9-1-2005

Justification for Class III Permit Modification September 2005, DSS Site 276, Operable Unit 1295, ormer Building 829X, Silver Recovery Sump at Technical Area I

Sandia National Laboratories/NM

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

Sandia National Laboratories

Drain and Septic Systems - Areas of Concern (AOCs) 276, 1004, 1031, 1034, 1035, 1036, 1052, 1078, 1079, 1080, 1081, 1084, 1087, 1092, 1098, 1102, 1104, 1113, and 1120 (Poster 2/2)

Environmental Restoration Project

Summary of Data Used for NFA Justification

- Soil samples were analyzed at on- and off-site laboratories for VOCs, SVOCs, PCBs, HE compounds, metals, cyanide, gross alpha/beta activity, and radionuclides by gamma spectroscopy.
- There were VOCs detected at the 19 sites, SVOCs were detected at 15 of the sites, PCBs were detected at 9 sites, and cyanide was identified at 14 of the sites. HE compounds were detected at one of the sites (AOC 1113).
- Barium was detected at concentrations above the background value at six sites. Chromium and arsenic were detected at concentrations above background values at five sites. Silver was detected at concentrations above the background value at three sites, lead was detected above the background value at two sites, and mercury was detected above the background value at one site. No other metals were detected above background concentrations.
- Uranium-235 was detected at an activity slightly above the background activity at 5 of the 19 sites and, although not detected, the MDA for U-235 exceeded the background activity at 14 sites and the MDA for U-238 exceeded the background activity at one site. Gross alpha activity was slightly above background activity at five of the 19 sites, and gross beta activity was above the background activity at one site.
- All confirmatory soil sample analytical results for each site were used for characterizing that site, for performing the risk screening assessment, and as justification for the NFA proposal for the site.

Recommended Future Land Use

- Industrial land use was established for these 19 AOC sites.

Results of Risk Analysis

- Risk assessment results for industrial and residential land-use scenarios 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 greater than background-screening levels or because constituents were present that did not have background-screening numbers, it was necessary to perform risk assessments for these all of these AOCs. The risk assessment analysis evaluated the potential for adverse health effects for industrial and residential land-use scenarios.
- The maximum concentration value for lead was 22.2 J mg/kg at AOC 1081 and 11.9 mg/kg at AOC 1087: these exceed the background value of 11.8 mg/kg. The EPA intentionally does not provide any human health toxicological data on lead; therefore, no risk parameter values could be calculated. The NMED guidance for lead screening concentrations for construction and industrial land-use scenarios are 750 and 1,500 mg/kg, respectively. The EPA screening guidance value for a residential land-use scenario is 400 mg/kg. The maximum concentration for lead at these two sites are less than all the screening values; therefore, lead was eliminated from further consideration in the human health risk assessment for each site.
- The non-radiological total human health HIs for 18 of the 19 AOCs are below NMED guidelines for a residential land-use scenario.
- For four sites, the total estimated excess cancer risks are at or slightly above the residential land-use scenario guideline. However, the incremental excess cancer risk values for these four sites are below the NMED residential land-use scenario guideline.
- For one of the 19 sites (AOC 1081), the total HI and the estimated excess cancer risk are above the NMED guidelines for the residential land-use scenario due to elevated levels of arsenic and silver. However, the total HI and estimated excess cancer risk values are below the NMED guidelines for the industrial land-use scenario.
- The total human health TEDEs for industrial land-use scenarios ranged from 0.001 to 0.46 mrem/yr, all of which are substantially below the EPA numerical guideline of 15 mrem/yr. The total human health TEDEs for residential land-use scenarios ranged from 0.0052 to 0.12 mrem/yr, all of which are substantially below the EPA numerical guideline of 75 mrem/yr. Therefore, these AOCs are eligible for unrestricted radiological release.
- Using the SNL predictive ecological risk and scoping assessment methodologies, it was concluded that a complete ecological pathway for each of 18 of the sites was not associated with the respective COPELs for that site. Thus, a more detailed ecological risk assessment to predict the level of risk was not deemed necessary for these sites.
- Ecological risks associated with AOC 1084 were predicted incorporating potential receptors and site-specific COPECs. The HQ values predicted were less than one, with the exception of barium. For barium, the contribution from background concentrations accounts for the majority (52%) of the HQ values. Therefore, ecological risks associated with this site are expected to be low.
- In conclusion, human health and ecological risks are acceptable for 18 sites for a residential land-use scenario and for all 19 for an industrial land-use scenario per NMED guidance. Thus, 18 of these sites are proposed for CAC without institutional controls, and one site (AOC 1081) is proposed for CAC with institutional controls.

The total HIs and excess cancer risk values for the nonradiological COCs at the 19 AOCs are as follows:

The total HIs and excess cancer risk values for the nonradiological COCs at the 19 AOCs are as follows:

AOC Number	Site Name	Residential Land-Use Scenario	
		Total Hazard Index	Excess Cancer Risk
276	Former Bldg 829X Silver Recovery Sump	0.27	2E-5 Total[a]/3.95E-6 Incremental
1004	Bldg 6969 Septic System	0.08	2E-6 Total
1031	Former Bldgs. 6589 and 6600 Septic System	0.25	1E-5 Total[a]/2.55E-6 Incremental
1034	Bldg 6710 Septic System	0.00	2E-9 Total
1035	Bldg 6715 Septic System	0.04	3E-9 Total
1036	Bldg 6922 Septic System	0.26	1E-5 Total[a]/8.35E-7 Incremental
1052	Bldg 803 Seepage Pit	0.00	2E-6 Total
1078	Bldg 6640 Septic System	0.27	1E-5 Total[a]/3.72E-7 Incremental
1079	Bldg 6643 Septic System	0.00	3E-8 Total
1080	Bldg 6644 Septic System	0.00	4E-8 Total
1084	Bldg 6505 Septic System	0.08	None
1087	Bldg 6743 Seepage Pit	0.00	4E-9 Total
1092	MO 228-230 Septic System	0.06	None
1098	TA-V Plenum Rooms Drywell	0.03	3E-7 Total
1102	Former Bldg 889 Septic System	0.00	1E-10 Total
1104	Bldg 6595 Seepage Pit	0.00	2E-6 Total
1113	Bldg 6597 Drywell	0.14	1E-7 Total
1120	Bldg 6643 Drywell	0.12	1E-6 Total
NMED Guidance for Residential Land Use		< 1	<1E-5

AOC Number	Site Name	Industrial Land-Use Scenario	
			Excess Cancer Risk
1081	Bldg 6650 Septic System	0.39	5E-6 Total
NMED Guidance for Industrial Land Use		< 1	<1E-5

[a]Maximum value exceeds NMED guidance for specified land-use scenario, therefore, incremental values are shown.

