approximately 600 feet to the northwest of SWMU 196.

TA-V is a secured research and testing area that has been operating since the 1960s. The facilities include large electron beam accelerators, research reactors, an intense gamma irradiation facility, and a hot-cell facility.

The Cistern at SWMU 196 is a 25-foot-diameter, vertically oriented, concrete cylinder that extends approximately 22 feet bgs with an unlined earthen bottom. The perimeter wall of the Cistern extends about 3 feet above the ground surface. The Cistern is located in the central portion of TA-V, approximately 37 feet west of Building 6597, which previously housed the PROTO 1 facility, which was used to test radiation effects on weapon components.

From 1978 to 1989, the Cistern received insulating oil and wash water from PROTO 1. The Cistern also served as an emergency catch basin for the series of underground storage tanks (SWMU 37) previously connected to PROTO 1. The PROTO 1 facility used Univolt™, a petroleum-based, electrical insulating oil manufactured by the Exxon Corporation that contained no polychlorinated biphenyl (PCB), metal, or radionuclide additives. Personnel interviews state that occasional, small quantities of insulating oil containing wash water (and possibly Freon™) were discharged into the Cistern. No records were maintained of discharges to the Cistern. No discharges have occurred at the Cistern since 1989 when the PROTO 1 facility was closed. The Cistern was not connected to any surface water collection systems.

The SWMU 196 constituents of concern (COCs) consist of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), metals, and radionuclides. Because the insulating oil was composed of petroleum hydrocarbons, VOCs and SVOCs were considered to be indicative of the insulating oil. The insulating oil was not manufactured with metallic, radionuclide, or polychlorinated biphenyl (PCB) additives. Analyses for radionuclides and PCBs were used as a measure of conservatism. The presence of elevated metals in Cistern soil may be attributable to corrosion of the PROTO 1 piping system. The lateral extent of insulating oil in soil was evaluated using total petroleum hydrocarbon (TPH) analyses that are useful for field screening but not for risk assessment purposes.

I.1 Summary of the 1994-1996 Confirmatory Sampling

Soil samples were collected in 1994 through 1996 as part of the 1996 RCRA Facility Investigation (RFI) (SNL/NM June 1996). The investigation included laboratory analysis of soil samples collected from the bottom of the Cistern using various sampling methods. An initial grab sample was collected in June 1994 and was submitted to an off-site laboratory for analyses for VOCs, PCBs, TPH, and Target Analyte List metals. In April 1995, two composite soil samples were collected from the bottom of the Cistern and were submitted to the Sandia National Laboratories/New Mexico (SNL/NM) Radiation Protection Sample Diagnostics (RPSD) Laboratory for analyses of radionuclides by gamma spectroscopy. Sample splits were sent to an off-site laboratory, Lockheed Analytical Laboratory (LAL), for analyses of H-3 and isotopic uranium.

In May 1995, soil samples were collected at three hand-auger locations (A1 through A3) at various depths in the bottom of the Cistern. Soil samples were collected from the surface and at half-foot increments to a total depth of 3 feet below the Cistern bottom. These samples were identified as field-screening samples and were submitted to SNL/NM Environmental Restoration Chemical Laboratory (ERCL) for analyses for selected metal analyses by x-ray fluorescence (XRF).

In March 1996, soil samples were collected at three hand-auger locations (D1 through D3) in the subsurface below the Cistern. A trench was excavated in the bottom of the Cistern to a depth of approximately 8 feet below the Cistern bottom. Auger holes D2 and D3 were driven to total depths 13 and 5 feet, respectively, below the bottom of the Cistern. These soil samples were submitted to an off-site laboratory (American Environmental Network [AEN]) for analyses of VOCs and TPH. The samples used for soil characterization in the 1996 RFI consisted of the initial grab sample (Site 196-Cistern) as well as the sample series A1 through A3 and D1 through D3.

Results for the soil characterization samples used in the 1996 RFI indicated no detectable values of VOCs or PCBs in any of the soil samples, elevated levels of TPH, metals, and detectable radionuclide activities either below or slightly above background values.

I.2 Summary of 1999 Sampling Activities

Following the submittal of the 1996 RFI, the Notice of Deficiency issued by the New Mexico Environment Department (NMED) stated that additional soil characterization was needed to define the vertical extent of contamination at SWMU 196 (Garcia July 1997). Due to the need for soil samples at increased depths, a hollow-stem auger rig was employed to place one vertical borehole as close as possible to the Cistern wall and one angled borehole to encounter soil beneath the Cistern. It was not possible to advance the boreholes from within the Cistern. Three boreholes (BH1, BH2, and BH3) were advanced near the Cistern. It was not feasible to drill the boreholes from within the interior of the Cistern.

The first attempt at drilling an angled borehole (BH1) was unsuccessful at obtaining soil samples beneath the Cistern. BH1 was drilled approximately 23 feet southwest of the Cistern wall, was set at approximately 37 degrees from vertical, and was advanced to the northeast. No samples were recovered in this borehole due to auger deflection preventing the advancement of the sampling equipment into the augers. Borehole BH1 was abandoned at 56 linear feet and plugged.

A vertical borehole (BH2) was located approximately 5 feet west of the Cistern wall. Soil samples were collected with a split-spoon sampler beginning at 25 feet bgs (placing the first sample at approximately the same depth as the bottom of the Cistern) and continuing at approximately 5- to 10-foot intervals to a total depth of 100 feet bgs. Twelve soil samples plus one soil duplicate were collected from borehole BH2.

A second angled borehole (BH3), was located approximately 10 feet west of the Cistern, was set at approximately 19 degrees from vertical, and was advanced to the east. A total of seven soil samples and one soil duplicate from 14 to 75 linear feet along the borehole were collected. Auger refusal at 90 linear feet along the borehole prevented further advancement.

All soil samples from the 1999 drilling activities were sent to an off-site laboratory (General Engineering Laboratories, Inc.) for analyses for VOCs, SVOCs, TPH, and RCRA metals plus beryllium. PCBs were eliminated from the analyses list because no PCBs were detected in the earlier investigation; this was verbally approved by the NMED.

The VOC analyses revealed detectable levels of carbon disulfide, ethylbenzene, methylene chloride, toluene, and xylene from boreholes BH2 and BH3. The sample from BH3 at 75 feet bgs (i.e., the sample from the bottom of the borehole) had rejected (R qualified) data for carbon disulfide, ethylbenzene, toluene, and xylene due to matrix interference. Data for the entire VOC suite for samples 196-BH3-99-19-SS, 196-BH3-99-40-SS, 196-BH3-99-40-SD, and 196-BH3-99-65-SS were also R qualified and rejected due to matrix interference. All other samples from boreholes BH2 and BH3 did not have detectable concentrations of VOCs.

No SVOCs were detected in any of the soil samples from boreholes BH2 and BH3, although numerous samples from both boreholes had R-qualified data for many of the SVOC constituents.

TPH results revealed detectable levels in both boreholes, ranging from 10.9 J to 5,220 mg/kg in borehole BH2 and 1,970 to 25,500 mg/kg in BH3.

Metals analyses revealed detectable levels of arsenic, barium, beryllium, chromium, lead, mercury, selenium, and silver. Two samples (196-BH3-99-14-SS and 196-BH3-99-40-SD) had barium results that exceeded the background value of 214 mg/kg (Dinwiddie September 1997) at 278 and 286 mg/kg, respectively. All other samples were below the corresponding background values for metals.

The 1999 drilling investigation was deemed incomplete by SNL/NM Environmental Restoration personnel due to difficulties with matrix interference causing rejected data, as well as not achieving a depth that defined the vertical extent of contamination. Further discussion with the NMED resulted in the development of a second Field Implementation Plan (FIP) to complete subsurface investigations at SWMU 196 (SNL/NM May 2003).

I.3 Summary of the 2003 Sampling Activities

In June 2003, a dual-wall percussion hammer drill rig was employed to drill one vertical borehole as close as possible to the outside of the Cistern wall. Located approximately 20 feet west of the Cistern, and in accordance with agreements reached with the NMED (Langkopf March 2003), the borehole was to be advanced until two consecutive, field-screened sample results showed less than 100 parts per million of TPH. Figure 2.1-1 provides the location of the borehole (BH4). Drilling activities were conducted from June 11 through June 13, 2003, and concluding with plugging and abandoning the borehole on June 14, 2003. Final depth of the borehole was 300 feet bgs.

Confirmatory soil samples were collected as detailed in the FIP (SNL/NM May 2003). Collection of soil samples from the borehole began at 100 feet bgs and continued at 10-foot intervals to 150 feet bgs, as agreed upon. At 150 feet bgs, soil samples were collected every 10 feet and were to be field-screened for TPH by an immunoassay method. However, difficulties with the field-screening equipment prevented determination of TPH levels in the field. Instead, soil samples were collected and sent to a local off-site laboratory (Pinnacle Laboratories) that provided fast turnaround on sample results so that the drilling activities would not be delayed. These samples were analyzed by U.S. Environmental Protection Agency (EPA) Method 418.1 for TPH (EPA November 1986). Analytical results for the field-screening samples from Pinnacle are not used for site characterization in this request for supplemental information (RSI) response. Soil samples were collected with a split-spoon sampler at the defined intervals. A split of all samples was also sent to Severn-Trent Laboratories (STL) following standard procedures. These samples are recorded on AR/COC Forms 606401 through 606407 and 606413 through 606415 (Attachment C of the RSI response). Samples were submitted for analyses for VOCs (EPA Method 8260), SVOCs (EPA Method 8270), and TPH (EPA Method 8015 modified) and were used for site characterization purposes. Metals were eliminated from further consideration as the earlier investigations determined that metal contamination was limited to the upper 6 inches of the bottom of the Cistern.

The criteria used to determine borehole depth was based upon results of TPH analysis for the field-screening soil samples sent to Pinnacle Laboratories. The condition of two consecutive samples from the borehole with results of less than 100 mg/kg TPH by EPA Method 418.1 was used. This method is suitable for field-screening purposes only. The criteria for determining the vertical extent of contamination was based upon TPH analysis for the confirmatory soil samples sent to STL. The condition of two consecutive soil samples from the borehole with no detection of TPH by EPA Method 8015 modified was used. The TPH field-screening results indicated the presence of TPH at greater than 100 mg/kg in the soil sample collected from 260 feet bgs. The results for the samples from 280 and 300 feet bgs were less than the field-screening criteria of 100 mg/kg. Thus, the total depth of the borehole was 300 feet bgs. The analysis of the confirmatory soil samples for TPH by EPA Method 8015 is discussed in Section 2.3.

Sixteen discrete soil samples and three soil sample duplicates were collected for laboratory analysis. Table 2.2-1 summarizes features for each sample, including sample identification, sample location rationale, and analytical suites.

Three equipment blanks were prepared at the site during the sampling event and were submitted for analysis. Three trip blanks accompanied the soil samples from the field and were submitted for VOC analysis.

The results of the analyses revealed detections of 10 VOCs (most values qualified with J), SVOC detections of chrysene at 86 J micrograms (μg)/kg, diethylphthalate at 390 μg/kg, fluoranthene at 330 μg/kg, phenanthrene at 140 J μg/kg, pyrene at 220 J μg/kg, and multiple detections of bis(2-ethylhexyl) phthalate (most values qualified with J). No detections of TPH were reported in any of the confirmatory soil samples.

II. Data Quality Objectives

The data quality objectives (DQOs) were presented in the SWMU 196 FIP (SNL/NM May 2003). The DQOs outline the quality assurance (QA)/quality control (QC) requirements necessary for producing defensible analytical data suitable for risk assessment purposes. The specific objectives for additional work at SWMU 196 included the following:

- The advancement of a borehole with a dual-wall percussion hammer drill rig to define the vertical extent of contamination
- The collection and analyses of soil samples to obtain additional supporting data for a no further action (NFA) decision
- The collection of QA/QC samples (duplicate soil samples as well as trip blank [TB] and equipment blank [EB] samples).

The sample summary and rationale for sample locations for the 1994–1996 sampling activities are provided in Table 1. Tables 2 and 3 provide the sample summaries for confirmatory sampling conducted in 1999 and 2003, respectively.

The samples collected in 1994 through 1996 were analyzed by Enseco Laboratory, AEN Laboratories, LAL, and the SNL/NM RPSD Laboratory. The samples collected from the borehole in 1999 were analyzed by GEL. The samples collected in 2003 were analyzed by Severn Trent Laboratories. Table 4 summarizes the number of samples, the analytical methods, and data quality level achieved.

Fourteen QA/QC samples were collected during both sampling events. The QA/QC samples consisted of five soil sample duplicates, four TBs, one field blank, and four aqueous EBs (Table 5). No significant QA/QC problems were identified in any of the QA/QC samples.

The 1994 and 1995 soil sample results were verified/validated by SNL/NM according to "Procedure for Validation of Chemical Measurement Data," Environmental Programs Department 7720, Procedure QA-11-01, Rev. 0 (SNL/NM October 1991) and "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994). The AEN data set from 1996 as well as all the 1999 and 2003 data were validated according to "Data Validation Procedure for Chemical and Radiochemical Data," SNL/NM Environmental Restoration (ER) Project Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). Reviews confirmed that the data from the analytical laboratories are defensible and therefore acceptable for use in the NFA proposal, fulfilling the DQO requirements. R-qualified data has been discussed but not used.

Table 1
Summary of 1994-1996 Sampling Performed at SWMU 196 to Meet Data Quality Objectives

Record Number[a]	Date	Sample Location	Sample Location Rationale	Sample Matrix	Laboratory	Analytical Suites (EPA Method[b]) [with number of samples]
00350	06-17-94	Site 196-Cistern (G)	Characterize soil at bottom of Cistern	Soil w/oil odor	Enseco/RMAL	VOCs (EPA Method 8240) [1]
				Sludge/soil		TPH (EPA Method 418.1) [1]
						PCBs (EPA Method 8080) [1]
						TAL Metals (EPA Method 6010) [1]
02948	04-25-95	0196-B1-C	Waste characterization[c]	Sludge composite[c]	LAL	H-3, Isotopic Uranium [2]
		0196-B2-C				
02591		0196-B1-C			RPSD	Radionuclides by gamma spectroscopy [2]
		0196-B2-C				
04513	03-26-96	TA3/5-196-D1-008	Characterize soil from depths of 0 to 13 ft below the bottom of Cistern	Soil	AEN	VOCs (EPA Method 8240) [11] TPH (EPA Method 418.1) [11]
		TA3/5-196-D1-009				
04427	03-27-96	TA3/5-196-D1-13				
		TA3/5-196-D2-000				
		TA3/5-196-D2-001				
		TA3/5-196-D2-005				
		TA3/5-196-D2-007				
		TA3/5-196-D2-011				
		TA3/5-196-D2-011DUP				
		TA3/5-196-D2-012				
		TA3/5-196-D3-002				
		TA3/5-196-D3-003				
		TA3/5-196-D3-004				

[a]Analysis request/chain-of-custody record.

[b]EPA November 1986.

[c]These samples were identified as waste characterization and sludge composite when it was believed that the soil in the bottom of the Cistern consisted of a thin layer of sludge and soil on a concrete bottom, and that this material would be removed and handled as waste. This was not the case and the soil collected for these samples was actually native soil, as the Cistern does not have a concrete bottom.