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United States Department of Energy
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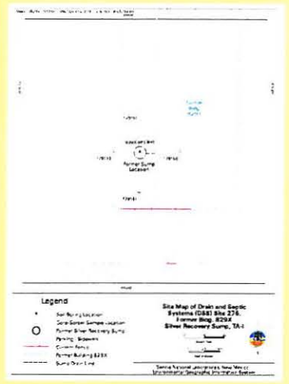
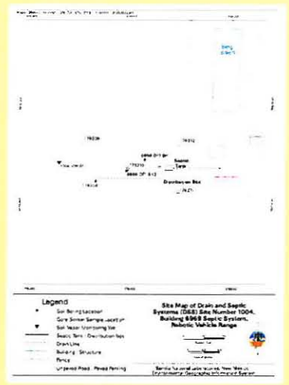
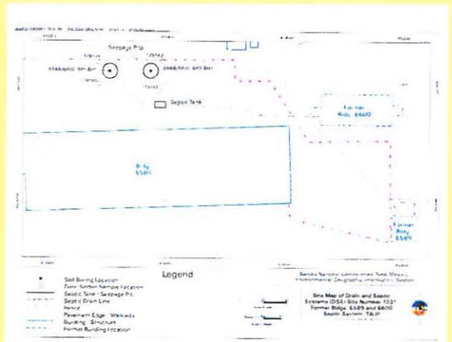
Sandia National Laboratories

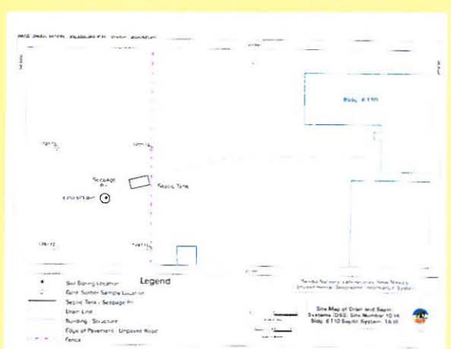
Drain and Septic Systems (DSS) Areas of Concern (AOCs)
276, 1004, 1031, 1034, 1035
1036, 1052

Environmental Restoration Project



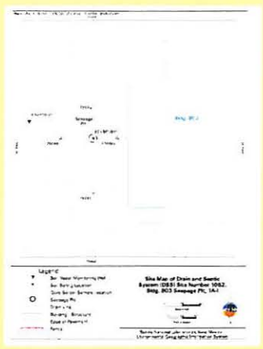


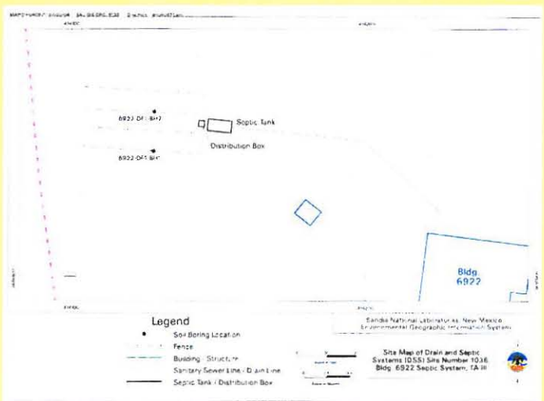




Septic system demolition and backfilling.

Three-foot long Geoprobe soil sampling device used to collect soil samples.





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Drain and Septic Systems - Areas of Concern (AOCs) 276, 1004, 1031, 1034, 1035, 1036, 1052, 1078, 1079, 1080, 1081, 1084, 1087, 1092, 1098, 1102, 1104, 1113, and 1120 (Poster 1/2)

This work supported by the United States Department of Energy under contract DE-AC04-94AL85000.

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Site History

Drain and septic system site histories for the 19 AOCs are as follows:

AOC Number	Site Name	Location	Year Building and System Built	Year Drain or Septic System Abandoned	Year(s) Septic Tank Effluent Sampled	Year Septic Tank Pumped For the last Time
276	Former Bldg 829X Silver Recovery Sump	TA-I	1948, 1978	1994	No septic tank at this site	NA
1004	Bldg 6969 Septic System	Robotic Vehicle Range	1958	System is active	Periodically since 1992	Periodically
1031	Former Bldgs 6589 and 6600 Septic System	TA-III	1967	1991 (septic tank and seepage pits backfilled in 2002)	1990-1991, 1992, 1995	1996
1034	Bldg 6710 Septic System	TA-III	1958	Early 1990s	1990-1991, 1992, 1995	1996
1035	Bldg 6715 Septic System	TA-III	1962	Early 1990s	1990-1991, 1992, 1995	1996
1036	Bldg 6922 Septic System	TA-III	1955	1991	1990-1991, 1992, 1995, 2005	2005
1052	Bldg 803 Seepage Pit	TA-I	1957	Unknown	No septic tank at this site	NA
1078	Bldg 6640 Septic System	TA-III	1959	1991	1990-1991	Unknown (backfilled in 1991)
1079	Bldg 6643 Septic System	TA-III	1989	1991	1990-1991, 1992, 1995, 2005	2005
1080	Bldg 6644 Septic System	TA-III	1989	1991	1990-1991, 1992, 1995	1996
1081	Bldg 6650 Septic System	TA-III	1967 (southern systems) Early 1980s (northern systems)	1991	1992-1995 (south septic tank) 2004 (north septic tank)	1996 (south septic tank) Unknown (north septic tank)
1084	Bldg 6505 Septic System	TA-III	1954	1991	1990-1991	Unknown (backfilled before 2003)
1087	Bldg 6743 Seepage Pit	TA-III	1967	2004-2005	No septic tank at this site	NA
1092	MO 228-230 Septic System	TA-III	1988	1991	1990-1991	Unknown (backfilled before 2003)
1098	TA-V Plenum Rooms Drywell	TA-X	1958	Early 1990s	No septic tank at this site	NA
1102	Former Bldg 889 Septic System	TA-I	Early 1950s	Early 1990s	1992-1995	Unknown (removed prior to 1999)
1104	Bldg 6595 Seepage Pit	TA-V	1966	Early 1990s	No septic tank at this site	NA
1113	Bldg 6597 Drywell	TA-V	1971	Prior to 2002	No septic tank at this site	NA
1120	Bldg 6643 Drywell	TA-III	1989	1991	No septic tank at this site	NA

Depth to Groundwater

Depth to groundwater at these 19 AOCs is as follows:

AOC Number	Site Name	Location	Groundwater Depth (ft bgs)
276	Former Bldg 829X Silver Recovery Sump	TA-I	555
1004	Bldg 6969 Septic System	Robotic Vehicle Range	548
1031	Former Bldgs. 6589 and 6600 Septic System	TA-III	486
1034	Bldg 6710 Septic System	TA-III	470
1035	Bldg 6715 Septic System	TA-III	470
1036	Bldg 6922 Septic System	TA-III	490
1052	Bldg 803 Seepage Pit	TA-I	552
1078	Bldg 6640 Septic System	TA-III	476
1079	Bldg 6643 Septic System	TA-III	487
1080	Bldg 6644 Septic System	TA-III	480
1081	Bldg 6650 Septic System	TA-III	480
1084	Bldg 6505 Septic System	TA-III	508
1087	Bldg 6743 Seepage Pit	TA-III	461
1092	MO 228-230 Septic System	TA-III	488
1098	TA-V Plenum Rooms Drywell	TA-V	509
1102	Former Bldg 889 Septic System	TA-I	535
1104	Bldg 6595 Seepage Pit	TA-V	507
1113	Bldg 6597 Drywell	TA-V	515
1120	Bldg 6643 Drywell	TA-III	483

Constituents of Concern

- VOCs
- SVOCs
- PCBs
- HE Compounds
- Metals
- Cyanide
- Radionuclides

Investigations

- A backhoe was used to positively locate buried components (drainfield drain lines, drywells) for placement of soil vapor samplers, and soil borings.
- Ten of the 19 AOCs were selected by NMED for passive soil-vapor sampling to screen for VOCs; no significant VOC contamination was identified at any of the ten sites.
- Soil samples were collected from directly beneath drainfield drain lines, seepage pits, and drywells to determine if COCs were released to the environment from drain systems.
- Four of the sites were selected by NMED for active soil vapor sampling to screen for VOCs. Each of the active soil-vapor monitoring wells was 150 ft deep with vapor sampling ports at 5, 20, 70, 100, and 150-ft bgs. The VOC concentrations were significantly lower than the 10 ppmv action level established by NMED.

The years that site-specific characterization activities were conducted and soil sampling depths at each of these 19 AOC sites are as follows:

AOC Number	Site Name	Buried Components (Drain Lines, Drywells) Located With a Backhoe	Soil Sampling Beneath Drainlines, Seepage Pits, Drywells	Type(s) of Drain System, and Soil Sampling Depths (ft bgs)	Passive Soil Vapor Sampling	Active Soil Vapor Monitor Well Installation and Sampling
276	Former Bldg 829X Silver Recovery Sump	None	1994, 2002	Silver Recovery Sump 8, 13	2002	None
1004	Bldg 6969 Septic System	2002	2002	Drainfield 8, 13	2002	2003
1031	Former Bldgs 6589 and 6600 Septic System	2002	2002	Seepage Pits 15, 20	2002	None
1034	Bldg 6710 Septic System	None	2002	Seepage Pit 14, 19	2002	None
1035	Bldg 6715 Septic System	None	2002	Seepage Pit 11, 16	2002	None
1036	Bldg 6922 Septic System	1997	1998, 1999	Drainfield 5, 10	None	None
1052	Bldg 803 Seepage Pit	None	2002	Seepage Pit 22, 27	2002	2003
1078	Bldg 6640 Septic System	2002	2002	Drainfield 5, 10	None	None
1079	Bldg 6643 Septic System	2002	2002	Drainfield 11, 16	None	None
1080	Bldg 6644 Septic System	2002	2002	Drainfield Borehole 1 & 2 5, 10 Borehole 3, 6, 11	None	None
1081	Bldg 6650 Septic System	2003 (north septic tank)	2002	South seepage pit 10, 12, 15, 17 North seepage pit 10, 12, 15, 17, 20, 24, 25	2002	2003
1084	Bldg 6505 Septic System	2002	2002	Drainfield 3, 8	2002	None
1087	Bldg 6743 Septic System	None	2002	Seepage Pit 8, 13	2002	None
1092	MO 228-230 Septic System	2002 2003	2002	Drainfield 6, 11	None	2003
1098	TA-V Plenum Rooms Drywell	None	2002	Drywell 10, 15	None	None
1102	Former Bldg 889 Septic System	1999 2003	2002	Seepage Pit 25, 30	None	None
1104	Bldg 6595 Seepage Pit	None	2002	Seepage Pit 11, 16	None	None
1113	Bldg 6597 Drywell	2002	2002	Drywell 5, 10	None	None
1120	Bldg 6643 Drywell	2002	2002	Drywell 8, 13	2002	None

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Justification for Class III Permit Modification

September 2005

DSS Site 276
Operable Unit 1295
Former Building 829X, Silver Recovery Sump at Technical Area I

CAC (SWMU Assessment Report) Submitted December 2004
RSI Submitted March 2005
RSI Submitted April 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.

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Justification for Class III Permit Modification

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United States Department of Energy
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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.