AEN = American Environmental Network.
DUP = Duplicate sample.
EPA = U.S. Environmental Protection Agency.
ft = Foot (feet).
G = Grab sample.
LAL = Lockheed Analytical Laboratory.
PCB = Polychlorinated biphenyl.
RMAL = Rocky Mountain Analytical Laboratory.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SWMU = Solid Waste Management Unit.
TA = Technical Area.
TAL = Target Analyte List.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

Table 2
Summary of 1999 Sampling Performed at SWMU 196 to Meet Data Quality Objectives

Sample Attributes				Analytical Suites			
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 418.1[b])	RCRA Metals, Beryllium (EPA Method 6010/7000[b])
602756	196-BH2-99-25-SS	Subsurface sample from 25 ft bgs	08-31-99	1	–	–	–
	196-BH2-99-30-SS	Subsurface sample from 30 ft bgs		1	–	–	–
	196-BH2-99-35-SS	Subsurface sample from 35 ft bgs		1	–	–	–
	196-BH2-99-35-SD	Subsurface sample duplicate from 35 ft bgs		1	–	–	–
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs	09-01-99	1	–	–	–
	196-BH2-99-45-SS	Subsurface sample from 45 ft bgs		1	–	–	–
	196-BH2-99-50-SS	Subsurface sample from 50 ft bgs		1	–	–	–
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs		1	–	–	–
	196-BH2-99-60-SS	Subsurface sample from 60 ft bgs		1	–	–	–
	196-BH2-99-70-SS	Subsurface sample from 70 ft bgs		1	–	–	–
	196-BH2-99-80-SS	Subsurface sample from 80 ft bgs		1	–	–	–
	196-BH2-99-90-SS	Subsurface sample from 90 ft bgs		1	–	–	–
	196-BH2-99-100-SS	Subsurface sample from 100 ft bgs		1	–	–	–
602812	196-BH2-99-25-SS	Subsurface sample from 25 ft bgs	08-31-99	–	1	1	1
	196-BH2-99-30-SS	Subsurface sample from 30 ft bgs		–	1	1	1
	196-BH2-99-35-SS	Subsurface sample from 35 ft bgs		–	1	1	1
	196-BH2-99-35-SD	Subsurface sample duplicate from 35 ft bgs		–	1	1	1
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs	09-01-99	–	1	1	1
	196-BH2-99-45-SS	Subsurface sample from 45 ft bgs		–	1	1	1
	196-BH2-99-50-SS	Subsurface sample from 50 ft bgs		–	1	1	1
	196-BH2-99-40-SS	Subsurface sample from 40 ft bgs		–	1	1	1
	196-BH2-99-60-SS	Subsurface sample from 60 ft bgs		–	1	1	1
	196-BH2-99-70-SS	Subsurface sample from 70 ft bgs		–	1	1	1
	196-BH2-99-80-SS	Subsurface sample from 80 ft bgs	09-01-99	–	1	1	1
	196-BH2-99-90-SS	Subsurface sample from 90 ft bgs		–	1	1	1
	196-BH2-99-100-SS	Subsurface sample from 100 ft bgs		–	1	1	1

Refer to footnotes at end of table.

Table 2 (Concluded)
Summary of 1999 Sampling Performed at SWMU 196 to Meet Data Quality Objectives

Sample Attributes				Analytical Suites			
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 418.1[b])	RCRA Metals, Beryllium (EPA Method 6010/7000[b])
602811	196-BH3-99-14-SS	Subsurface sample from 14 ft bgs	09-02-99	–	1	1	1
	196-BH3-99-19-SS	Subsurface sample from 19 ft bgs		–	1	1	1
	196-BH3-99-24-SS	Subsurface sample from 24 ft bgs		–	1	1	1
	196-BH3-99-28-SS	Subsurface sample from 28 ft bgs		–	1	1	1
	196-BH3-99-40-SS	Subsurface sample from 40 ft bgs		–	1	1	1
	196-BH3-99-40-SD	Subsurface sample duplicate from 40 ft bgs		–	1	1	1
	196-BH3-99-65-SS	Subsurface sample from 65 ft bgs		–	1	1	1
	196-BH3-99-75-SS	Subsurface sample from 75 ft bgs		–	1	1	1
602813	196-BH3-99-14-SS	Subsurface sample from 14 ft bgs	09-02-99	1	–	–	–
	196-BH3-99-19-SS	Subsurface sample from 19 ft bgs		1	–	–	–
	196-BH3-99-24-SS	Subsurface sample from 24 ft bgs		1	–	–	–
	196-BH3-99-28-SS	Subsurface sample from 28 ft bgs		1	–	–	–
	196-BH3-99-40-SS	Subsurface sample from 40 ft bgs		1	–	–	–
	196-BH3-99-40-SD	Subsurface sample duplicate from 40 ft bgs		1	–	–	–
	196-BH3-99-65-SS	Subsurface sample from 65 ft bgs		1	–	–	–
	196-BH3-99-75-SS	Subsurface sample from 75 ft bgs		1	–	–	–
Quality Assurance/Quality Control Samples (aqueous matrix)							
602811	196-BH3-99-TB	September 2, 1999		1	–	–	–
602812	196-BH2-99-TB	September 1, 1999		1	–	–	–
	196-BH2-99-EB			–	1	1	1

[a]Analysis request/chain-of-custody record.
[b]EPA November 1986.

bgs = Below ground surface.
BH = Borehole.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
RCRA = Resource Conservation and Recovery Act.
SD = Sample duplicate.
SS = Soil sample.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TB = Trip blank.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.
– = Analysis not performed on sample.

Table 3
Summary of 2003 Sampling Performed at SWMU 196 to Meet Data Quality Objectives

Sample Attributes				Analytical Suites		
Record Number[a]	ER Sample ID	Sample Location Rationale	Date Sampled	VOCs (EPA Method 8260[b])	SVOCs (EPA Method 8270[b])	TPH (EPA Method 8015 Modified[b])
606401	TA3/5-196-C01-100-SS	Subsurface sample from 100 ft bgs	06-11-03	1	1	1
	TA3/5-196-C02-110-SS	Subsurface sample from 110 ft bgs		1	1	1
	TA3/5-196-C02-110-SD	Subsurface sample duplicate from 110 ft bgs		1	1	1
606402	TA3/5-196-C03-120-SS	Subsurface sample from 120 ft bgs	06-11-03	1	1	NR
	TA3/5-196-C04-130-SS	Subsurface sample from 130 ft bgs		1	1	NR
606403	TA3/5-196-C05-140-SS	Subsurface sample from 140 ft bgs	06-11-03	1	1	1
	TA3/5-196-C06-150-SS	Subsurface sample from 150 ft bgs		1	1	NR
606404	TA3/5-196-C07-160-SS	Subsurface sample from 160 ft bgs	06-11-03	1	1	1
	TA3/5-196-C07-160-SD	Subsurface sample duplicate from 160 ft bgs		1	1	1
606405	TA3/5-196-C09-180-SS	Subsurface sample from 180 ft bgs	06-12-03	1	1	1
	TA3/5-196-C10-190-SS	Subsurface sample from 190 ft bgs		1	1	1
606406	TA3/5-196-C11-200-SS	Subsurface sample from 200 ft bgs	06-12-03	1	1	1
	TA3/5-196-C11-200-SD	Subsurface sample duplicate from 200 ft bgs		1	1	1
	TA3/5-196-C12-210-SS	Subsurface sample from 210 ft bgs		1	1	1
606407	TA3/5-196-C13-220-SS	Subsurface sample from 220 ft bgs	06-12-03	1	NR	NR
	TA3/5-196-C14-230-SS	Subsurface sample from 230 ft bgs		1	1	1
606413	TA3/5-196-C17-260-SS	Subsurface sample from 260 ft bgs	06-13-03	1	1	1
606414	TA3/5-196-C19-280-SS	Subsurface sample from 280 ft bgs	06-13-03	1	1	1
606415	TA3/5-196-C21-300-SS	Subsurface sample from 300 ft bgs	06-13-03	1	1	1
Quality Assurance/Quality Control Samples (aqueous matrix)						
606404	TA3/5-190-0X-TB[c]	NA	06-11-03	1	NA	NA
	TA3/5-190-0X-EB[c]	NA		1	1	NA
606407	TA3/5-190-0X-TB[c]	NA	06-12-03	1	NA	NA
	TA3/5-190-0X-EB[c]	NA		1	1	NA
606415	TA3/5-190-0X-TB[c]	NA	06-13-03	1	NA	NA
	TA3/5-190-0X-EB[c]	NA		1	1	NA

[a]AR/COC record.
[b]EPA November 1986.
[c]Nomenclature used on AR/COCs for TB and EB samples was erroneous. 190 and 0X do not represent correct identifications.

AR/COC = Analysis request/chain-of-custody.
bgs = Below ground surface.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
NA = Not applicable.
NR = No recovery; sample volume not sufficient for analyses.
SD = Soil sample duplicate.
SS = Subsurface soil sample.
SVOC = Semivolatile organic compound.
SWMU = Solid Waste Management Unit.
TA = Technical area.
TB = Trip blank.
TPH = Total petroleum hydrocarbons.
VOC = Volatile organic compound.

Table 4
Summary of Data Quality Requirements for SWMU 196

Data Set	Analytical Requirement	Data Quality Level	Number of Soil Samples Collected from Each Laboratory (does not include duplicates)					
			Enseco/ RMAL	AEN	GEL	Severn Trent	LAL	SNL/NM RPSD
1994–1996 Surface and Subsurface Soil Samples	VOCs EPA Method 8240	Defensible	1	13	–	–	–	–
	TPH EPA Method 418.1	Defensible	1	13	–	–	–	–
	TAL Metals EPA Methods 6010/7060/ 7196/7421/7471/7740/7841	Defensible	1	–	–	–	–	–
	PCBs EPA Method 8082	Defensible	1	–	–	–	–	–
	Isotopic Uranium, H-3 EPA Method 901.1	Defensible	–	–	–	–	2	–
	Gamma Spectroscopy EPA Method 901.1	Defensible	–	–	–	–	–	2
1999 Subsurface Soil Samples	VOCs EPA Method 8260	Defensible for complete suite for 14 samples, rejected for 3, and partially rejected suite for 1 sample	–	–	18	–	–	–
	SVOCs EPA Method 8270	Defensible for complete suite for 9 samples, rejected for 2, and partially rejected suites for 7 samples	–	–	18	–	–	–
	TPH EPA Method 418.1	Defensible	–	–	18	–	–	–
	RCRA Metals EPA Methods 3005/3050/ 7470/7471	Defensible	–	–	18	–	–	–
	Beryllium EPA Method 3005	Defensible	–	–	18	–	–	–
2003 Subsurface Soil Samples	VOCs EPA Method 8260	Defensible	–	–	–	16	–	–
	SVOCs EPA Method 8270	Defensible	–	–	–	15	–	–
	TPH EPA Method 418.1	Defensible	–	–	–	12	–	–

Refer to footnotes at end of table.

Table 4 (Concluded)
Summary of Data Quality Requirements for SWMU 196

AEN	= American Environmental Network.
EPA	= U.S. Environmental Protection Agency.
GEL	= General Engineering Laboratories, Inc.
LAL	= Lockheed Analytical Laboratory.
PCB	= Polychlorinated biphenyl.
RCRA	= Resource Conservation and Recovery Act.
RMAL	= Rocky Mountain Analytical Laboratory.
RPSD	= Radiation Protection Sample Diagnostics Laboratory.
SNL/NM	= Sandia National Laboratories/New Mexico.
SVOC	= Semivolatile organic compound.
SWMU	= Solid Waste Management Unit.
TAL	= Target Analyte List.
TPH	= Total petroleum hydrocarbons.
VOC	= Volatile organic compound.
–	= Information not available.

Table 5
Summary of Quality Assurance/Quality Control Samples for SWMU 196

Data Set	Sample Type	Number of Samples
1994–1996 Surface and Subsurface Soil Samples	Soil Duplicate	1
	Trip Blank	–
	Equipment Blank	–
1999 Subsurface Soil Samples	Soil Duplicate	2
	Trip Blank	2
	Equipment Blank	1
2003 Subsurface Soil Samples	Soil Duplicate	3
	Trip Blank	3
	Equipment Blank	3

SWMU = Solid Waste Management Unit.
– = Not collected.

III. Determination of Nature, Rate, and Extent of Contamination

III.1 Introduction

The site conceptual model for SWMU 196 is based upon the COCs identified from operational history information and process knowledge. This section summarizes the nature and extent of contamination and the environmental fate of the COCs.

III.2 Nature and Extent of Contamination

The determination of the nature and extent of contamination at SWMU 196 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, and soil sampling. The DQOs contained in the FIP (SNL/NM May 2003) identified the sample locations, sample density, sample depth, and analytical requirements. The sample data were subsequently used to develop the final conceptual site model for SWMU 196, which is presented in Section 3.0 of the associated request for a determination of NFA. The quality of the data specifically used to determine the nature and extent of contamination is described in the following sections.

The COCs for SWMU 196 include VOCs, SVOCs, metals, and radionuclides. Because the insulating oil was composed of petroleum hydrocarbons, VOCs and SVOCs were considered to be indicative of the presence of insulating oil. The insulating oil was not manufactured with metal, radionuclide, or PCB additives. Analyses for radionuclides and PCBs were performed as a measure of conservatism. The presence of elevated metals in the near subsurface soil of the Cistern may be attributable to corrosion of the PROTO piping system. Sections 1.0 and 2.0 of this RSI response summarize the SWMU 196 analytical results. The analytes selected and methods used are appropriate for characterizing the COCs and potential degradation products, if any, at SWMU 196.

Combining the results of the three investigations (1994 to 1996, 1999, and 2003), soil samples were collected from the surface to 13 feet bgs inside the Cistern to a maximum depth of 300 feet bgs near the Cistern in order to determine the nature and extent of contamination. Combined, these soil samples are considered to be representative of the native soil beneath and near the Cistern and are sufficient to determine the vertical extent of COCs.

Very low levels of VOCs and SVOCs were detected from 100 to 300 feet bgs during the 2003 investigation. No TPH was detected in any confirmatory soil samples. The vertical extent of contamination has been defined by these analyses. The NMED requirement for two consecutive nondetect TPH samples from the bottom of the borehole was achieved with the samples collected from 280 and 300 feet bgs. No VOCs or TPH were detected in the last two confirmatory soil samples from the borehole.

SWMU 196 is an inactive site and all primary sources of contamination have been eliminated. As a result, only secondary sources of COCs potentially remain in the soil in the form of adsorbed COCs. The COC migration in the soil is therefore predominantly dependent upon precipitation and occasional surface-water flow. The borehole data collected are adequate for characterizing the migration of COCs in the subsurface. Data available from TA-V monitoring wells (SNL/NM April 2004) are adequate for characterizing SWMU 196.

The primary releases of COCs at SWMU 196 were to the soil in the bottom of the 25-foot-diameter, 20-foot-deep Cistern resulting from disposal activities associated with Building 6597. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the area of the release point (the bottom of the Cistern) is small, none of these are considered to be of potential significance. Infiltration of precipitation is also considered to be low at SWMU 196, as virtually all of the moisture that enters the Cistern most likely evaporates. Because groundwater at this site is approximately 500 feet bgs (SNL/NM April 2004), the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low. A depth of greater than 200 feet separates the area of the last detections of VOCs or SVOCs from the groundwater.

COCs at SMWU 196 are limited to organic constituents. The organic COCs (VOCs and SVOCs) at SWMU 196 may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation may occur; however, the arid environment may limit biological activity.

Wind, water, and biota are considered to be of low significance as potential transport mechanisms at this site. Significant leaching into the subsurface soil in unlikely, and leaching into the groundwater at this site is highly unlikely. The potential for transformation of COCs is low.

In summary, the design and execution of the confirmatory soil sampling for SWMU 196 was appropriate and adequate to determine the nature and extent of residual COCs in the subsurface soil at SWMU 196.

IV. Comparison of COCs to Background Screening Levels

Site history and characterization activities are used to identify potential COCs. The SWMU 196 RSI response describes the identification of COCs and the sampling conducted in order to determine the concentration levels of potential COCs across the site. Generally, COCs evaluated in this risk assessment include all detected organic, inorganic, and radiological COCs for which samples were analyzed. When the detection limit of an organic compound is too high (i.e., could possibly cause an adverse effect to human health or the environment), the compound is retained. Nondetected organic compounds not included in this assessment were determined to have detection limits low enough to ensure protection of human health and the environment. In order to provide conservatism in this risk assessment, the calculation uses only the maximum concentration value of each COC found for the entire site. The SNL/NM maximum background concentration (Dinwiddie September 1997) was selected to provide the background screen listed in Tables 6 through 9.

Nonradiological inorganic constituents that are essential nutrients, such as iron, magnesium, calcium, potassium, and sodium, are not included in this risk assessment (EPA 1989). Both radiological and nonradiological COCs are evaluated. The nonradiological COCs included in the risk assessment consist of both inorganic and organic compounds.

Tables 6 and 7 list the nonradiological COCs for the human health and ecological risk assessments at SWMU 196, respectively. Tables 8 and 9 list the radiological COCs for the human health and ecological risk assessments, respectively. All tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Section VI.4 discusses the results presented in Tables 6 and 8; Sections VII.2 and VII.3 discuss the results presented in Tables 7 and 9.