Sandia National Laboratories/New Mexico
Environmental Restoration Project

SWMU ASSESSMENT REPORT AND PROPOSAL FOR CORRECTIVE ACTION COMPLETE DRAIN AND SEPTIC SYSTEMS SITE 276, FORMER BUILDING 829X SILVER RECOVERY SUMP

December 2004

United States Department of Energy
Sandia Site Office

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ACRONYMS AND ABBREVIATIONS

AOP	Administrative Operating Procedure
BA	butyl acetate
bgs	below ground surface
CAC	Corrective Action Complete
COC	constituent of concern
DSS	Drain and Septic Systems
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FIP	Field Implementation Plan
GS	Gore-Sorber™
HE	high explosive
HI	hazard index
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
MDA	minimum detectable activity
MDL	method detection limit
mg	milligram(s)
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
OU	Operable Unit
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RPSD	Radiation Protection Sample Diagnostics
SAP	Sampling and Analysis Plan
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TB	trip blank
TEDE	total effective dose equivalent
Tetryl	methyl-2,4,6-trinitrophenylnitramine
TOP	Technical Operating Procedure
VOC	volatile organic compound
yr	year

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1.0 PROJECT BACKGROUND

Environmental characterization of Sandia National Laboratories/New Mexico (SNL/NM) drain and septic systems (DSS) started in the early 1990s. These units consist of either septic systems (one or more septic tanks plumbed to either drainfields or seepage pits), or other types of miscellaneous drain units without septic tanks (including drywells or french drains, seepage pits, and surface outfalls). Initially, 23 of these sites were designated as Solid Waste Management Units (SWMUs) under Operable Unit (OU) 1295, Septic Tanks and Drainfields. Characterization work at 22 of these 23 SWMUs has taken place since 1994 as part of SNL/NM Environmental Restoration (ER) Project activities. The twenty-third site did not require any characterization, and an administrative proposal for no further action (NFA) was granted in July 1995.

Numerous other DSS sites that were not designated as SWMUs were also present throughout SNL/NM. An initial list of these non-SWMU sites was compiled and summarized in an SNL/NM document dated July 8, 1996; the list included a total of 101 sites, facilities, or systems (Bleakly July 1996). For tracking purposes, each of these 101 individual DSS sites was designated with a unique four-digit site identification number starting with 1001. This numbering scheme was devised to clearly differentiate these non-SWMU sites from existing SNL/NM SWMUs, which have been designated by one- to three-digit numbers. As work progressed on the DSS site evaluation project, it became apparent that the original 1996 list was in need of field verification and updating. This process included researching SNL/NM's extensive library of facilities engineering drawings and conducting field verification inspections jointly with SNL/NM ER personnel and New Mexico Environment Department (NMED)/Hazardous Waste Bureau (HWB) regulatory staff from July 1999 through January 2000. The goals of this additional work included the following:

- Determine to the degree possible whether each of the 101 systems included on the 1996 list was still in existence, or had ever existed.
- For systems confirmed or believed to exist, determine the exact or apparent locations and components of those systems (septic tanks, drainfields, seepage pits, etc.).
- Identify which systems would, or would not, need initial shallow investigation work as required by the NMED.
- For systems requiring characterization, determine the specific types of shallow characterization work (including passive soil-vapor sampling and/or shallow soil borings) that would be required by the NMED.

A number of additional drain systems were identified from the engineering drawings and field inspection work. It was also determined that some of the sites on the 1996 list actually contained more than one individual drain or septic system that had been combined under one four-digit site number. In order to reduce confusion, a decision was made to assign each individual system its own unique four-digit number. The Former Building 829X Silver Recovery Sump had already been identified as SWMU 276 before the 1996 non-SWMU site list was generated, but it was later incorporated into the DSS project because it was physically similar to many other DSS seepage pit sites. A new site list containing a total of 121 individual DSS sites

was generated in 2000. Of these 121 sites, the NMED required environmental assessment work at a total of 61, including DSS Site 276. No characterization was required at the remaining 60 sites because the sites either were found not to exist, were the responsibility of other non-SNL/NM organizations, were already designated as individual SWMUs, or were considered by the NMED to pose no threat to human health or the environment. Subsequent backhoe excavation at DSS Site 1091 confirmed that the system did not exist, which decreased the number of DSS sites requiring characterization to 60. Environmental characterization at DSS Site 276 followed the same procedures utilized at the other 60 DSS sites.

Concurrent with the field inspection and site identification work, NMED/HWB and SNL/NM ER Project technical personnel worked together to reach consensus on a staged approach and specific procedures that would be used to characterize the DSS sites, as well as the remaining OU 1295 Septic Tanks and Drainfield SWMUs that had not been approved for NFA. These procedures are described in detail in the "Sampling and Analysis Plan [SAP] for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico" (SNL/NM October 1999), which was approved by the NMED/HWB on January 28, 2000 (Bearzi January 2000). A follow-on document, "Field Implementation Plan [FIP], Characterization of Non-Environmental Restoration Drain and Septic Systems" (SNL/NM November 2001), was then written to formally document the updated DSS site list and the specific site characterization work required by the NMED for each of the 60 DSS sites. The FIP was approved by the NMED in February 2002 (Moats February 2002).

2.0 DSS SITE 276: FORMER BUILDING 829X SILVER RECOVERY SUMP

2.1 Summary

The SNL/NM ER Project conducted an assessment of DSS Site 276, the Former Building 829X Silver Recovery Sump. Environmental concern at this site is based upon the potential for the release of constituents of concern (COCs) in aqueous effluent possibly spilled inside the silver recovery sump. The assessment was conducted to determine whether environmental contamination was released to the environment via the silver recovery sump present at the site. This report provides documentation that the site was specifically characterized, that no significant releases of contaminants to the environment occurred via the former silver recovery sump, and that it does not pose a threat to human health or the environment under either the industrial or residential land-use scenarios. Building 829X was demolished in 1994, and the abandoned silver recovery sump was removed in September 1999 (SNL/NM September 2004).

Review and analysis of all relevant data for DSS Site 276 indicate that concentrations of COCs at this site were found to be below applicable risk assessment action levels. Thus, a determination of Corrective Action Complete (CAC) without controls (NMED April 2004) is recommended for DSS Site 276 based upon sampling data demonstrating that COCs released from the site into the environment pose an acceptable level of risk.

2.2 Site Description and Operational History

2.2.1 Site Description

DSS Site 276 is located in SNL/NM Technical Area (TA)-I on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy. The site is near the northwest corner of TA-I, approximately 4,200 feet southeast of the Wyoming Gate entrance to KAFB (Figure 2.2.1-1). The abandoned sump was circular, approximately 6 feet in diameter, and 5.5 feet deep. Construction details are based upon engineering drawings (SNL/NM April 1978), soil sampling following building demolition (IT April 1995), and site inspections. The system received discharges from former Building 829X, approximately 6 feet to the east (Figure 2.2.1-2).