V. Fate and Transport

The primary releases of COCs at SWMU 196 were to the subsurface soil resulting from the discharge of effluent from the Building 6597 Cistern. Wind, water, and biota are natural mechanisms of COC transport from the primary release point; however, because the discharge was to subsurface soil, none of these are considered to be of potential significance as transport mechanisms at this site. Because the site is no longer active, additional water infiltration is not expected. Infiltration of precipitation is essentially nonexistent at SWMU 196, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 500 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low.

The COCs at SWMU 196 include both inorganic and organic constituents. The inorganic COCs include both radiological and nonradiological analytes. The inorganic COCs are elemental in form and are not considered to be degradable. Transformations of these inorganic constituents could include changes in valence (oxidation/reduction reactions) or incorporation into organic forms (e.g., the conversion of selenite or selenate from soil to seleno-amino acids in plants). Cyanide can be metabolized by soil biota. Radiological COCs will undergo decay to stable isotopes or radioactive daughter elements. However, because of the long half-lives of the radiological COCs, the aridity of the environment at this site, and the lack of potential contact with biota, none of these mechanisms are expected to result in significant losses or transformations of the inorganic COCs.

Table 6
Nonradiological COCs for Human Health Risk Assessment at SWMU 196 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (All Samples) (mg/kg)	SNL/NM Background Concentration[a] (mg/kg)	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (Maximum Aquatic)	Log K_{ow} (for Organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
Inorganic						
Arsenic	4.18	4.4	Yes	44[c]	–	**Yes**
Barium	286	214	**No**	170[d]	–	**Yes**
Beryllium	0.458 J	0.65	Yes	19[c]	–	No
Cadmium	2.5	0.9	**No**	64[c]	–	**Yes**
Chromium	14.8	15.9	Yes	16[c]	–	No
Copper	213	15.4	**No**	6[c]	–	No
Lead	180	21.4	**No**	49[c]	–	**Yes**
Mercury	0.05[e]	<0.1	Yes	5,500[c]	–	**Yes**
Nickel	17.8	11.5	**No**	47[c]	–	**Yes**
Selenium	0.615	<1	Yes	800[f]	–	**Yes**
Silver	2.9	<1	**No**	0.5[c]	–	No
Organic						
2-Butanone	0.5[e]	NA	**NA**	1[g]	0.29[g]	No
Carbon disulfide	0.0043 J	NA	**NA**	7.9[g]	2.93[h]	No
Chloromethane	0.5[e]	NA	**NA**	1.8[h]	0.91[i]	No
Chrysene	0.086 J	NA	**NA**	18,000[j]	5.91[j]	**Yes**
1,2-Dichloroethane	0.25[e]	NA	**NA**	1.2[g]	1.79[g]	No
1,1-Dichloroethene	0.25[e]	NA	**NA**	–	2.13[j]	No
Diethylphthalate	0.39	NA	**NA**	117[i]	2.47[i]	No
Ethylbenzene	0.25[e]	NA	**NA**	15.5[i]	3.15[i]	No
bis(2-Ethylhexyl) phthalate	0.43	NA	**NA**	851[i]	7.6[j]	**Yes**
Fluoranthene	0.33	NA	**NA**	12,302[j]	4.90[j]	**Yes**
Methylene chloride	0.25[e]	NA	**NA**	5[g]	1.25[g]	No
Phenanthrene	0.14 J	NA	**NA**	23,800[c]	4.63[c]	**Yes**
Pyrene	0.22 J	NA	**NA**	36,300[c]	5.32[j]	**Yes**
1,1,1-Trichloroethane	0.25[e]	NA	**NA**	8.9[g]	2.48[j]	No

Refer to footnotes at end of table.

Table 6 (Concluded)
Nonradiological COCs for Human Health Risk Assessment at SWMU 196 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (All Samples) (mg/kg)	SNL/NM Background Concentration[a] (mg/kg)	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (Maximum Aquatic)	Log K_{ow} (for Organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
Tetrachloroethene	0.25[e]	NA	**NA**	49[g]	2.67[j]	**Yes**
Toluene	0.25[e]	NA	**NA**	10.7[c]	2.69[c]	No
Trichloroethene	0.25[e]	NA	**NA**	10.6[c]	2.29[c]	No
Xylene	0.25[e]	NA	**NA**	23.4[g]	1.5[j]	No

Note: **Bold** indicates COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, Southwest Area Supergroup.
[b]NMED March 1998.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Parameter was not detected. Value is one-half of the highest method detection limit.
[f]Callahan et al. 1979.
[g]Howard 1990.
[h]Lyman et al. 1982.
[i]Howard 1989.
[j]Micromedex, Inc. 1998.

BCF = Bioconcentration factor.
COC = Constituent of concern.
J = Estimated concentration.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
mg/kg = Milligram(s) per kilogram.
NA = Not applicable.
NMED = New Mexico Environment Department.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
– = Information not available.

Table 7
Nonradiological COCs for Ecological Risk Assessment at SWMU 196 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

COC	Maximum Concentration (Samples ≤ 5 ft bgs) (mg/kg)	SNL/NM Background Concentration (mg/kg)[a]	Is Maximum COC Concentration Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (Maximum Aquatic)	Log K_{ow} (for Organic COCs)	Bioaccumulator?[b] (BCF>40, Log K_{ow}>4)
Inorganic						
Arsenic	0.56 J	4.4	Yes	44[c]	–	**Yes**
Barium	87.3	214	Yes	170[d]	–	**Yes**
Beryllium	0.25	0.65	Yes	19[c]	–	No
Cadmium	2.5	0.9	**No**	64[c]	–	**Yes**
Chromium	14.8	15.9	Yes	16[c]	–	No
Copper	213	15.4	**No**	6[c]	–	No
Lead	180	21.4	**No**	49[c]	–	**Yes**
Mercury	0.05[e]	<0.1	Yes	5,500[c]	–	**Yes**
Nickel	17.8	11.5	**No**	47[c]	–	**Yes**
Selenium	0.25[e]	<1	Yes	800[f]	–	**Yes**
Silver	2.9	<1	**No**	0.5[c]	–	No

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, Southwest Area Supergroup.
[b]NMED March 1998.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Parameter was not detected. Concentration is one-half of the highest detection limit.
[f]Callahan et al. 1979.

BCF = Bioconcentration factor.
bgs = Below ground surface.
COC = Constituent of concern.
ft = Foot (feet).
J = Estimated concentration.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
mg/kg = Milligram(s) per kilogram.
NMED = New Mexico Environment Department.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.
– = Information not available.

Table 8
Radiological COCs for Human Health Risk Assessment at SWMU 196 with Comparison to the Associated SNL/NM Background Screening Value and BCF

COC	Maximum Activity (All Samples) (pCi/g)[a]	SNL/NM Background Activity (pCi/g)[b]	Is Maximum COC Activity Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (maximum aquatic)	Is COC a Bioaccumulator?[c] (BCF >40)
Cs-137	ND (0.0382)	0.079	Yes	3,000[d]	**Yes**
H-3	**ND (98)**	0.021[e]	**No**	NA	No
Th-232	0.624	1.01	Yes	3,000[f]	**Yes**
U-233	**0.89**	NC	**No**	900[f]	**Yes**
U-235	**ND (0.315)**	0.16	**No**	900f	**Yes**
U-238	**ND (4.8)**	1.4	**No**	900[f]	**Yes**

Note: **Bold** indicates COCs that exceed the background screening values and/or are bioaccumulators.
[a]Value listed is the greater of either the maximum detection or the highest MDA.
[b]Dinwiddie September 1997, Southwest Area Supergroup.
[c]NMED March 1998.
[d]Whicker and Schultz, 1982.
[e]Tharp February 1999.
[f]Baker and Soldat 1992.

BCF = Bioconcentration factor.
COC = Constituent of concern.
MDA = Minimum detectable activity.
NA = Not applicable.
NC = Not calculated.
ND ( ) = Not detected above the MDA, shown in parentheses.
ND ( ) = Not detected but the MDA, shown in parentheses, exceeds background activity.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

Table 9
Radiological COCs for Ecological Risk Assessment at SWMU 196 with Comparison to the Associated SNL/NM Background Screening Value and BCF

COC	Maximum Activity (Samples ≤ 5 ft bgs) (pCi/g)[a]	SNL/NM Background Activity (pCi/g)[b]	Is Maximum COC Activity Less Than or Equal to the Applicable SNL/NM Background Screening Value?	BCF (Maximum Aquatic)	Is COC a Bioaccumulator?[c] (BCF >40)
Cs-137	ND (0.0382)	0.079	Yes	3,000[d]	**Yes**
H-3	**ND (98)**	0.021[e]	**No**	NA	No
Th-232	0.624	1.01	Yes	3,000[f]	**Yes**
U-233	**0.89**	NC	**No**	900[f]	**Yes**
U-235	**ND (0.315)**	0.16	**No**	900[f]	**Yes**
U-238	**ND (4.8)**	1.4	**No**	900[f]	**Yes**

[a]Value listed is the greater of either the maximum detection or the highest MDA.
[b]Dinwiddie September 1997, Southwest Area Supergroup.
[c]NMED March 1998.
[d]Whicker and Schultz, 1982.
[e]Tharp February 1999.
[f]Baker and Soldat 1992.

BCF = Bioconcentration factor.
bgs = Below ground surface.
COC = Constituent of concern.
ft = Foot (feet).
MDA = Minimum detectable activity.
NA = Not applicable.
NC = Not calculated.
ND ( ) = Not detected, above the MDA, shown in parentheses.
ND ( ) = Not detected but the MDA, shown in parentheses, exceeds background activity.
NMED = New Mexico Environment Department.
pCi/g = Picocurie(s) per gram.
SNL/NM = Sandia National Laboratories/New Mexico.
SWMU = Solid Waste Management Unit.

The organic COCs at SWMU 196 include both VOCs and SVOCs. Organic constituents may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at this site. Because of the depth of the COCs in the soil, the loss of VOCs through volatilization is expected to be minimal.

Table 10 summarizes the fate and transport processes that can occur at SWMU 196. COCs at this site include organic analytes as well as radiological and nonradiological inorganic analytes. Wind, surface water, and biota are considered to be of low significance as potential transport mechanisms at this site. Significant leaching into the subsurface soil is unlikely, and leaching into the groundwater at this site is highly unlikely. The potential for transformation of COCs is low, and loss through decay of the radiological COCs is insignificant because of their long half-lives.

Table 10
Summary of Fate and Transport at SWMU 196

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Low
Surface runoff	Yes	Low
Migration to groundwater	No	None
Food chain uptake	Yes	Low
Transformation/degradation	Yes	Low

SWMU = Solid Waste Management Unit.

VI. Human Health Risk Assessment

VI.1 Introduction

The human health risk assessment of this site includes a number of steps that culminate in a quantitative evaluation of the potential adverse human health effects caused by constituents located at the site. The steps to be discussed include the following:

Step 1.	Site data are described that provide information on the potential COCs, as well as the relevant physical characteristics and properties of the site.
Step 2.	Potential pathways are identified by which a representative population might be exposed to the COCs.
Step 3.	The potential intake of these COCs by the representative population is calculated using a tiered approach. The first component of the tiered approach is a screening procedure that compares the maximum concentration of the COC to an SNL/NM maximum background screening value. COCs that are not eliminated during the first screening procedure are carried forward in the risk assessment process.
Step 4.	Toxicological parameters are identified and referenced for COCs that were not eliminated during the screening procedure.

Step 5.	Potential toxicity effects (specified as a hazard index [HI]) and estimated excess cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and incremental estimated cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction applies only when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6.	These values are compared with guidelines established by the EPA, NMED, and the U.S. Department of Energy (DOE) to determine whether further evaluation and potential site cleanup are required. Nonradiological COC risk values also are compared to background risk so that an incremental risk can be calculated.
Step 7.	Uncertainties of the above steps are addressed.

VI.2 Step 1. Site Data

Section I of this risk assessment provides the site description and history for SWMU 196. Section II presents a comparison of results to DQOs. Section III discusses the nature, rate, and extent of contamination.

VI.3 Step 2. Pathway Identification

SWMU 196 has been designated with a future land-use scenario of industrial (DOE et al. September 1995) (see Appendix 1 for default exposure pathways and parameters). However, the residential land-use scenario is also considered in the pathway analysis. Because of the location and characteristics of the potential contaminants, the primary pathway for human exposure is considered to be soil ingestion for the nonradiological COCs and direct gamma exposure for the radiological COCs. The inhalation pathway for both nonradiological and radiological COCs is included because the potential exists to inhale dust. Soil ingestion is included for the radiological COCs as well. The dermal pathway is included for the nonradiological COCs because of the potential for the receptor to be exposed to contaminated soil. No water pathways to the groundwater are considered; depth to groundwater at SWMU 196 is approximately 500 feet bgs. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Figure 1 shows the conceptual site model flow diagram for SWMU 196.

Pathway Identification

Nonradiological Constituents	Radiological Constituents
Soil ingestion	Soil ingestion
Inhalation (dust)	Inhalation (dust)
Dermal contact	Direct gamma

VI.4 Step 3. Background Screening Procedure

This section discusses Step 3, the background screening procedure, which compares the maximum COC concentrations to the background screening levels. The methodology and results are described in the following sections.

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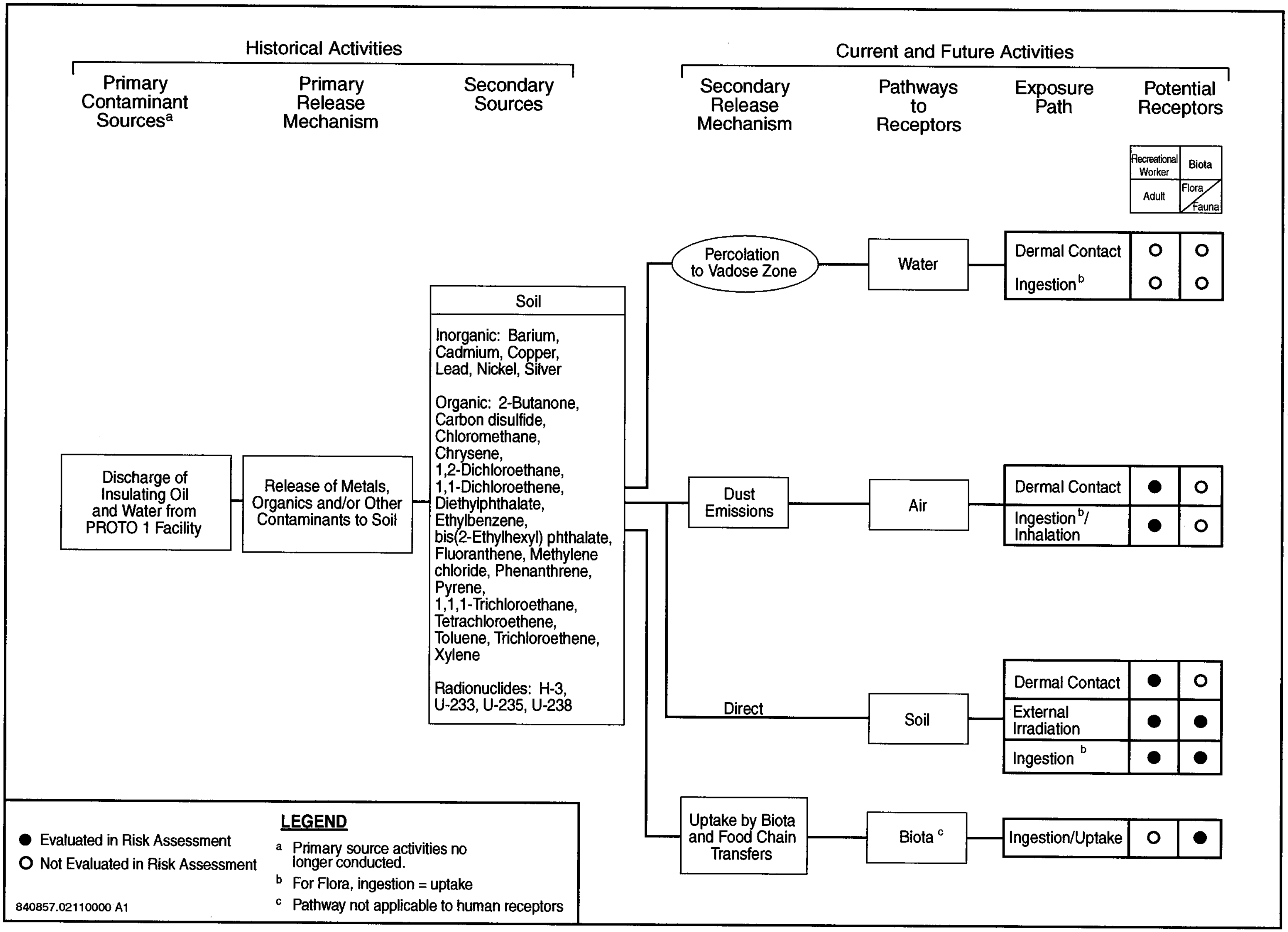

Figure 1

Conceptual Site Model Flow Diagram for SWMU 196, Building 6597 Cistern

VI.4.1 Methodology

Maximum concentrations of the nonradiological COCs were compared to the approved SNL/NM maximum screening levels for this area. The SNL/NM maximum background concentration was selected to provide the background screen in Table 6 and used to calculate risk attributable to background in Section VI.6.2. Only the COCs that were detected above the corresponding SNL/NM maximum background screening levels or did not have either a quantifiable or calculated background screening level are considered in further risk assessment analyses.

For the radiological COCs that exceed the SNL/NM background screening levels, background values are subtracted from the individual maximum radionuclide concentrations. Those that do not exceed these background levels are not carried any further in the risk assessment. This approach is consistent with DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (DOE 1993). Radiological COCs that do not have background screening values and were detected above the analytical minimum detectable activity (MDA) are carried through the risk assessment at the maximum levels. The resultant radiological COCs remaining after this step are referred to as background-adjusted radiological COCs.

VI.4.2 Results

Tables 6 and 8 show the SWMU 196 maximum COC concentrations that were compared to SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment. For the nonradiological COCs, six constituents were measured at concentrations greater than background screening values. Eighteen nonradiological COCs are organic compounds that do not have corresponding background screening values.

The maximum concentration value for lead is 180 mg/kg. The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. However, the NMED guidance for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1,500 mg/kg, respectively (Olson and Moats March 2000). The EPA screening guidance value for a residential land-use scenario is 400 mg/kg (Laws July 1994). The maximum concentration value for lead at this site is less than all the screening values; therefore, lead is eliminated from further consideration in the human health risk assessment.

For the radiological COCs, three constituents (H-3, U-235, and U-238) had MDA values greater than the background screening levels. The greater of either the maximum detection or the highest MDA is conservatively used in the risk assessment. Because U-233 was detected but does not have a background screening level, it is carried through the risk assessment at the maximum detection level.

VI.5 Step 4. Identification of Toxicological Parameters

Tables 11 and 12 list the COCs retained in the risk assessment and provide the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 11 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk

Table 11
Toxicological Parameter Values for SWMU 196 Nonradiological COCs

COC	RfD_o (mg/kg-d)	Confidence[a]	RfD_{inh} (mg/kg-d)	Confidence[a]	SF_o $(mg/kg\text{-}d)^{-1}$	SF_{inh} $(mg/kg\text{-}d)^{-1}$	Cancer Class[b]	ABS
Inorganics								
Barium	7E-2[c]	M	1.4E-4[d]	–	–	–	D	0.01[e]
Cadmium	5E-4[c]	H	5.7E-5[f]	–	–	6.3E+0[c]	B1	0.001[e]
Copper	3.7E-2[f]	–	–	–	–	–	D	0.01[e]
Nickel	2E-2[c]	M	–	–	–	–	–	0.01[e]
Silver	5E-3[c]	L	–	–	–	–	D	0.01[e]
Organic								
2-Butanone	6E-1[c]	L	2.9E-1[c]	L	–	–	D	0.1[e]
Carbon disulfide	1E-1[c]	M	2E-1[c]	M	–	–	–	0.25[g]
Chloromethane	–	–	2.6E-2[c]	M	1.3E-2[d]	6.3E-3[d]	C	0.1[e]
Chrysene	–	–	–	–	7.3E-3[f]	3.1E-3[f]	B2	0.13[e]
1,2-Dichloroethane	2.9E-3[f]		2.9E-3[f]	–	9.1E-2[c]	9.1E-2[c]	B2	0.1[e]
1,1-Dichloroethene	5E-2[c]	M	5.7E-3[c]	M	–	1.2E+0[d]	C	0.1[e]
Diethylphthalate	8E-1[c]	L	8E-1[f]	–	–	–	D	0.1[e]
Ethyl benzene	1E-1[c]	L	2.9E-1[c]	L	3.85E-3[h]	3.85E-3[h]	–	0.1[e]
bis(2-Ethylhexyl) phthalate	2E-2[f]	–	2E-2[f]	–	1.4E-2[f]	1.4E-2[f]		0.01[g]
Fluoranthene	4E-2[c]	L	4E-2[f]	–	–	–	D	0.13[e]
Methylene chloride	6E-2[c]	M	8.6E-1[d]	–	7.5E-2[c]	1.6E-3[c]	B2	0.1[e]
Phenanthrene[i]	3E-1[c]	L	3E-1[f]	–	–	–	D	0.1[e]
Pyrene	3E-2[c]	L	3E-2[f]	–	–	–	D	0.1[e]
1,1,1-Trichloroethane	3.5E-2[f]	–	2.9E-1[f]	–	–	–	D	0.1[e]
Tetrachloroethene	1E-2[c]	M	1.1E-1[f]	–	5.2E-2[f]	1.2E-2[f]	–	0.1[e]
Toluene	2E-1[c]	M	1.1E-1[c]	M	–	–	D	0.1[e]
Trichloroethene	3E-4[f]	–	1.1E-2[f]	–	4E-4[f]	4E-4[f]	–	0.1[e]
Xylene	2E+0[c]	M	2E-1[f]	–	–	–	D	0.1[e]

[a]Confidence associated with IRIS (EPA 2004a) database values. Confidence: L = low, M = medium, H = high.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2004a):
- B1 = Probable human carcinogen. Limited human data are available.
- B2 = Probable human carcinogen. Sufficient evidence in animals and inadequate or no evidence in humans
- C = Possible human carcinogen.
- D = Not classifiable as to human carcinogenicity.

Table 11 (Concluded)
Toxicological Parameter Values for SWMU 196 Nonradiological COCs

[c]Toxicological parameter values from IRIS electronic database (EPA 2004a).
[d]Toxicological parameter values from HEAST (EPA 1997a).
[e]Toxicological parameter values from NMED (February 2004).
[f]Toxicological parameter values from EPA Region 6 electronic database (EPA 2004b).
[g]Toxicological parameter values from Risk Assessment Information System (ORNL 2003).
[h]Toxicological parameter values from EPA Region 9 electronic database (EPA 2002a).
[i]Toxicological parameter values for phenanthrene could not be found. Anthracene was used as a surrogate.

ABS	= Gastrointestinal absorption coefficient.
COC	= Constituent of concern.
EPA	= U.S. Environmental Protection Agency.
HEAST	= Health Effects Assessment Summary Tables.
IRIS	= Integrated Risk Information System.
mg/kg-d	= Milligram(s) per kilogram-day.
$mg/kg\text{-}d^{-1}$	= Per milligram per kilogram-day.
NMED	= New Mexico Environment Department.
RfD_{inh}	= Inhalation chronic reference dose.
RfD_{o}	= Oral chronic reference dose.
SF_{inh}	= Inhalation slope factor.
SF_{o}	= Oral slope factor.
SWMU	= Solid Waste Management Unit.
--	= Information not available.

Table 12
Toxicological Parameter Values for SWMU 196 Radiological COCs Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
H-3	7.2E-14	9.6E-14	0	A
U-233	4.50E-11	1.40E-08	3.50E-11	A
U-235	4.70E-11	1.30E-08	2.70E-07	A
U-238	6.20E-11	1.20E-08	6.60E-08	A

[a]Yu et al. 1993a.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989): A = Human carcinogen for high dose and high dose rate (i.e., greater than 50 rem per year). For low-level environmental exposures, the carcinogenic effect has not been observed and documented.
1/pCi = One per picocurie.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
g/pCi-yr = Gram(s) per picocurie-year.
SF_{ev} = External volume exposure slope factor.
SF_{inh} = Inhalation slope factor.
SF_o = Oral (ingestion) slope factor.
SWMU = Solid Waste Management Unit.

Assessment Information System (ORNL 2003), and the EPA Regions 6 and 9 electronic databases (EPA 2004b, EPA 2002a). Dose conversion factors (DCFs) used in determining the excess TEDE values for radiological COCs for the individual pathways are the default values provided in the RESRAD computer code (Yu et al. 1993a) as developed in the following documents:

- DCFs for ingestion and inhalation were taken from "Federal Guidance Report No. 11, Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (EPA 1988).

- DCFs for surface contamination of the site were taken from DOE/EH-0070, "External Dose-Rate Conversion Factors for Calculation of Dose to the Public" (DOE 1988).

- DCFs for volume contamination (exposure to contamination deeper than the immediate surface of the site) were calculated using the methods discussed in "Dose-Rate Conversion Factors for External Exposure to Photon Emitters in Soil" (Kocher 1983) and in ANL/EAIS-8, "Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil" (Yu et al. 1993b).

VI.6 Step 5. Exposure Assessment and Risk Characterization

Section VI.6.1 describes the exposure assessment for this risk assessment. Section VI.6.2 provides the risk characterization, including the HI and excess cancer risk for both the potential nonradiological COCs and associated background for the industrial and residential land-use scenarios. The incremental TEDE and incremental estimated cancer risk are provided for the background-adjusted radiological COCs for both industrial and residential land-use scenarios.

VI.6.1 Exposure Assessment

Appendix 1 provides the equations and parameter input values used to calculate intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the Risk Assessment Guidance for Superfund (RAGS) (EPA 1989). Parameters are based upon information from the RAGS (EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), as well as other EPA and NMED guidance documents. Parameters reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For radiological COCs, the coded equations provided in RESRAD computer code are used to estimate the incremental TEDE and cancer risk for individual exposure pathways. Further discussion of this process is provided in the "Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD" (Yu et al. 1993a). Although the designated land-use scenario for this site is industrial, risk and TEDE values for a residential land-use scenario are also presented.

VI.6.2 Risk Characterization

Table 13 shows an HI of 0.03 for the SWMU 196 nonradiological COCs and an estimated excess cancer risk of 3E-6 for the designated industrial land-use scenario. The numbers presented include exposure from soil ingestion, dermal contact, and dust and volatile inhalation for nonradiological COCs. Table 14 shows an HI of 0.01 and an estimated excess cancer risk of 3E-10 for the SWMU 196 associated background constituents under the designated industrial land-use scenario.

For the radiological COCs, contribution from the direct gamma exposure pathway is included. For the industrial land-use scenario, a TEDE is calculated for an individual on the site that results in an incremental TEDE of 1.2E-1 millirem (mrem)/year (yr). In accordance with EPA guidance found in Office of Solid Waste and Emergency Response (OSWER) Directive No. 9200.4-18 (EPA 1997b), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for SWMU 196 for the industrial land use is well below this guideline. The estimated excess cancer risk is 1.0E-6.

The HI is 0.27 with an estimated excess cancer risk of 6E-6 for the nonradiological COCs under the residential land-use scenario (Table 13). The numbers in the table include exposure from soil ingestion, dermal contact, and dust inhalation. Although the EPA (1991) guidelines generally recommend that inhalation not be included in a residential land-use scenario, this pathway is included because of the potential for soil in Albuquerque, New Mexico, to be eroded and for dust to be present in predominantly residential areas. Based upon the nature of local soil, other exposure pathways are not evaluated (see Appendix 1). Table 14 shows an HI of 0.08 and an estimated excess cancer risk of 6E-10 for the associated background constituents at SWMU 196 under the residential land-use scenario.

Table 13
Risk Assessment Values for SWMU 196 Nonradiological COCs

COC	Maximum Concentration (All Samples) (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Barium	286	0.00	–	0.05	–
Cadmium	2.5	0.00	8E-10	0.06	2E-9
Copper	213	0.01	–	0.08	–
Nickel	17.8	0.00	–	0.01	–
Silver	2.9	0.00	–	0.01	–
Organic					
2-Butanone	0.5[b]	0.00	–	0.01	–
Carbon disulfide	0.0043 J	0.00	–	0.00	–
Chloromethane	0.5[b]	0.00	2E-7	0.01	4E-7
Chrysene	0.086 J	0.00	4E-10	0.00	1E-9
1,2-Dichloroethane	0.25[b]	0.00	3E-7	0.01	7E-7
1,1-Dichloroethene	0.25[b]	0.00	2E-7	0.00	4E-7
Diethylphthalate	0.39	0.00	–	0.00	–
Ethyl benzene	0.25[b]	0.00	2E-8	0.00	4E-8
bis(2-Ethylhexyl) phthalate	0.43	0.00	2E-9	0.00	1E-8
Fluoranthene	0.33	0.00	–	0.00	–
Methylene chloride	0.25[b]	0.00	1E-8	0.00	3E-8
Phenanthrene	0.14 J	0.00	–	0.00	–
Pyrene	0.22 J	0.00	–	0.00	–
1,1,1-Trichloroethane	0.25[b]	0.00	–	0.00	–
Tetrachloroethene	0.25[b]	0.00	7E-8	0.00	2E-7
Toluene	0.25[b]	0.00	–	0.00	–
Trichloroethene	0.25[b]	0.00	2E-6	0.02	5E-6
Xylene	0.25[b]	0.00	–	0.00	–
Total		**0.03**	**3E-6**	**0.27**	**6E-6**

[a]EPA 1989.
[b]Maximum concentration is one-half of the detection limit.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
J = Concentration was qualified as an estimated value.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
– = Information not available.

Table 14
Risk Assessment Values for SWMU 196 Nonradiological Background Constituents

COC	Background Concentration[a] (mg/kg)	Industrial Land-Use Scenario[b]		Residential Land-Use Scenario[b]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Barium	214	0.00	–	0.04	–
Cadmium	0.9	0.00	3E-10	0.02	6E-10
Copper	15.4	0.00	–	0.01	–
Nickel	11.5	0.00	–	0.01	–
Silver	<1	–	–	–	–
Total		**0.01**	**3E-10**	**0.08**	**6E-10**

[a]Dinwiddie September 1997, Southwest Area Supergroup.
[b]EPA 1989.
COC = Constituent of concern.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
SWMU = Solid Waste Management Unit.
– = Information not available.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 4.3E-1 mrem/yr. The guideline being used is an excess TEDE of 75 mrem/yr (SNL/NM February 1998) for a complete loss of institutional controls (residential land use in this case); the calculated dose value for SWMU 196 for the residential land-use scenario is well below this guideline. Consequently, SWMU 196 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 3.3E-6. The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18, "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination" (EPA 1997b). This summation is tabulated in Section VI.9, "Summary."

VI.7 Step 6. Comparison of Risk Values to Numerical Guidelines

The human health risk assessment analysis evaluates the potential for adverse health effects for both the industrial (the designated land-use scenario for this site) and residential land-use scenarios.

For the nonradiological COCs under the industrial land-use scenario, the HI is 0.03 (lower than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The excess cancer risk is 3E-6. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also determines risks by evaluating background concentrations of the potential nonradiological COCs for both the industrial and residential land-use scenarios. The incremental risk is determined by subtracting risk associated with background from potential COC risk. These numbers are not rounded before the difference is determined and therefore may appear to be inconsistent with numbers presented in tables and within the text. For conservatism, the background constituents that do not have quantified background concentrations are assumed to have a hazard quotient (HQ) of 0.00. The incremental HI is 0.02 and the estimated incremental cancer risk is 2.99E-6 for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs considering an industrial land-use scenario.

For the radiological COCs under the industrial land-use scenario, the incremental TEDE is 1.2E-1 mrem/yr, which is significantly lower than EPA's numerical guideline of 15 mrem/yr (EPA 1997b). The estimated incremental excess cancer risk is 1.0E-6.