The surface geology at DSS Site 276 is characterized by a veneer of aeolian sediments underlain by Upper Santa Fe Group alluvial fan deposits that interfinger with sediments of the ancestral Rio Grande west of the site. These deposits extend to, and probably far below, the water table at this site. The alluvial fan materials originated in the Manzanita Mountains east of DSS Site 276, and typically consist of a mixture of silts, sands, and gravels that are poorly sorted, and exhibit moderately connected lenticular bedding. Individual beds range from 1 to 5 feet in thickness with a preferred east-west orientation and have moderate to low hydraulic conductivities (SNL/NM March 1996). Because the site is now paved over, no vegetation exists in the surrounding area.

The ground surface in the vicinity of the site is flat to very slightly sloping to the northeast. The closest major drainage is Tijeras Arroyo, located approximately 1.3 miles southeast of the site.

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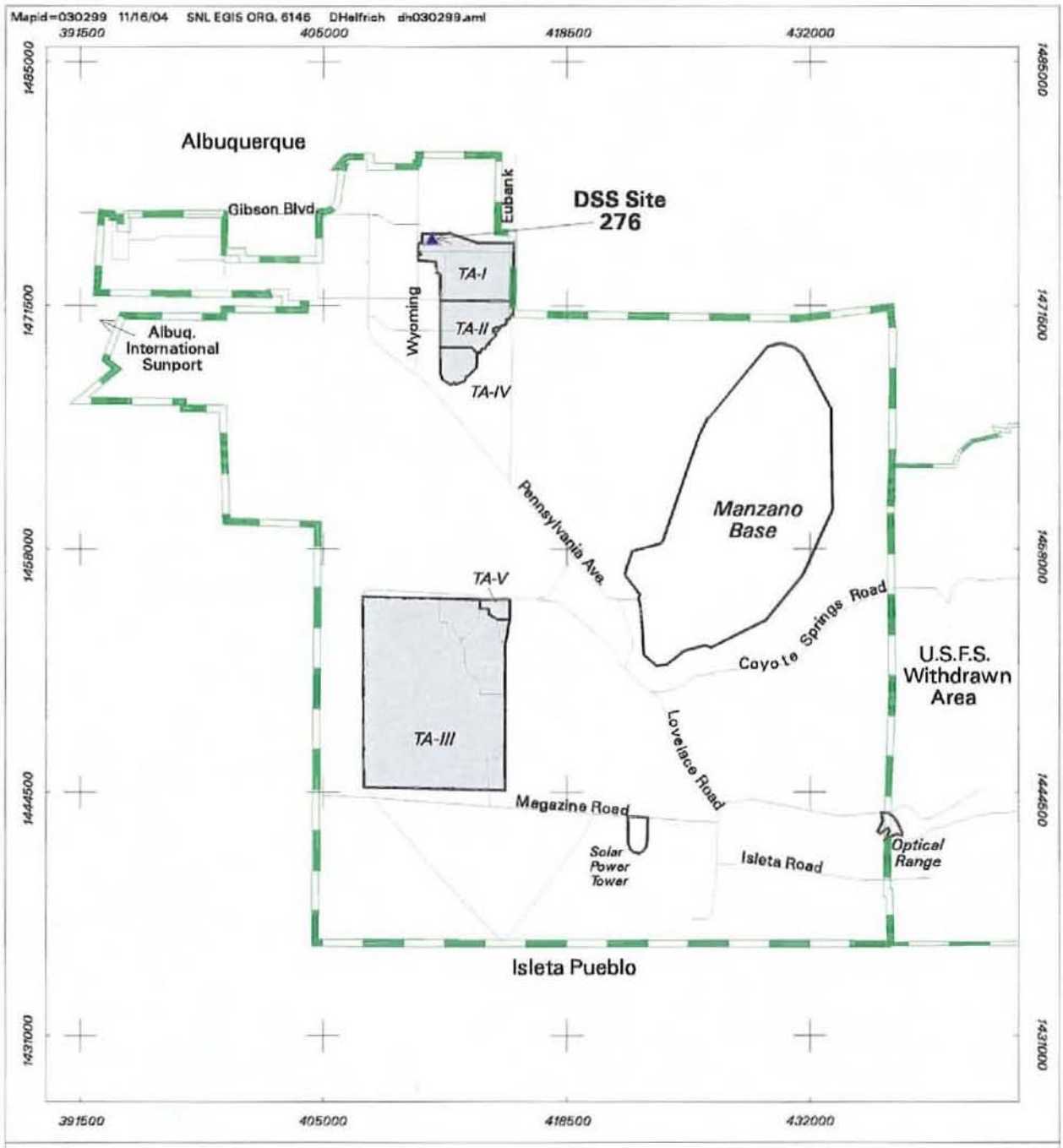


Legend

- DSS Site 276
- Major Road
- KAFB Boundary
- USFS Withdrawn Area Boundary
- SNL Technical Area