For the nonradiological COCs under the residential land-use scenario, the calculated HI is 0.27, which is below the numerical guidance. The excess cancer risk is 6E-6. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.19 and the estimated incremental cancer risk is 6.48E-6 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under a residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological components is 4.3E-1 mrem/yr, which is significantly lower than the numerical guideline of 75 mrem/yr suggested in the SNL/NM "RESRAD Input Parameter Assumptions and Justification" (SNL/NM February 1998). The estimated incremental excess cancer risk is 3.3E-6.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at SWMU 196 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with the FIP (SNL/NM May 2003). The DQOs contained in the FIP are appropriate for use in risk assessments. The data from soil samples collected during the three sampling events (1994–1996, 1999, and 2003) are representative of potential COC releases to the site. The analytical requirements and results satisfy the DQOs, and data quality was verified/validated in accordance with SNL/NM procedures. Therefore, no uncertainty is associated with the data quality used to perform the risk assessment for SWMU 196.

Because of the location, history, and future land use, there is low uncertainty in the land-use scenario and the potentially affected populations that were considered in performing the risk assessment analysis. Based upon the COCs found in near-surface soil and the location and physical characteristics of the site, there is low uncertainty in the exposure pathways relevant to the analysis.

An RME approach is used to calculate the risk assessment values. Specifically, the parameter values in the calculations are conservative and calculated intakes may be overestimated. Maximum measured values of COC concentrations are used to provide conservative results.

Table 11 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a), HEAST (EPA 1997a), the Risk Assessment Information System (ORNL 2003), EPA Regions 6 and 9 (EPA 2004b, EPA 2002a), and the Technical Background Document for Development of

Soil Screening Levels (NMED February 2004). Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 2004a), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), or EPA regions (EPA 2004b, EPA 2002a, EPA 2002b). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for nonradiological COCs are within the acceptable range for human health under residential and industrial land-use scenarios compared to established numerical guidance.

For the radiological COCs, the conclusion of the risk assessment is that potential effects on human health for both industrial and residential land-use scenarios are within guidelines and represent only a small fraction of the estimated 360 mrem/yr received by the average U.S. population (NCRP 1987).

The overall uncertainty in all of the steps in the risk assessment process is not considered to be significant with respect to the conclusion reached.

VI.9 Summary

SWMU 196 contains identified COCs consisting of organic, inorganic, and radiological compounds. Because of the location of the site, the designated industrial land-use scenario, and the nature of contamination, potential exposure pathways identified for this site include soil ingestion, dermal contact, and dust inhalation for chemical COCs and soil ingestion, dust inhalation, and direct gamma exposure for radionuclides. The same exposure pathways are applied to the residential land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the industrial land-use scenario the HI (0.03) is significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is 3E-6. Thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.02 and the incremental excess cancer risk is 2.99E-6 for the industrial land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the industrial land-use scenario.

Using conservative assumptions and an RME approach to risk assessment, calculations for the nonradiological COCs show that for the residential land-use scenario the HI (0.27) is also below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 6E-6. Thus, excess cancer risk is below the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.19 and the incremental excess cancer risk is 6.48E-6 for the residential land-use scenario. The incremental risk calculations indicate insignificant risk to human health for the residential land-use scenario.

The incremental TEDE and corresponding estimated cancer risk from the radiological COCs are much lower than EPA guidance values. The estimated TEDE is 1.2E-1 mrem/yr for the industrial land-use scenario, which is much lower than the EPA's numerical guidance of

15 mrem/yr (EPA 1997b). The corresponding incremental estimated cancer risk value is 1.0E-6 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional control is 4.3E-1 mrem/yr with an associated risk of 3.3E-6. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, SWMU 196 is eligible for unrestricted radiological release.

The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 15.

Table 15
Summation of Incremental Nonradiological and Radiological Risks from SWMU 196, Building 6597 Cistern Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	2.99E-6	1.0E-6	4.0E-6
Residential	6.48E-6	3.3E-6	9.8E-6

SWMU = Solid Waste Management Unit.

Uncertainties associated with the calculations are considered small relative to the conservatism of this risk assessment analysis. Therefore, it is concluded that this site poses insignificant risk to human health under both the industrial and residential land-use scenarios.

VII. Ecological Risk Assessment

VII.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at SWMU 196. A component of the NMED Risk-Based Decision Tree (NMED March 1998) is to conduct an ecological assessment that corresponds with that presented in EPA's Ecological RAGS (EPA 1997c). The current methodology is tiered and contains an initial scoping assessment followed by a more detailed risk assessment. Initial components of NMED's decision tree (a discussion of DQOs, data assessment, and evaluations of bioaccumulation as well as fate and transport potential) are addressed in previous sections of this report. Following the completion of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary. If deemed necessary, the scoping assessment proceeds to a risk assessment whereby a more quantitative estimate of ecological risk is conducted. Although this assessment is conservative in the estimation of ecological risks, ecological relevance and professional judgment are also used as recommended by the EPA (1998) to ensure that predicted exposures of selected ecological receptors reflect those reasonably expected to occur at the site.

VII.2 Scoping Assessment

The scoping assessment focuses primarily on the likelihood of exposure of biota at, or adjacent to, the site to constituents associated with site activities. Included in this section are an evaluation of existing data and a comparison of maximum detected concentrations to background concentrations, examination of bioaccumulation potential, and fate and transport potential. A scoping risk-management decision (Section VII.2.4) summarizes the scoping results and assesses the need for further examination of potential ecological impacts.

VII.2.1 Data Assessment

As indicated in Section IV (Tables 7 and 9), constituents in the soil within the 0- to 5-foot depth interval that are identified as COPECs for this site include the following:

- Cadmium
- Copper
- Lead
- Nickel
- Silver
- H-3
- U-233
- U-235
- U-238

VII.2.2 Bioaccumulation

Among the COPECs listed in Section VII.2.1, the following are considered to have bioaccumulation potential in aquatic environments (Section IV, Tables 7 and 9):

- Cadmium
- Lead
- Nickel
- U-233
- U-235
- U-238

However, as directed by the NMED (March 1998), bioaccumulation for inorganic constituents is assessed exclusively based upon maximum reported bioconcentration factors (BCFs) for aquatic species. Because only aquatic BCFs are used to evaluate the bioaccumulation potential for metals, bioaccumulation in terrestrial species is likely to be overpredicted.

VII.2.3 Fate and Transport Potential

The potential for the COPECs to migrate from the source of contamination to other media or biota is discussed in Section V. As noted in Table 10 (Section V), wind, surface water, and biota (food chain uptake) are expected to be of low significance as transport mechanisms for COPECs at this site. Degradation, transformation, and radiological decay of the COPECs are also expected to be of low significance.

VII.2.4 Scoping Risk-Management Decision

Based upon information gathered through the scoping assessment, it is concluded that complete ecological pathways may be associated with this site and that COPECs also exist at the site. As a consequence, a detailed ecological risk assessment is deemed necessary to predict the potential level of ecological risk associated with the site.

VII.3 Risk Assessment

As concluded in Section VII.2.4, both complete ecological pathways and COPECs are associated with this site. The ecological risk assessment performed for the site involves a quantitative estimate of current ecological risks using exposure models in association with exposure parameters and toxicity information obtained from the literature. The estimation of potential ecological risks is conservative to ensure that ecological risks are not underpredicted.

Components within the risk assessment include the following:

- Problem Formulation—sets the stage for the evaluation of potential exposure and risk.
- Exposure Estimation—provides a quantitative estimate of potential exposure.
- Ecological Effects Evaluation—presents benchmarks used to gauge the toxicity of COPECs to specific receptors.
- Risk Characterization—characterizes the ecological risk associated with exposure of the receptors to environmental media at the site.
- Uncertainty Assessment—discusses uncertainties associated with the estimation of exposure and risk.
- Risk Interpretation—evaluates ecological risk in terms of HQs and ecological significance.
- Risk Assessment Scientific/Management Decision Point—presents the decision to risk managers based upon the results of the risk assessment.

VII.3.1 Problem Formulation

Problem formulation is the initial stage of the risk assessment that provides the introduction to the risk evaluation process. Components that are addressed in this section include a discussion of ecological pathways and the ecological setting, identification of COPECs, and selection of ecological receptors. The conceptual model, ecological food webs, and ecological endpoints (other components commonly addressed in an ecological risk assessment) are presented in "Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratories, New Mexico" (IT July 1998) and are not duplicated here.

VII.3.1.1 Ecological Pathways and Setting

SWMU 196 is less than 1 acre in size. The site is located in an area dominated by grassland habitat. The site is currently fenced, and the Cistern is deep. Therefore, ecological exposure is expected to be very limited. No threatened or endangered species exist at this site (IT February 1995), and no surface-water bodies, seeps, or springs are associated with the site.

Complete ecological pathways may exist at this site through the exposure of plants and wildlife to COPECs in the soil at this site. It is assumed that direct uptake of COPECs from soil is the major route of exposure for plants and that exposure of plants to wind-blown soil is minor. Exposure modeling for the wildlife receptors is limited to the food and soil ingestion pathways and external radiation. Because of the lack of surface water at this site, exposure to COPECs through the ingestion of surface water is considered insignificant. Inhalation and dermal contact also are considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Groundwater is not expected to be affected by COPECs at this site.

VII.3.1.2 COPECs

The Building 6597 Cistern is the primary source of COPECs at SWMU 196. All COPECs identified for this site are listed in Section VII.2. The COPECs include both radiological and nonradiological analytes. The analytes were screened against background concentrations and those that exceed the approved SNL/NM background screening levels (Dinwiddie September 1997) for the area are considered to be COPECs. All organic analytes detected in the soil are retained as COPECs. Nonradiological inorganic constituents that are essential nutrients, such as iron, magnesium, calcium, potassium, and sodium, are not included in this risk assessment as set forth by the EPA (1989). In order to provide conservatism, this ecological risk assessment is based upon the maximum soil concentrations of the COPECs measured in the upper 5 feet of soil at this site. Tables 7 and 9 present the maximum concentrations for the COPECs.

VII.3.1.3 Ecological Receptors

A nonspecific perennial plant has been selected as the receptor to represent plant species at the site (IT July 1998). Vascular plants are the principal primary producers at the site and are key to the diversity and productivity of the wildlife community associated with the site. The deer mouse (*Peromyscus maniculatus*) and the burrowing owl (*Speotyto cunicularia*) are used to represent wildlife use. Because of its opportunistic food habits, the deer mouse is used to represent a mammalian herbivore, omnivore, and insectivore. The burrowing owl represents a top predator at this site. The burrowing owl is present at SNL/NM and is designated a species of management concern by the U.S. Fish and Wildlife Service in Region 2, which includes the state of New Mexico (USFWS September 1995).

VII.3.2 Exposure Estimation

For nonradiological COPECs, direct uptake from the soil is considered the only significant route of exposure for terrestrial plants. Exposure modeling for the wildlife receptors is limited to food and soil ingestion pathways. Inhalation and dermal contact are considered insignificant pathways with respect to ingestion (Sample and Suter 1994). Drinking water is also considered an insignificant pathway because of the lack of surface water at this site. The deer mouse is modeled under three dietary regimes: as an herbivore (100 percent of its diet as plant material), as an omnivore (50 percent of its diet as plants and 50 percent as soil invertebrates), and as an insectivore (100 percent of its diet as soil invertebrates). The burrowing owl is modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Because the exposure in the burrowing owl from a diet consisting of equal parts of herbivorous, omnivorous, and insectivorous deer mice would be equivalent to the exposure consisting of only omnivorous deer mice, the diet of the burrowing owl is modeled with intake of omnivorous deer mice only. Both species are modeled with soil ingestion comprising 2 percent of the total dietary intake. Table 16 presents the species-specific factors used in modeling exposures in the wildlife receptors. Justification for use of the factors presented in this table is described in the ecological risk assessment methodology document (IT July 1998).

Although home range is also included in this table, exposures for this risk assessment are modeled using an area use factor of 1.0, implying that all food items and soil ingested come from the site being investigated. The maximum COPEC concentrations measured in the upper 5 feet of soil are used to conservatively estimate potential exposures and risks to plants and wildlife at this site.

For the radiological dose-rate calculations, the deer mouse is modeled as an herbivore (100 percent of its diet as plants), and the burrowing owl is modeled as a strict predator on small mammals (100 percent of its diet as deer mice). Both are modeled with soil ingestion comprising 2 percent of the total dietary intake. Receptors are exposed to radiation both internally and externally from H-3, U-233, U-235, and U-238. Internal and external dose rates to the deer mouse and the burrowing owl are approximated using modified dose-rate models from the DOE (1995) as presented in the ecological risk assessment methodology document for the SNL/NM ER Project (IT July 1998). Radionuclide-dependent data for the dose-rate calculations were obtained from Baker and Soldat (1992). The external dose-rate model examines the total-body dose rate to a receptor residing in soil exposed to radionuclides. The soil surrounding the receptor is assumed to be an infinite medium uniformly contaminated with gamma-emitting radionuclides. The external dose-rate model is the same for both the deer mouse and the burrowing owl. The internal total-body dose-rate model assumes that a fraction of the radionuclide concentration ingested by a receptor is absorbed by the body and concentrated at the center of a spherical body shape. This provides for a conservative estimate for absorbed dose. This concentrated radiation source at the center of the body of the receptor is assumed to be a "point" source. Radiation emitted from this point source is absorbed by the body tissues to contribute to the absorbed dose. Alpha and beta emitters are assumed to transfer 100 percent of their energy to the receptor as they pass through tissues. Gamma-emitting radionuclides transfer only a fraction of their energy to the tissues because gamma rays interact less with matter than do beta or alpha emitters. The external and internal dose-rate results are summed to calculate a total dose rate from exposure to H-3, U-233, U-235, and U-238 in soil.

Table 17 provides the transfer factors used in modeling the concentrations of COPECs through the food chain. Table 18 presents the maximum concentrations in soil and derived concentrations in tissues of the various food chain elements that are used to model dietary exposures for each of the wildlife receptors.

Table 16
Exposure Factors for Ecological Receptors at SWMU 196

Receptor Species	Class/Order	Trophic Level	Body Weight (kg)[a]	Food Intake Rate (kg/day)[b]	Dietary Composition[c]	Home Range (acres)
Deer Mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Herbivore	2.39E-2[d]	3.72E-3	Plants: 100% (+ Soil at 2% of intake)	2.7E-1[e]
Deer Mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Omnivore	2.39E-2[d]	3.72E-3	Plants: 50% Invertebrates: 50% (+ Soil at 2% of intake)	2.7E-1[e]
Deer Mouse (*Peromyscus maniculatus*)	Mammalia/ Rodentia	Insectivore	2.39E-2[d]	3.72E-3	Invertebrates: 100% (+ Soil at 2% of intake)	2.7E-1[e]
Burrowing owl (*Speotyto cunicularia*)	Aves/ Strigiformes	Carnivore	1.55E-1[f]	1.73E-2	Rodents: 100% (+ Soil at 2% of intake)	3.5E+1[g]

[a]Body weights are in kg wet weight.
[b]Food intake rates are estimated from the allometric equations presented in Nagy (1987). Units are kg dry weight per day.
[c]Dietary compositions are generalized for modeling purposes. Default soil intake value of 2 percent of food intake.
[d]Silva and Downing 1995.
[e]EPA (1993), based upon the average home range measured in semiarid shrubland in Idaho.
[f]Dunning 1993.
[g]Haug et al. 1993.
EPA = U.S. Environmental Protection Agency.
kg = Kilogram(s).
SWMU = Solid Waste Management Unit.

Table 17
Transfer Factors Used in Exposure Models for COPECs at SWMU 196

COPEC	Soil-to-Plant Transfer Factor	Soil-to-Invertebrate Transfer Factor	Food-to-Muscle Transfer Factor
Inorganic			
Cadmium	5.5E-1[a]	6.0E-1[b]	5.5E-4[a]
Copper	8.0E-1[c]	2.5E-1[b]	1.0E-2[a]
Lead	9.0E-2[d]	4.0E-2[b]	8.0E-4[d]
Nickel	2.0E-1[d]	3.8E-1[e]	6.0E-3[a]
Silver	1.0E+0[d]	2.5E-1[b]	5.0E-3[d]

[a]Baes et al. 1984.
[b]Stafford et al. 1991.
[c]IAEA 1994.
[d]NCRP January 1989.
[e]Ma 1982.
COPEC = Constituent of potential ecological concern.
IAEA = International Atomic Energy Agency.
NCRP = National Council on Radiation Protection and Measurements.
SWMU = Solid Waste Management Unit.