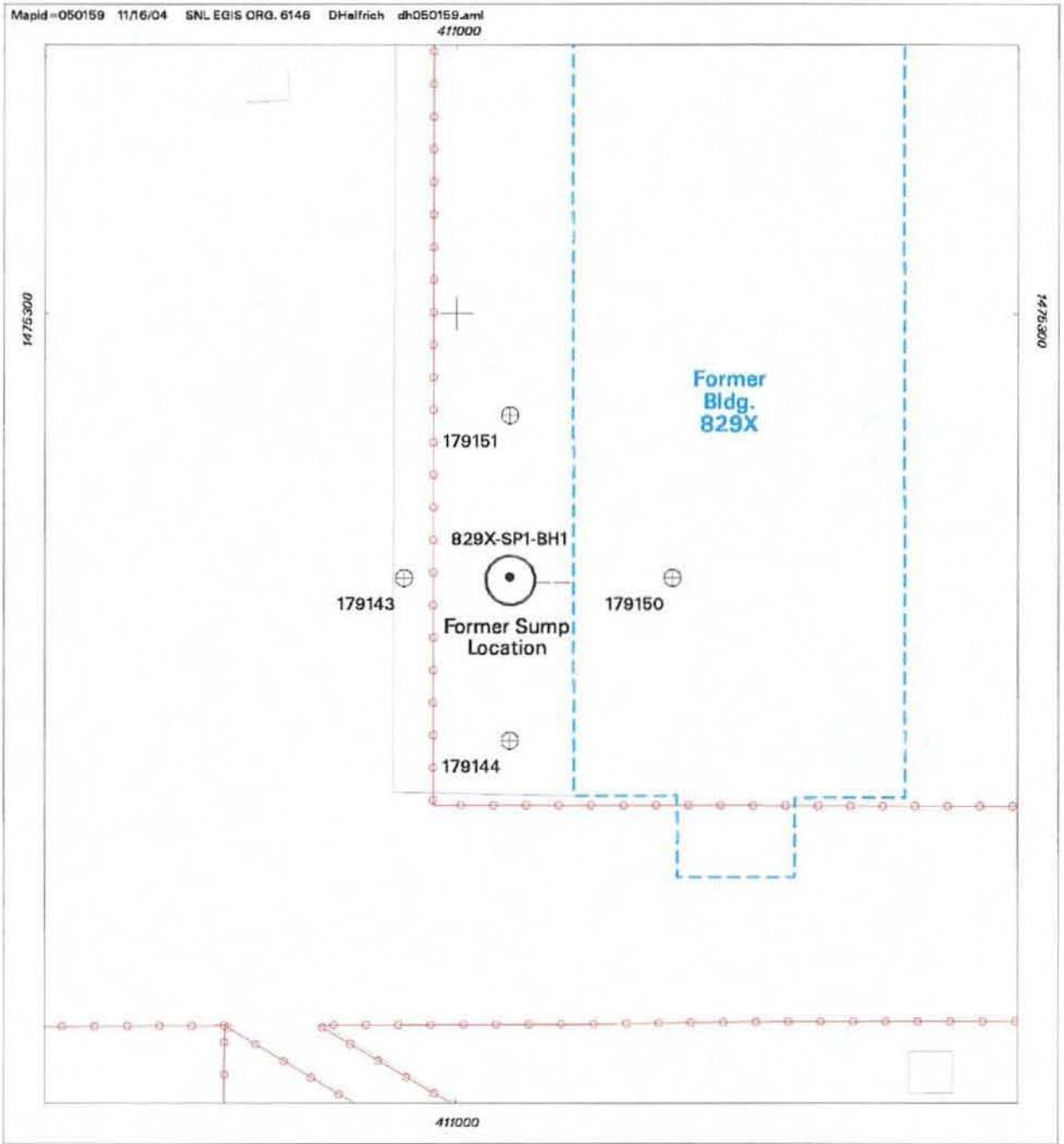
Figure 2.2.2-1
Location Map of Drain and Septic Systems (DSS) Site 276, Former Bldg. 829X Silver Recovery Sump, TA-I

0 4500 9000
Scale in Feet

0 1080 2160
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A235



Legend

- Soil Boring Location
- Gore-Sorber Sample Location
- Former Silver Recovery Sump
- Parking / Sidewalk
- Current Fence
- Former Building 829X
- Sump Drain Line

Figure 2.2.1-2
Site Map of Drain and Septic Systems (DSS) Site 276, Former Bldg. 829X Silver Recovery Sump, TA-I

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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No perennial surface-water bodies are present in the vicinity of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration rates for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996).

The site lies at an average elevation of approximately 5,410 feet above mean sea level (SNL/NM April 2003). Two water-bearing zones, a shallow groundwater system and the regional aquifer, underlie this site. Depth to the shallow groundwater system, which has a limited lateral extent and is present beneath the north-central portion of KAFB, is approximately 265 feet below ground surface (bgs) at the site. The shallow groundwater system is not used as a water supply source. Depth to regional groundwater is approximately 555 feet bgs at the site. Both the City of Albuquerque and KAFB use the regional aquifer as a water supply source. Groundwater flow in the shallow system is to the southeast, while that in the regional aquifer is to the northwest beneath DSS Site 276 (SNL/NM May 2003). The nearest production wells to DSS Site 276 are KAFB-1, approximately 3,650 feet to the southwest, and KAFB-3, approximately 5,800 feet to the northwest. The nearest regional aquifer groundwater monitoring well is PGS-2, approximately 550 feet west of the site.

2.2.2 Operational History

Available information indicates that Building 829X was constructed in 1948 (SNL/NM September 2004) and the silver recovery sump was added in 1978. The building was used either for office space or by the Graphics Arts Services Organization (IT April 1995). The sump contained two 55-gallon, steel drums that collected effluent from a film-processing unit. The drums were periodically pumped out and the silver recovered from the solution. The sump bottom was unlined, and the drums rested on a layer of loose gravel approximately 6 inches in thickness (IT April 1995). The building was demolished in 1994, and the soil surrounding the building, under the septic line piping, and under the sump was sampled in December 1994 (IT April 1995). The metal culvert enclosing the abandoned sump and approximately 1.5 feet of underlying soil and gravel aggregate were removed, and the excavation was backfilled in September 1999 (IT January 2000). The sump location was surveyed for later relocation and sampling. The DSS site investigation was planned to be consistent with other DSS site investigations and to sample for possible COCs that may have been released during facility operations.

2.3 Land Use

2.3.1 Current Land Use

The current land use for DSS Site 276 is industrial.

2.3.2 Future/Proposed Land Use

The projected future land use for DSS Site 276 is industrial (DOE et al. September 1995).

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3.0 INVESTIGATORY ACTIVITIES

3.1 Summary

Three assessment investigations have been conducted at DSS Site 276. In December 1994, soil samples were collected from the area surrounding the former building, along the septic system drain line, and from the soil beneath the gravel on the bottom of the sump (Investigation 1). In April and May 2002, a passive soil-vapor survey was conducted to determine whether areas of significant volatile organic compound (VOC) contamination were present in the soil around the sump (Investigation 2). In September 2004, subsurface soil samples were collected from one boring drilled through the center of, and beneath, the sump location (Investigation 3). Investigations 2 and 3 were required by the NMED/HWB to adequately characterize the site and were conducted in accordance with procedures presented in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) described in Chapter 1.0. These investigations are discussed in the following sections.