Table 18
Media Concentrations[a] for COPECs at SWMU 196

COPEC	Soil (Maximum)[a]	Plant Foliage[b]	Soil Invertebrate[b]	Deer Mouse Tissues[c]
Inorganic				
Cadmium	2.5E+0	1.4E+0	1.5E+0	2.6E-3
Copper	2.1E+2	1.7E+2	5.3E+1	3.6E+0
Lead	1.8E+2	1.6E+1	7.2E+0	3.8E-2
Nickel	1.8E+1	3.6E+0	6.8E+0	1.0E-1
Silver	2.9E+0	2.9E+0	7.3E-1	2.9E-2

[a]In milligrams per kilogram. All biotic media are based upon dry weight of the media. Soil concentration measurements are assumed to have been based upon dry weight. Values have been rounded to two significant digits after calculation.
[b]Product of the soil concentration and the corresponding transfer factor.
[c]Based upon the deer mouse with an omnivorous diet. Product of the average concentration ingested in food and soil times the food-to-muscle transfer factor times a wet weight-dry weight conversion factor of 3.125 (EPA 1993).
COPEC = Constituent of potential ecological concern.
SWMU = Solid Waste Management Unit.

VII.3.3 Ecological Effects Evaluation

Table 19 shows benchmark toxicity values for the plant and wildlife receptors. For plants, the benchmark soil concentrations are based upon the lowest-observed-adverse-effect level (LOAEL). For wildlife, the toxicity benchmarks are based upon the no-observed-adverse-effect level (NOAEL) for chronic oral exposure in a taxonomically similar test species. Sufficient toxicity information was not available to estimate the LOAELs or NOAELs for some COPECs.

The benchmark used for exposure of terrestrial receptors to radiation was 0.1 rad/day. This value has been recommended by the International Atomic Energy Agency (IAEA 1992) for the protection of terrestrial populations. Because plants and insects are less sensitive to radiation than vertebrates (Whicker and Schultz 1982), the dose of 0.1 rad/day should also protect other groups within the terrestrial habitat of SWMU 196.

VII.3.4 Risk Characterization

Maximum concentrations in soil and estimated dietary exposures are compared to plant and wildlife benchmark values, respectively. Table 20 presents the results of these comparisons. HQs are used to quantify the comparison with benchmarks for plant and wildlife exposure.

HQs for plants exceed unity for copper, lead, and silver. Because of a lack of sufficient toxicity information, HQs for the burrowing owl could not be determined for silver. As directed by the NMED, HIs are calculated for each of the receptors (the HI is the sum of chemical-specific HQs for all pathways for a given receptor). The maximum HI is 8.6 for plants.

Tables 21 and 22 summarize the internal and external dose-rate model results for H-3, U-233, U-235, and U-238 for the deer mouse and burrowing owl, respectively. The total radiation dose rate for the deer mouse is predicted to be 1.1E-3 rad/day and that for the burrowing owl is 8.7E-4 rad/day. The dose rates for the deer mouse and the burrowing owl are lower than the benchmark of 0.1 rad/day.

VII.3.5 Uncertainty Assessment

Many uncertainties are associated with the characterization of ecological risks at SWMU 196. These uncertainties result from assumptions used in calculating risk that may overestimate or underestimate true risk presented at the site. For this risk assessment, assumptions are made that are more likely to overestimate exposures and risk rather than to underestimate them. These conservative assumptions are used to be more protective of the ecological resources potentially affected by the site. Conservatisms incorporated into this risk assessment include the use of maximum analyte concentrations measured in soil samples to evaluate risk, the use of wildlife toxicity benchmarks based upon NOAEL values, and the incorporation of strict herbivorous and strict insectivorous diets for predicting the extreme HQ values for the deer mouse. Each of these uncertainties, which are consistent among each of the site-specific ecological risk assessments, is discussed in greater detail in the uncertainty section of the ecological risk assessment methodology document for the SNL/NM ER Project (IT July 1998).

Table 19
Toxicity Benchmarks for Ecological Receptors at SWMU 196

COPEC	Plant Benchmark[a,b]	Mammalian NOAELs			Avian NOAELs		
		Mammalian Test Species[c,d]	Test Species NOAEL[d,e]	Deer Mouse NOAEL[e,f]	Avian Test Species[d]	Test Species NOAEL[d,e]	Burrowing Owl NOAEL[e,g]
Inorganic							
Cadmium	3	rat[h]	1	1.9	mallard	1.45	1.45
Copper	100	mink	11.7	29.8	chicks	47	47
Lead	50	rat	8	15.7	American kestrel	3.85	3.85
Nickel	30	rat	40	78.2	mallard	77.4	77.4
Silver	2	rat	17.8	34.8	–	–	–

[a]In mg/kg soil dry weight.
[b]Efroymson et al. 1997.
[c]Body weights (in kg) for the NOAEL conversion are as follows: lab rat, 0.350; mink, 1.0 (except where noted).
[d]Sample et al. 1996, except where noted.
[e]In mg/kg body weight per day.
[f]Based upon NOAEL conversion methodology presented in Sample et al. (1996), using a deer mouse body weight of 0.0239 kg and a mammalian scaling factor of 0.25.
[g]Based upon NOAEL conversion methodology presented in Sample et al. (1996). The avian scaling factor of 0.0 was used, making the NOAEL independent of body weight.
[h]Body weight: 0.303 kg.
COPEC = Constituent of potential ecological concern.
kg = Kilogram(s).
mg/kg = Milligram(s) per kilogram.
NOAEL = No-observed-adverse-effect level.
SWMU = Solid Waste Management Unit.
– = Insufficient toxicity data.

Table 20
HQs for Ecological Receptors at SWMU 196

COPEC	Plant HQ[a]	Deer Mouse HQ[a] (Herbivorous)	Deer Mouse HQ (Omnivorous)	Deer Mouse HQ (Insectivorous)	Burrowing Owl HQ
Inorganic					
Cadmium	8.3E-1	1.2E-1	1.2E-1	1.3E-1	4.0E-3
Copper	**2.1E+0**	9.1E-1	6.1E-1	3.0E-1	1.9E-2
Lead	**3.6E+0**	2.0E-1	1.5E-1	1.1E-1	1.1E-1
Nickel	5.9E-1	7.8E-3	1.1E-2	1.4E-2	6.6E-4
Silver	**1.5E+0**	1.3E-2	8.4E-3	3.5E-3	–
HI[b]	**8.6E+0**	**1.2E+0**	9.0E-1	5.5E-1	1.3E-1

[a]**Bold** values indicate the HQ or HI exceeds unity.
[b]The HI is the sum of individual HQs.
COPEC = Constituent of potential ecological concern.
HI = Hazard index.
HQ = Hazard quotient.
SWMU = Solid Waste Management Unit.
– = Insufficient toxicity data available for risk estimation purposes.

Table 21
Total Dose Rates for the Deer Mouse
Exposed to Radionuclides at SWMU 196

Radionuclide	Maximum Activity (pCi/g)	Total Dose (rad/day)
H-3	ND (98)	3.1E-4
U-233	0.89	1.0E-5
U-235	ND (0.315)	8.6E-6
U-238	ND (4.8)	7.8E-4
Total Dose		1.1E-3

MDA = Minimum detectable activity.
ND ( ) = Not detected above the MDA, shown in parentheses.
pCi/g = Picocurie(s) per gram.
SWMU = Solid Waste Management Unit.

Table 22
Total Dose Rates for the Burrowing Owl
Exposed to Radionuclides at SWMU 196

Radionuclide	Maximum Activity (pCi/g)	Total Dose (rad/day)
H-3	ND (98)	1.1E-4
U-233	0.89	4.3E-6
U-235	ND (0.315)	6.5E-6
U-238	ND (4.8)	7.5E-4
Total Dose		8.7E-4

MDA = Minimum detectable activity.
ND ( ) = Not detected above the MDA, shown in parentheses.
pCi/g = Picocurie(s) per gram.
SWMU = Solid Waste Management Unit.

Initial predictions of potential risk to plants from exposure to several metals were based upon maximum measured soil concentrations, highly conservative plant toxicity benchmarks, and assumptions of high bioavailability. Actual risk to this receptor is expected to be low based upon more realistic exposure assumptions. In addition, all of the plant HQs are below 10, indicating low average risk to this receptor from these COPECs.

Uncertainties associated with the estimation of risk to ecological receptors following exposure to H-3, U-233, U-235, and U-238 are primarily related to those inherent in the radionuclide-specific data. Radionuclide-dependent data are measured values that have their associated errors. The dose-rate models used for these calculations are based upon conservative estimates of receptor shape, radiation absorption by body tissues, and intake parameters. The goal is to provide a realistic but conservative estimate of a receptor's internal and external exposure to radionuclides in soil.

VII.3.6 Risk Interpretation

Ecological risks associated with SWMU 196 were estimated through a risk assessment that incorporates site-specific information when available. Initial predictions of potential risk to plants from exposure to several metals were based upon maximum measured soil concentrations, highly conservative plant toxicity benchmarks, and assumptions of high bioavailability. Actual risk to this receptor is expected to be low based upon more realistic exposure assumptions. All of the remaining receptor HQs are less then unity. Based upon this final analysis, the potential for ecological risks associated with SWMU 196 is expected to be low.

VII.3.7 Risk Assessment Scientific/Management Decision Point

After potential ecological risks associated with the site have been assessed, a decision is made regarding whether the site should be recommended for NFA or whether additional data should be collected to more thoroughly assess actual ecological risk at the site. With respect to this site, ecological risks are predicted to be low. The scientific/management decision is to recommend SWMU 196 for NFA.

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APPENDIX 1
EXPOSURE PATHWAY DISCUSSION FOR CHEMICAL AND RADIONUCLIDE CONTAMINATION

Introduction

Sandia National Laboratories/New Mexico (SNL/NM) uses a default set of exposure routes and associated default parameter values developed for each future land-use designation being considered for SNL/NM Environmental Restoration (ER) Project sites. This default set of exposure scenarios and parameter values are invoked for risk assessments unless site-specific information suggests other parameter values. Because many SNL/NM solid waste management units (SWMUs) have similar types of contamination and physical settings, SNL/NM believes that the risk assessment analyses at these sites can be similar. A default set of exposure scenarios and parameter values facilitates the risk assessments and subsequent review.

The default exposure routes and parameter values used are those that SNL/NM views as resulting in a Reasonable Maximum Exposure (RME) value. Subject to comments and recommendations by the U.S. Environmental Protection Agency (EPA) Region VI and New Mexico Environment Department (NMED), SNL/NM will use these default exposure routes and parameter values in future risk assessments.

At SNL/NM, all SWMUs exist within the boundaries of the Kirtland Air Force Base. Approximately 240 potential waste and release sites have been identified where hazardous, radiological, or mixed materials may have been released to the environment. Evaluation and characterization activities have occurred at all of these sites to varying degrees. Among other documents, the SNL/NM ER draft Environmental Assessment (DOE 1996) presents a summary of the hydrogeology of the sites and the biological resources present. When evaluating potential human health risk the current or reasonably foreseeable land use negotiated and approved for the specific SWMU/AOC, aggregate, or watershed will be used. The following references generally document these land uses: *Workbook: Future Use Management Area 2 (DOE et al. September 1995); Workbook: Future Use Management Area 1 (DOE et al. October 1995); Workbook: Future Use Management Areas 3, 4, 5, and 6 (DOE and USAF January 1996); Workbook: Future Use Management Area 7 (DOE and USAF March 1996)*. At this time, all SNL/NM SWMUs have been tentatively designated for either industrial or recreational future land use. The NMED has also requested that risk calculations be performed based upon a residential land-use scenario. Therefore, all three land-use scenarios will be addressed in this document.

The SNL/NM ER Project has screened the potential exposure routes and identified default parameter values to be used for calculating potential intake and subsequent hazard index (HI), excess cancer risk and dose values. The EPA (EPA 1989) provides a summary of exposure routes that could potentially be of significance at a specific waste site. These potential exposure routes consist of:

- Ingestion of contaminated drinking water
- Ingestion of contaminated soil

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water
- Dermal contact with chemicals in soil
- Inhalation of airborne compounds (vapor phase or particulate)
- External exposure to penetrating radiation (immersion in contaminated air; immersion in contaminated water; and exposure from ground surfaces with photon-emitting radionuclides)

Based upon the location of the SNL/NM SWMUs and the characteristics of the surface and subsurface at the sites, we have evaluated these potential exposure routes for different land-use scenarios to determine which should be considered in risk assessment analyses (the last exposure route is pertinent to radionuclides only). At SNL/NM SWMUs, there is currently no consumption of fish, shellfish, fruits, vegetables, meat, eggs, or dairy products that originate on site. Additionally, no potential for swimming in surface water is present due to the high-desert environmental conditions. As documented in the RESRAD computer code manual (ANL 1993), risks resulting from immersion in contaminated air or water are not significant compared to risks from other radiation exposure routes.

For the industrial and recreational land-use scenarios, SNL/NM ER has, therefore, excluded the following five potential exposure routes from further risk assessment evaluations at any SNL/NM SWMU:

- Ingestion of contaminated fish and shellfish
- Ingestion of contaminated fruits and vegetables
- Ingestion of contaminated meat, eggs, and dairy products
- Ingestion of contaminated surface water while swimming
- Dermal contact with chemicals in water

That part of the exposure pathway for radionuclides related to immersion in contaminated air or water is also eliminated.

Based upon this evaluation, for future risk assessments the exposure routes that will be considered are shown in Table 1.

Table 1
Exposure Pathways Considered for Various Land-Use scenarios

Industrial	Recreational	Residential
Ingestion of contaminated drinking water	Ingestion of contaminated drinking water	Ingestion of contaminated drinking water
Ingestion of contaminated soil	Ingestion of contaminated soil	Ingestion of contaminated soil
Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)	Inhalation of airborne compounds (vapor phase or particulate)
Dermal contact (nonradiological constituents only) soil only	Dermal contact (nonradiological constituents only) soil only	Dermal contact (nonradiological constituents only) soil only
External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces	External exposure to penetrating radiation from ground surfaces

Equations and Default Parameter Values for Identified Exposure Routes

In general, SNL/NM expects that ingestion of compounds in drinking water and soil will be the more significant exposure routes for chemicals; external exposure to radiation may also be significant for radionuclides. All of the above routes will, however, be considered for their appropriate land-use scenarios. The general equation for calculating potential intakes via these routes is shown below. The equations are taken from "Assessing Human Health Risks Posed by Chemicals: Screening-Level Risk Assessment" (NMED March 2000) and "Technical Background Document for Development of Soil Screening Levels" (NMED December 2000). Equations from both documents are based upon the "Risk Assessment Guidance for Superfund" (RAGS): Volume 1 (EPA 1989, EPA 1991). These general equations also apply to calculating potential intakes for radionuclides. A more in-depth discussion of the equations used in performing radiological pathway analyses with the RESRAD code may be found in the RESRAD Manual (ANL 1993). RESRAD is the only code designated by the U.S. Department of Energy (DOE) in DOE Order 5400.5 for the evaluation of radioactively contaminated sites (DOE 1993). The Nuclear Regulatory Commission (NRC) has approved the use of RESRAD for dose evaluation by licensees involved in decommissioning, NRC staff evaluation of waste disposal requests, and dose evaluation of sites being reviewed by NRC staff. EPA Science Advisory Board reviewed the RESRAD model. EPA used RESRAD in their rulemaking on radiation site cleanup regulations. RESRAD code has been verified, undergone several benchmarking analyses, and been included in the International Atomic Energy Agency's VAMP and BIOMOVS II projects to compare environmental transport models.

Also shown are the default values SNL/NM ER will use in RME risk assessment calculations for industrial, recreational, and residential land-use scenarios, based upon EPA and other governmental agency guidance. The pathways and values for chemical contaminants are discussed first, followed by those for radionuclide contaminants. RESRAD input parameters that are left as the default values provided with the code are not discussed. Further information relating to these parameters may be found in the RESRAD Manual (ANL 1993) or by directly accessing the RESRAD websites at: http://web.ead.anl.gov/resrad/home2/ or http://web.ead.anl.gov/resrad/documents/.

Generic Equation for Calculation of Risk Parameter Values

The equation used to calculate the risk parameter values (i.e., hazard quotients/HI, excess cancer risk, or radiation total effective dose equivalent [TEDE] [dose]) is similar for all exposure pathways and is given by:

Risk (or Dose) = Intake x Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)

= C x (CR x EFD/BW/AT) x Toxicity Effect (1)

where;

C = contaminant concentration (site specific)
CR = contact rate for the exposure pathway
EFD= exposure frequency and duration
BW = body weight of average exposure individual
AT = time over which exposure is averaged.

For nonradiological constituents of concern (COCs), the total risk/dose (either cancer risk or HI) is the sum of the risks/doses for all of the site-specific exposure pathways and contaminants. For radionuclides, the calculated radiation exposure, expressed as TEDE is compared directly to the exposure guidelines of 15 millirem per year (mrem/year) for industrial and recreational future use and 75 mrem/year for the unlikely event that institutional control of the site is lost and the site is used for residential purposes (EPA 1997).

The evaluation of the carcinogenic health hazard produces a quantitative estimate for excess cancer risk resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of the quantitative estimate with the potentially acceptable risk of 1E-5 for nonradiological carcinogens. The evaluation of the noncarcinogenic health hazard produces a quantitative estimate (i.e., the HI) for the toxicity resulting from the COCs present at the site. This estimate is evaluated for determination of further action by comparison of this quantitative estimate with the EPA standard HI of unity (1). The evaluation of the health hazard from radioactive compounds produces a quantitative estimate of doses resulting from the COCs present at the site. This estimated dose is used to calculate an assumed risk. However, this calculated risk is presented for illustration purposes only, not to determine compliance with regulations.

The specific equations used for the individual exposure pathways can be found in RAGS (EPA 1989) and are outlined below. The RESRAD Manual (ANL 1993) describes similar equations for the calculation of radiological exposures.

Soil Ingestion

A receptor can ingest soil or dust directly by working in the contaminated soil. Indirect ingestion can occur from sources such as unwashed hands introducing contaminated soil to food that is then eaten. An estimate of intake from ingesting soil will be calculated as follows:

$$I_s = \frac{C_s * IR * CF * EF * ED}{BW * AT}$$

where:

I_s = Intake of contaminant from soil ingestion (milligrams [mg]/kilogram [kg]-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Ingestion rate (mg soil/day)
CF = Conversion factor (1E-6 kg/mg)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

It should be noted that it is conservatively assumed that the receptor only ingests soil from the contaminated source.

Soil Inhalation

A receptor can inhale soil or dust directly by working in the contaminated soil. An estimate of intake from inhaling soil will be calculated as follows (EPA August 1997):

$$I_s = \frac{C_s * IR * EF * ED * \left(\frac{1}{VF} \, or \, \frac{1}{PEF} \right)}{BW * AT}$$

where:

I_s = Intake of contaminant from soil inhalation (mg/kg-day)
C_s = Chemical concentration in soil (mg/kg)
IR = Inhalation rate (cubic meters [m^3]/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
VF = soil-to-air volatilization factor (m^3/kg)
PEF = particulate emission factor (m^3/kg)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Soil Dermal Contact

$$D_a = \frac{C_s * CF * SA * AF * ABS * EF * ED}{BW * AT}$$

where:

D_a = Absorbed dose (mg/kg-day)
C_s = Chemical concentration in soil (mg/kg)
CF = Conversion factor (1E-6 kg/mg)
SA = Skin surface area available for contact (cm^2/event)
AF = Soil to skin adherence factor (mg/cm^2)
ABS = Absorption factor (unitless)
EF = Exposure frequency (events/year)

ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Groundwater Ingestion

A receptor can ingest water by drinking it or through using household water for cooking. An estimate of intake from ingesting water will be calculated as follows (EPA August 1997):

$$I_w = \frac{C_w * IR * EF * ED}{BW * AT}$$

where:

I_w = Intake of contaminant from water ingestion (mg/kg/day)
C_w = Chemical concentration in water (mg/liter [L])
IR = Ingestion rate (L/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged) (days)

Groundwater Inhalation

The amount of a constituent taken into the body via exposure to volatilization from showering or other household water uses will be evaluated using the concentration of the constituent in the water source (EPA 1991 and 1992). An estimate of intake from volatile inhalation from groundwater will be calculated as follows (EPA 1991):

$$I_w = \frac{C_w * K * IR_i * EF * ED}{BW * AT}$$

where:

I_w = Intake of volatile in water from inhalation (mg/kg/day)
C_w = Chemical concentration in water (mg/L)
K = volatilization factor (0.5 L/m^3)
IR_i = Inhalation rate (m^3/day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
BW = Body weight (kg)
AT = Averaging time (period over which exposure is averaged—days)

For volatile compounds, volatilization from groundwater can be an important exposure pathway from showering and other household uses of groundwater. This exposure pathway will only be evaluated for organic chemicals with a Henry's Law constant greater than $1x10^{-5}$ and with a molecular weight of 200 grams/mole or less (EPA 1991).

Tables 2 and 3 show the default parameter values suggested for use by SNL/NM at SWMUs, based upon the selected land-use scenarios for nonradiological and radiological COCs, respectively. References are given at the end of the table indicating the source for the chosen parameter values. SNL/NM uses default values that are consistent with both regulatory guidance and the RME approach. Therefore, the values chosen will, in general, provide a conservative estimate of the actual risk parameter. These parameter values are suggested for use for the various exposure pathways, based upon the assumption that a particular site has no unusual characteristics that contradict the default assumptions. For sites for which the assumptions are not valid, the parameter values will be modified and documented.

Summary

SNL/NM will use the described default exposure routes and parameter values in risk assessments at sites that have an industrial, recreational, or residential future land-use scenario. There are no current residential land-use designations at SNL/NM ER sites, but NMED has requested this scenario to be considered to provide perspective of the risk under the more restrictive land-use scenario. For sites designated as industrial or recreational land use, SNL/NM will provide risk parameter values based upon a residential land-use scenario to indicate the effects of data uncertainty on risk value calculations or in order to potentially mitigate the need for institutional controls or restrictions on SNL/NM ER sites. The parameter values are based upon EPA guidance and supplemented by information from other government sources. If these exposure routes and parameters are acceptable, SNL/NM will use them in risk assessments for all sites where the assumptions are consistent with site-specific conditions. All deviations will be documented.

Table 2
Default Nonradiological Exposure Parameter Values for Various Land-Use scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency (day/yr)	250[a,b]	8.7 (4 hr/wk for 52 wk/yr)[a,b]	350[a,b]
Exposure Duration (yr)	25[a,b,c]	30[a,b,c]	30[a,b,c]
Body Weight (kg)	70[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]	70 Adult[a,b,c] 15 Child[a,b,c]
Averaging Time (days) for Carcinogenic Compounds (= 70 yr x 365 day/yr) for Noncarcinogenic Compounds (= ED x 365 day/yr)	25,550[a,b] 9,125[a,b]	25,550[a,b] 10,950[a,b]	25,550[a,b] 10,950[a,b]
Soil Ingestion Pathway			
Ingestion Rate (mg/day)	100[a,b]	200 Child[a,b] 100 Adult[a,b]	200 Child[a,b] 100 Adult[a,b]
Inhalation Pathway			
Inhalation Rate (m^3/day)	20[a,b]	15 Child[a] 30 Adult[a]	10 Child[a] 20 Adult[a]
Volatilization Factor (m^3/kg)	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor (m^3/kg)	1.36E9[a]	1.36E9[a]	1.36E9[a]
Water Ingestion Pathway			
Ingestion Rate (liter/day)	2.4[a]	2.4[a]	2.4[a]
Dermal Pathway			
Skin Adherence Factor (mg/cm^2)	0.2[a]	0.2 Child[a] 0.07 Adult[a]	0.2 Child[a] 0.07 Adult[a]
Exposed Surface Area for Soil/Dust (cm^2/day)	3,300[a]	2,800 Child[a] 5,700 Adult[a]	2,800 Child[a] 5,700 Adult[a]
Skin Adsorption Factor	Chemical Specific	Chemical Specific	Chemical Specific

[a]Technical Background Document for Development of Soil Screening Levels (NMED 2000).
[b]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[c]Exposure Factors Handbook (EPA August 1997).
ED = Exposure duration.
EPA = U.S. Environmental Protection Agency.
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not available.
wk = Week(s).
yr = Year(s).

Table 3
Default Radiological Exposure Parameter Values for Various Land-Use scenarios

Parameter	Industrial	Recreational	Residential
General Exposure Parameters			
Exposure Frequency	8 hr/day for 250 day/yr	4 hr/wk for 52 wk/yr	365 day/yr
Exposure Duration (yr)	25[a,b]	30[a,b]	30[a,b]
Body Weight (kg)	70 Adult[a,b]	70 Adult[a,b]	70 Adult[a,b]
Soil Ingestion Pathway			
Ingestion Rate	100 mg/day[c]	100 mg/day[c]	100 mg/day[c]
Averaging Time (days) (= 30 yr x 365 day/yr)	10,950[d]	10,950[d]	10,950[d]
Inhalation Pathway			
Inhalation Rate (m^3/yr)	7,300[d,e]	10,950[e]	7,300[d,e]
Mass Loading for Inhalation g/m^3	1.36 E-5[d]	1.36 E-5[d]	1.36 E-5[d]
Food Ingestion Pathway			
Ingestion Rate, Leafy Vegetables (kg/yr)	NA	NA	16.5[c]
Ingestion Rate, Fruits, Non-Leafy Vegetables & Grain (kg/yr)	NA	NA	101.8[b]
Fraction Ingested	NA	NA	0.25[b,d]

[a]Risk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).
[b]Exposure Factors Handbook (EPA August 1997).
[c]EPA Region VI guidance (EPA 1996).
[d]For radionuclides, RESRAD (ANL 1993).
[e]SNL/NM (February 1998).
EPA = U.S. Environmental Protection Agency.
g = Gram(s)
hr = Hour(s).
kg = Kilogram(s).
m = Meter(s).
mg = Milligram(s).
NA = Not applicable.
wk = Week(s).
yr = Year(s).

References

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DOE and USAF, see U.S. Department of Energy and U.S. Air Force.

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Attachment F

ATTACHMENT F
SWMU 196
Surface-Water Assessment Report

SURFACE WATER SITE ASSESSMENT

Part B (3 pages)

Site Information:

1a) Site # 196 **1b)** Building # (if applicable) NA **1c)** OU # 1306

2. Date/Time (M/D/Y H:M, 24Hr) 08-15-00) 1125

Site Setting:

3a) On Alluvial Plain.

3b) Within a bench of an arroyo or drainage basin

3c) In canyon floor/drainage basin, but not in an established channel.

3d) Within established arroyo channel/drainage basin

Explanation: Building 6597 Cistern (TA-U)
Open bottom cistern

4. Estimated ground and / or canopy cover at the site: (deciduous leaves, pine needles, vegetation, trees, rocks)

Estimated percent of ground cover:

a) X X X X X

b) X X X X X X X X X X X X

c) X X X X X X X X X X X X X X X X X X X X X X X

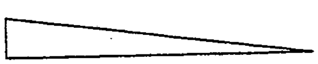
0-25% cover

25-75% cover

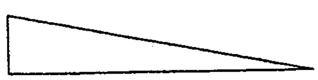
75-100% cover

Explanation:
Slight gravel and soil. No vegetation.

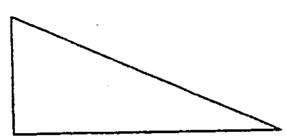
5. Steepest slope at the area impacted:

a) 

less than 10%

b) 

10 to 30%

c) 

30% or greater

Explanation:

SURFACE WATER SITE ASSESSMENT

Part B (3 pages)
SITE 196

Runoff Factors:

Y / N

6) Is there visible evidence of runoff discharging from the site? If yes, answer a) – c) below:

6a) Is runoff channelized? If yes, describe. Man-made channel. Natural Channel.

6b) Where does evidence of runoff terminate?

Drainage or wetland. (name)	NA
Within bench of Canyon setting. (name)	NA
Other (retention pond, meadow, mesa top etc)	NA

Explanation: NA

6c) Has runoff caused visible erosion at the site? If yes, explain. Sheet Rill Gully

Explanation: NA

Run-on Factors:

Rate the potential for storm water to run on to this site: (Check **EITHER** #7 or #9)

Note: Include comments in appropriate boxes if both natural and man-made run-on exist.

7. Are structures creating run-on to the site? (buildings, roof drains, parking lots, storm drains)

Explanation: NA

8. Are current operations adversely impacting run-on to the site? (fire hydrants, NPDES outfalls)

Explanation: NA

9. Are natural drainage patterns directing stormwater onto the site?

Explanation: NA

SURFACE WATER SITE ASSESSMENT

Part B (3 pages)
SITE 196

Assessment Finding:

Y / N

○ ○ 10. Based on the above criteria and the assessment of this site, do soil erosion potentials exist? **(REFER TO EROSION POTENTIAL MATRIX)**

Explanation: NA

11. ANGEL B VEGA
Angel B Vega Jr
ER SW Representative
MSM / 6135 / 844-9081
Company / Organization / Phone #

Task Leader or Designee
GRAM / 6133 / 284-2588
Company / Organization / Phone

Initials of Independent Reviewer. ☐ Check here when information is entered into database. ☐

Notes Recommendations & Photos. (Please attach photos)

○ ○ 12a. Is there visible trash / debris on the site?

○ ○ 12b. Is there visible trash / debris in the watercourse?

Description of existing BMP's: NA

○ ○ 13a. Are BMP's being properly maintained? (If no, describe in "Other Internal Notes")

○ ○ 13b. Are BMP's effectively keeping sediment in place and reducing erosion potential?

Recommended BMP's for this site: NA

Other Internal Notes:

Surface Water Site Assessment Erosion Matrix Sheet

SWMU / IRP # 196/NA

CRITERIA EVALUATED	Value	Erosion / Sediment transport Potential Factor: Low 0.1	Medium 0.5	High 1.0	Calculated Score
Site Setting (43 point max.)					
On Mesa top or hill top	1	No Multiplying Factor	Defined Based on Topgraphic Setting		
Within bench of canyon/drainage basin	4				4
Within canyon floodplain or drainage basin, but not in watercourse	13				
Within canyon bottom or drainage basin and in watercourse	17				
Estimated % ground and canopy cover	13	> 75 %	25 - 75 %	✓ < 25 %	13
Slope at area impacted	13	0 - 10 %	10 - 30 %	> 30 %	~~13.0~~ 0 SAY
				Section Total	[illegible]
Surface Water Run-off Factors (46 point max.)					
Visible evidence of runoff discharge? (Y/N)	5	If NO, Score 0 for Run-off Section. If YES, Score 5 and Complete Section.			0
Where does runoff terminate?	19	Other	Bench Setting	Drainage/Wetland	0
Has runoff caused visible erosion? (Y/N)	22	Sheet	Rill	Gully	0
		If NO, Score as 0. If YES, Caculate and Record Value.			
				Section Total	
Surface Water Run-on Factors (11 point max.)					
Do structures adversely affect run-on?* (Y/N)	7	If YES, Score as 7. If NO, Score as 0.			0
Does natural drainage adversely affect site run-on?* (Y/N)	7	If YES, Score as 7. If NO, Score as 0.			0
Do current operations adversely impact site run-on? (Y/N)	4	If YES, Score as 4. If NO, Score as 0.			0
* Select either structures OR natural drainage.					
MAX. POSSIBLE EROSION MATRIX SCORE:	100	Score: < 40 = low erosion potential 40 - 60 = moderate erosion potential > 60 = high erosion potential		**Total Score**	[illegible]

RSI

f ram

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

cc: ES&HSEC Carolyn O. VAS

MAY 2 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East, Building 1
Santa Fe, NM 87505

Dear Mr. Bearzi:

On behalf of the Department of Energy (DOE) and Sandia Corporation, DOE is submitting the enclosed responses to NMED's Request for Supplemental Information, Environmental Restoration Project Supplemental and No Further Action for Various Solid Waste Management Units (SWMUs 1, 78, 196 and 46) dated October 2004 Sandia National Laboratories, New Mexico, EPA ID No. NM589011518, HWB-SNL-99-006, 99-021, and 99-013, dated March 2, 2005.

If you have any questions, please contact John Gould at (505) 845-6089.