3.2 Investigation 1—Silver Recovery Sump Soil Sampling

On December 20, 1994, following the demolition of Building 829X, soil samples were collected from the area surrounding the former building, along the Building 892X septic system drain line, and from the soil beneath the gravel layer on the sump bottom. The primary goal of the sump sampling was to identify types and concentrations of potential contaminants, mainly silver, in the soil beneath the sump so that any necessary remedial activities could be planned. Four samples were collected from the sump at depths of 0 to 12 inches bgs. The sample locations are shown on Figure 2-1 in the report in Annex A. Three of the four samples were analyzed for silver only; the fourth sample was also analyzed for VOCs, semivolatile organic compounds (SVOCs), total metals, radionuclides by gamma spectroscopy, and tritium. Silver concentrations ranged from not detected in one sample up to 125 milligrams (mg)/kilogram in another (IT April 1995). A portion of the contamination assessment report (IT April 1995) presenting the activities and a summary of the analytical results is presented as Annex A.

When the culvert was subsequently removed in September 1999, approximately 1.5 feet of soil and gravel aggregate underlying the sump were also removed and disposed of according to SNL/NM policy (IT January 2000). Because this soil was removed in 1999, the data have not been incorporated into the data tables or the risk assessment for this CAC proposal. The soil beneath the sump was resampled in September 2002 as described in Section 3.4 of this report.

3.3 Investigation 2—Passive Soil-Vapor Sampling

In April and May 2002, a passive soil-vapor survey was conducted in the area of the former Building 829X silver recovery sump. This survey was required at this site by NMED/HWB regulators and was conducted to determine whether significant VOC contamination was present in the soil at the site.

3.3.1 Passive Soil-Vapor Sampling Methodology

A Gore-Sorber™ (GS) passive soil-vapor survey is a qualitative screening procedure that can be used to identify many VOCs present in the vapor phase in soil. The technique is highly sensitive to organic vapors, and the result produces a qualitative measure of organic soil vapor chemistry over a two- to three-week period rather than at one point in time.

Each GS soil-vapor sampler consists of a 1-foot-long, 0.25-inch diameter tube of waterproof, vapor-permeable fabric containing 40 mg of absorbent material. At each sampling location, a 3-foot-deep by 1.5-inch-diameter borehole was drilled with the Geoprobe™. A sample identification tag and location string were attached to the GS sampler and lowered into the open borehole to a depth of 1 to 2 feet bgs. The location string was attached to a numbered pin flag at the surface. A cork was placed in the borehole above the sampler as a seal, and the upper 1 foot of the borehole, from the cork to the ground surface, was backfilled with site soil.

The vapor samplers were left in the ground for approximately two weeks before retrieval. After retrieval, each sampler was individually placed into a pre-cleaned jar, sealed, and sent to W.L. Gore and Associates for analysis by thermal desorption and gas chromatography using a modified U.S. Environmental Protection Agency (EPA) Method 8260. Analytical results for the VOCs of interest are reported as mass (expressed in micrograms) of the individual VOCs absorbed by the sampler while it was in the ground (Gore June 2002). All samples were documented and handled in accordance with applicable SNL/NM operating procedures.

3.3.2 Soil-Vapor Survey Results and Conclusions

A total of four GS passive soil-vapor samplers were placed in the silver recovery sump area of the site (Figure 2.2.1-2). Samplers were installed at the site on April 26, 2002, and were retrieved on May 10, 2002. Sample locations are designated by the same six-digit sample number both on Figure 2.2.1-2 and in the analytical results tables presented in Annex B.

As shown in the analytical results tables in Annex B, the GS samplers were analyzed for a total of 30 individual or groups of VOCs, including trichloroethene, tetrachloroethene, cis- and trans-dichloroethene, and benzene/toluene/ethylbenzene/xylene. Low to trace-level (but quantifiable) amounts of 14 individual or groups of VOCs were detected in the GS samplers installed at this site. The analytical results indicated there were no areas of significant VOC contamination at the site that would require additional characterization.

3.4 Investigation 3—Soil Sampling

On September 24, 2002, soil sampling was conducted in accordance with the rationale and procedures in the SAP (SNL/NM October 1999) approved by the NMED. Soil samples were collected from one borehole drilled through, and beneath, the former sump location. The soil boring location is shown on Figure 2.2.1-2. Figure 3.4-1 shows the sump before removal, and Figure 3.4-2 shows soil sampling at the sump location following removal and backfilling. A summary of the borehole, sample depths, sample analyses, analytical methods, laboratories, and sample date is presented in Table 3.4-1.

Figure 3.4-1

View of DSS Site 276, the Former Building 829X Silver Recovery Sump on September 14, 1999, approximately two weeks before removal. The metal culvert is approximately 6 feet in diameter and 5.5 feet deep. View to the southwest.

Figure 3.4-2

Collecting soil samples with the Geoprobe™ from the
borehole drilled through the backfilled location of the sump at DSS Site 276,
the Former Building 829X Silver Recovery Sump. View to the southwest. September 24, 2002

Table 3.4-1
Summary of Area Sampled, Analytical Methods, and Laboratories Used for
DSS Site 276, Former Building 829X Silver Recovery Sump Soil Samples

Sampling Area	Number of Borehole Locations	Top of Sampling Intervals in Each Borehole (ft bgs)	Total Number of Soil Samples	Analytical Parameters and EPA Methods[a]	Analytical Laboratory	Date Samples Collected
Silver Recovery Sump	1	8, 13	2 +1 Duplicate	VOCs EPA Method 8260	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	SVOCs EPA Method 8270	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	PCBs EPA Method 8082	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	HE Compounds EPA Method 8330	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	RCRA Metals EPA Methods 6000/7000	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	Hexavalent Chromium EPA Method 7196A	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	Total Cyanide EPA Method 9012A	GEL	09-24-02
	1	8, 13	2 +1 Duplicate	Gamma Spectroscopy EPA Method 901.1	RPSD	09-24-02
	1	8, 13	2 +1 Duplicate	Gross Alpha/Beta Activity EPA Method 900.0	GEL	09-24-02

[a]EPA November 1986.
bgs = Below ground surface.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ft = Foot (feet).
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
PCB = Polychlorinated biphenyl.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

3.4.1 Soil Sampling Methodology

An auger drill rig was used to sample all boreholes at two depth intervals. In the borehole drilled through the center of the former sump, the shallow sample interval started in native soil below the depth of the sump removal excavation, and the lower (deep) interval started at 5 feet below the top of the upper sample interval. Once the auger rig had reached the top of the sampling interval, a 3- or 4-foot-long by 1.5-inch inside diameter Geoprobe™ sampling tube lined with a butyl acetate (BA) sampling sleeve was inserted into the borehole and hydraulically driven downward 3 or 4 feet to fill the tube with soil.