Sincerely,

Patty Wagner

Patty Wagner
Manager

Enclosure

cc w/enclosure:
W. Moats, NMED-HWB (via Certified Mail)
L. King, EPA, Region 6 (Via Certified Mail)
M. Gardipe, NNSA/SC/ERD
J. Volkerding, NMED-OB
D. Pepe, NMED-OB

cc w/o enclosure:
J. Estrada, NNSA/SSO, MS 0184
F. Nimick, SNL, MS 1089
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
J. Copland, SNL, MS 1087
J. Pavletich, SNL, MS 1087
S. Griffith, SNL, MS 1087
A. Blumberg, SNL, MS 0141

Sandia National Laboratories
Albuquerque, New Mexico
May 2005

Environmental Restoration Project
Responses to NMED Request for Supplemental Information
Environmental Restoration Project Supplemental and No Further Action Information for Various Solid Waste Management Units (SWMUs 1, 78, 196 and 46)
Dated October 2004

INTRODUCTION

This document responds to a March 2, 2005 Request for Supplemental Information (RSI) letter from William P. Moats of the State of New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) to the U.S. Department of Energy and Sandia National Laboratories/New Mexico (SNL/NM). A response to this RSI was due within sixty (60) days of receipt of the letter by SNL/NM, or by May 4, 2005.

In this document, the NMED comments (in bold font) are restated in the same order in which they were provided in the RSI. Following each comment, the word "Response" introduces the U.S. Department of Energy/SNL/NM reply (in normal font style).

1. **SWMU 78: Gas Cylinder Disposal Pit:**
   Please provide a copy of Appendix F, the data validation reports for the 2003 confirmation sampling. The appendix was not included in NMED's copy of the subject report.

Response: Enclosed in Annex A are the data validation reports for the 2003 confirmation sampling that was labeled Attachment F in the original document.

2. **SWMU 196: Building 6597 Cistern:**
   Please state whether the cistern has been backfilled. If it has not been backfilled, explain why this is the case.

Response: The Building 6597 Cistern has not been backfilled. The site has been adequately characterized to demonstrate that it poses no significant risk to human health or the environment in its present state. The cistern is located within an industrial area in Technical Area 5 and is fenced to prevent inadvertent or unauthorized access.

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

3. **SWMU 46: Old Acid Waste Line Outfall:**
Table 11 in Attachment G (Risk Assessment) provides the risk assessment values (hazard index and cancer risk) that were calculated using the maximum concentrations of contaminants at the site. However, the report states that the site meets residential risk standards based on risk assessment values that were calculated using the 95% Upper Confidence Limit (UCL) of the mean concentrations of contaminants. Please provide a table which shows the risk assessment values calculated using the UCLs. It does not appear that the site currently meets residential risk goals based on the UCLs.

Response: Enclosed in Annex B is a revised Table 11 that includes the risk assessment values calculated using UCLs. The total incremental excess cancer risk is 4E-6 which is below NMED guidance of 1E-5. The total hazard index is 1.61 which exceeds NMED guidance of 1. However, because the hazard indices do not provide additive affects for any specific health condition, the hazard index for each constituent of concern (COC) is compared to the NMED guidance of 1. All COCs with the exception of cadmium are below the NMED guidance of 1; cadmium has a hazard index of 1.03 that slightly exceeds the NMED guidance of 1.

4. **SWMU 1: Radioactive Waste Landfill:**

   a. **NMED understands that a factor was entered into the RESRAD equations to account for the placement of cover material at the site. NMED notes that the "clean fill" placed at this site contains both radiological and nonradiological contaminants. Please provide the values of the various parameters assumed for this cover soil, including the thickness of the fill and the chemical and radiological constituents in the fill. Any deviations from the typical assumptions used in risk assessments (e.g., exposure routes, parameter values) should be described in the text of the document. Please state how the placement of fill affects the results of the risk assessments and describe any other variances that were made during the calculations of the human health and ecological risk assessments.**

Response: Five feet of "clean fill" was assumed for the SWMU 1 radiological risk assessment based on the current onsite conditions at SWMU 1. Originally the "clean fill" was assumed to have no radiological contamination; therefore no radiological risk was completed for direct contact exposure with the clean backfill. There was no "clean fill" considered in the nonradiological calculations; the risk assessment for human health nonradiological contaminants used the "standard" assumptions and exposure parameters (i.e., the maximum chemical concentration were used in the risk evaluation). The ecological risk assessment process also was not affected by the assumption of the clean fill (i.e., the radiological and nonradiological contaminants within the 0 to 5 feet bgs horizon were evaluated at maximum concentrations and activities). The only deviation from the typical risk assessment process was the assumption of 5 feet of clean fill with no radiological contamination for the human health radiological risk assessment. Within the human health radiological risk assessment calculations, the clean fill provides shielding from the soil that is below 5 feet. No other deviations from the typical risk assessment process occurred. All the receptors, exposure routes and parameter values remain consistent with the SNL risk assessment process.

To determine the human health radiological risk associated with direct contact with the clean fill, the maximum activities for the radiological COCs within the 0 to 5 feet bgs horizon were used; the results are included here. With the exception of the tritium activity which is discussed below, the maximum activities for the 0 to 5 feet bgs horizon are those that were reported in Annex A, Table A-5. The maximum activities are as follows:

Table 1
Summary of Maximum Radionuclide Activities Used in Direct Contact Exposure Calculations for 0-5 ft bgs Fill for SWMU 1

Radionuclide	Activity (pCi/g)	Sample ID	Table (SNL/NM October 2004)
Am-241	ND (<0.352)	TA2-1-GRAB4-5FT-2-S	Annex B, Table B-9
Cs-137	0.203	TA2-1-OVER-SLPE-030-S	Annex B, Table B-13
H-3	4.49	TA2-1-GRAB4-10FT-3-S	Annex B, Table B-11
Pu-238	0.184	TA2-1-OVER-SLPE-031-S	Annex B, Table B-14
Pu-239/240	2.55	TA2-1-OVER-SLPE-006-S	Annex B, Table B-14
Th-232	1.24*	TA2-1-OVER-SLPE-014-S	Annex B, Table B-13
U-235	0.351	TA2-1-OVER-SLPE-045-S	Annex B, Table B-13
U-238	25	TA2-1-OVER-SLPE-045-S	Annex B, Table B-13

*This value was below background and was screened out of risk calculations.

The incremental TEDE and corresponding estimated cancer risk associated with the activities of these radiological COCs are much less than EPA guidance values; the estimated TEDE is 8.3E-1 mrem/yr for the industrial land use scenario. This value is much less than the EPA numerical guidance of 15 mrem/yr. The corresponding incremental estimated cancer risk value is 6.8E-6 for the industrial land use scenario. Furthermore, the incremental TEDE for the residential land use scenario that results from a complete loss of institutional control is only 2.2 mrem/yr, with an associated risk of 2.0E-5. The guideline for this scenario is 75 mrem/yr. Therefore, SWMU 1 is eligible for unrestricted radiological release within the 0 to 5 feet bgs horizon.

b. **Please clarify what was the maximum value of tritium detected in the soil that was placed from 0 to 5 feet below ground surface. Table 4-2 gives a maximum value of 4.49 pCi/g, while Table A-6 in the Risk Assessment lists the maximum value as 0.2205 pCi/g. Please also provide the sample identification number for this maximum tritium value and state where it is listed in the analytical data included in the subject report. State which value was used for calculating the ecological risk for SWMU 1.**

Response: The value of 4.49 pCi/g is shown in Table B-11 of Appendix B. It corresponds to sample TA2-1-GRAB4-10FT-3-S; this sample was from the over-excavation soil that was used as backfill in Lifts 8 through 14 (approximately 11 to 3 ft bgs). The tritium value of 0.2205 pCi/g (or 4,410 pCi/L) corresponds to sample TA2-2-BLDG-901-004-S in Table B-15 of Appendix B; this sample was from soil placed in the excavation as Lifts 14 through 16 (approximately 4 ft to 1 ft bgs). The value of 0.2205 was erroneously used in the risk assessment for the 0 - 5 ft bgs backfill layer (SNL/NM October 2005); the intent was to use the value of 4.49 pCi/g. The human health and ecological risk assessment has been re-calculated using the tritium value of 4.49 pCi/g, which was listed in Table 4-2 (SNL/NM October 2005). Because these tritium activites contribute such meager amounts to the overall total doses and risks, the final results are numerically equivalent; therefore, no revision to the SWMU 1 risk assessment conclusion was necessary.

A revised version of Table B-11 is included in this RSI in Annex C. The tritium results from LCS (Liquid Scintillation Counting) for samples TA2-1-GRAB5-15FT-3-S through TA2-1-GRAB9-5FT-3-S that were originally listed as "NR" ("not reported") are now included.

RSI

[redacted]

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

AUG 30 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East, Building 1
Santa Fe, NM 87505

Dear Mr. Bearzi,

On behalf of the Department of Energy (DOE) and Sandia Corporation, DOE is submitting the enclosed responses to the New Mexico Environment Department's (NMED's) Request for Supplemental Information, Environmental Restoration Project Supplemental and No Further Action Information for Solid Waste Management Units 46 and 196 dated October 2004, Sandia National Laboratories, New Mexico, EPA ID No. NM589011518, HWB-SNL-99-006, 99-021, and 99-01, dated July 19, 2005.

If you have any questions, please contact John Gould at (505) 845-6089.

Sincerely,

Patty Wagner

Patty Wagner
Manager

Enclosure

cc w/enclosure:
W. Moats, NMED-HWB (via Certified Mail)
L. King, EPA, Region 6 (via Certified Mail)
M. Gardipe, NNSA/SC/ERD
J. Volkerding, DOE-NMED-OB (2 copies)

cc w/o enclosure:
J. Estrada, NNSA/SSO, MS 0184
F. Nimick, SNL, MS 1089
P. Freshour, SNL, MS 1089
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
S. Griffith, SNL, MS 1087

Sandia National Laboratories
Albuquerque, New Mexico
August 2005

Environmental Restoration Project
Responses to NMED Request for Supplemental Information
And Certificates of Completion: Environmental Restoration Project Supplemental and No Further Action Information for Various Sold Waste Management Units (SWMUs 1, 78, 196, 45, and 46); dated October 2004
Sandia National Laboratories, EPA ID#NM 5890110518
HWB-SNL-99-006, 99-021, AND 99-01

INTRODUCTION

This document responds to the July 19, 2005 Request for Supplemental Information (RSI) letter from William P. Moats of the State of New Mexico Environment Department (NMED) Hazardous Water Bureau (HWB) to the U.S. Department of Energy and Sandia Corporation (Sandia). A response to this RSI is due within 45 days of receipt of the letter by NMED, or by September 2, 2005.

In this document, the NMED comments (in bold font) are restated in the same order in which they were provided in the RSI. Following each comment, the "Response" introduces the U.S. Department of Energy/Sandia reply (in normal font style).

1. **NMED will not issue a Certificate for Corrective Action Complete for SWMU 196 until the cistern (a large seepage pit) is backfilled in accordance with the Septic System Abandonment Regulations at 20.7.3.410 NMAC. The DOE/Sandia Corporation should inform the NMED in writing as soon as possible after the backfilling of the cistern has been accomplished. The NMED will then reconsider issuance of a Certificate of Completion for SWMU 196 after said work is completed.**

Response: SWMU 196, the Building 6597 Cistern, will be backfilled to fulfill the requirement by NMED as stated in Comment 1. DOE/Sandia will inform the NMED in writing when this task has been completed.

RSI

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

OCT 2 8 2005

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East, Building 1
Santa Fe, NM 87505

Dear Mr. Bearzi,

This letter is in response to the New Mexico Environment Department (NMED) Request for Supplemental Information and Certificates of Completion: Environmental Restoration Project Supplemental and No Further Action Information for Various Soil Waste Management Units (SWMUs 1, 78, 196, 45 and 46), October 2004, Sandia National Laboratories, EPA ID Number NM5890110518 HWB-SNL-99-006, 99-021, and 99-013; dated July 19, 2005. The following is an excerpt from the U.S. Department of Energy and Sandia Corporation's (Sandia) response dated August 30, 2005. The NMED comments are restated (in **bold** font), followed by Sandia's original response (in normal font).

1. **NMED will not issue a Certificate for Corrective Action Complete for SWMU 196 until the Cistern (a large seepage pit) is backfilled in accordance with the Septic System Abandonment Regulations at 20.7.3.410 NMAC. The DOE/Sandia Corporation should inform the NMED in writing as soon as possible after the backfilling of the Cistern has been accomplished. The NMED will then reconsider issuance of a Certificate of Completion for SWMU 196 after said work is completed.**

   Response: SWMU 196, the Building 6597 Cistern, will be backfilled to fulfill the requirement by NMED as stated in Comment 1. DOE/Sandia will inform the NMED in writing when this task has been completed.

To follow-up on Sandia's response, the SWMU 196 Cistern was backfilled September 23-30, 2005. Figures 1 through 5 (enclosed) show the progression of backfilling. The backfilling activities included removing the above-ground portion of the concrete wall that was approximately 3 feet above ground (Figure 1). The wall debris was knocked into the bottom of the Cistern (Figure 2). Clean backfill soil from the borrow pit located in the southern portion of Technical Area III was transported to the site. The soil was mixed with water (10%) at the borrow pit to allow for compaction. The soil was placed into the Cistern by unloading from dump trucks and allowed to fill the Cistern to within 4 feet below ground surface (Figure 3). At that depth the Cistern area could be entered with equipment and was compacted with a vibratory compactor (Figure 4). The last 4 feet of backfill was compacted in approximately 1 foot lifts. Approximately 460 cubic yards of soil was used to backfill the Cistern. The surface was returned to the surrounding grade (Figure 5). NMED personnel, Brian Salem, visited the site on September 27, 2005 with Mike Sanders of SNL to observe the backfilling activities.

If you have any questions, please contact me at (505)845-6036, or John Gould at (505) 845-6089.

Sincerely,

Patty Wagner

Patty Wagner
Manager

Enclosure

cc w/enclosure:
W. Moats, NMED-HWB (via Certified Mail)
L. King, EPA, Region 6 (via Certified Mail)

J. Volkerding, NMED-OB (2 copies)
A. Blumberg, SNL, MS 0141
F. Nimick, SNL, MS 1089
P. Freshour, SNL, MS 1089
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
S. Griffith, SNL, MS 1087
M. Sanders, SNL, MS 1087
T. A. Romero, SNL, MS 0933
R. J. Segelhorst, SNL, MS 0945

Figure 1. The above-ground portion of the Cistern wall after removal.

Figure 2. The wall debris was knocked into the bottom of the Cistern.

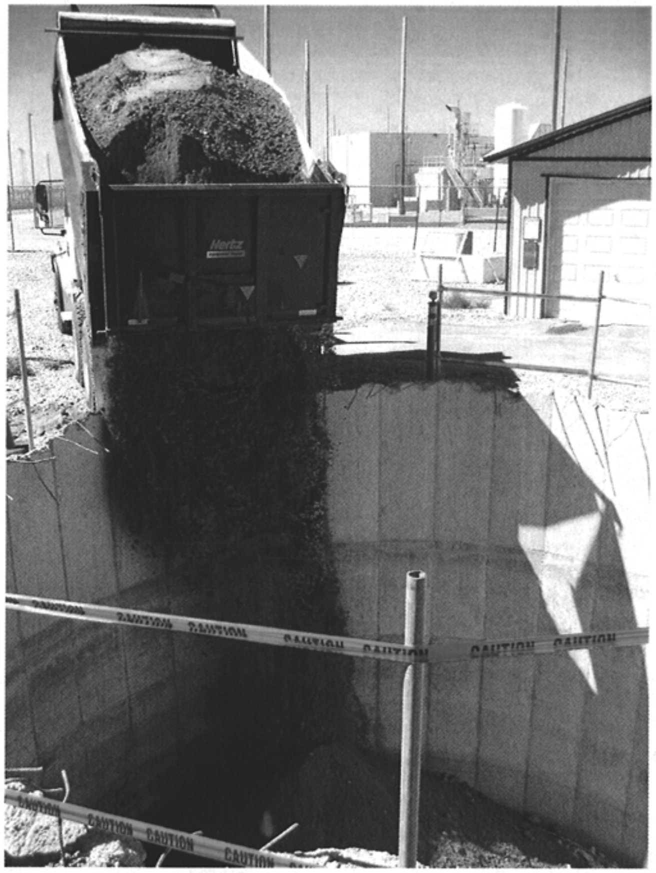


Figure 3. Clean backfill soil was dumped into the Cistern.

Figure 4. The backfill soil was compacted starting at approximately 3-4 feet below ground surface and continuing in 1 foot lifts to the ground surface.

Figure 5. SWMU 196 after completion of backfilling activities.