Once the sample tube was retrieved from the borehole, the sample for VOC analysis was immediately collected by slicing off a 3- to 4-inch section from the lower end of the BA sleeve and capping the section ends with Teflon® film, then a rubber end cap, and finally sealing the tube with tape.

For the non-VOC analyses, the soil remaining in the BA liner was emptied into a decontaminated mixing bowl, and aliquots of soil were transferred into appropriate sample containers for analysis. On occasion, the amount of soil recovered in the first sampling run was insufficient for sample volume requirements. In this case, additional sampling runs were completed until an adequate soil volume was recovered. Soil recovered from these additional runs was emptied into the mixing bowl and blended with the soil already collected. Aliquots of the blended soil were then transferred into sample containers and submitted for analysis.

All samples were documented and handled in accordance with applicable SNL/NM operating procedures and transported to on- and off-site laboratories for analysis.

3.4.2 Soil Sampling Results and Conclusions

Analytical results for the soil samples collected at DSS Site 276 are presented and discussed in this section.

VOCs

VOC analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-1. Method detection limits (MDLs) for the VOC soil analyses are presented in Table 3.4.2-2. Low concentrations of 2-butanone were detected in the 8-foot-bgs duplicate and the 13-foot-bgs soil samples. This compound was not detected in the equipment blank (EB) or trip blank (TB) associated with these samples, and it is a common laboratory contaminant that may not indicate soil contamination at this site.

SVOCs

SVOC analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-3. MDLs for the SVOC soil analyses are presented in Table 3.4.2-4. No SVOCs were detected in the soil samples collected at this site. Diethylphthalate was detected in the EB associated with these samples.

Table 3.4.2-1
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, VOC Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			VOCs (EPA Method 8260[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	2-Butanone
605728	829X-SP1-BH1-8-S	8	ND (3.82)
605728	829X-SP1-BH1-8-DU	8	**4.34 J (4.9)**
605728	829X-SP1-BH1-13-S	13	**7.61**
Quality Assurance/Quality Control Samples (µg/L)			
605728	829X-SP1-EB	NA	ND (2.31)
605728	829X-SP1-BH1-TB	NA	ND (2.31)
605728	829X-SP1-TB	NA	ND (2.31)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EPA = U.S. Environmental Protection Agency.
EB = Equipment blank.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
SP = Seepage pit.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3.4.2-2
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, VOC Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8260[a] Detection Limit (µg/kg)
Acetone	3.45–3.59
Benzene	0.441–0.459
Bromodichloromethane	0.48–0.5
Bromoform	0.48–0.5
Bromomethane	0.49–0.51
2-Butanone	3.67–3.82
Carbon disulfide	2.31–2.41
Carbon tetrachloride	0.48–0.5
Chlorobenzene	0.402–0.418
Chloroethane	0.794–0.827
Chloroform	0.51–0.531
Chloromethane	0.363–0.378
Dibromochloromethane	0.49–0.51
1,1-Dichloroethane	0.461–0.48
1,2-Dichloroethane	0.422–0.439
1,1-Dichloroethene	0.49–0.51
cis-1,2-Dichloroethene	0.461–0.48
trans-1,2-Dichloroethene	0.52–0.541
1,2-Dichloropropane	0.471–0.49
cis-1,3-Dichloropropene	0.422–0.439
trans-1,3-Dichloropropene	0.245–0.255
Ethylbenzene	0.373–0.388
2-Hexanone	3.7–3.85
Methylene chloride	1.32–1.38
4-Methyl-2-pentanone	3.95–4.11
Styrene	0.382–0.398
1,1,2,2-Tetrachloroethane	0.892–0.929
Tetrachloroethene	0.373–0.388
Toluene	0.333–0.347
1,1,1-Trichloroethane	0.52–0.541
1,1,2-Trichloroethane	0.529–0.551
Trichloroethene	0.441–0.459
Vinyl acetate	1.75–1.82
Vinyl chloride	0.549–0.571
Xylene	0.382–0.398

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
VOC = Volatile organic compound.

Table 3.4.2-3
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, SVOC Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			SVOCs (EPA Method 8270[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	Diethylphthalate
605728	829X-SP1-BH1-8-S	8	ND (17.7)
605728	829X-SP1-BH1-8-DU	8	ND (17.7)
605728	829X-SP1-BH1-13-S	13	ND (17.7)
Quality Assurance/Quality Control Sample (µg/L)			
605728	829X-SP1-EB	NA	**0.871 J (9.71)**

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EPA = U.S. Environmental Protection Agency.
EB = Equipment blank.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
SP = Seepage pit.
SVOC = Semivolatile organic compound.

Table 3.4.2-4
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, SVOC Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8270[a] Detection Limit (µg/kg)
Acenaphthene	8
Acenaphthylene	16.7
Anthracene	16.7
Benzo(a)anthracene	16.7
Benzo(a)pyrene	16.7
Benzo(b)fluoranthene	16.7
Benzo(g,h,i)perylene	16.7
Benzo(k)fluoranthene	16.7
4-Bromophenyl phenyl ether	34
Butylbenzyl phthalate	28.7
Carbazole	16.7
4-Chlorobenzenamine	167
bis(2-Chloroethoxy)methane	12.3
bis(2-Chloroethyl)ether	37.3
bis-Chloroisopropyl ether	11
4-Chloro-3-methylphenol	167
2-Chloronaphthalene	13.7
2-Chlorophenol	15.3
4-Chlorophenyl phenyl ether	19.7
Chrysene	16.7
o-Cresol	26
Dibenz[a,h]anthracene	16.7
Dibenzofuran	17
1,2-Dichlorobenzene	10
1,3-Dichlorobenzene	11.3
1,4-Dichlorobenzene	15.7
3,3'-Dichlorobenzidine	167
2,4-Dichlorophenol	20.7
Diethylphthalate	17.7
2,4-Dimethylphenol	167
Dimethylphthalate	18.3
Di-n-butyl phthalate	24
Dinitro-o-cresol	167
2,4-Dinitrophenol	167
2,4-Dinitrotoluene	25.3
2,6-Dinitrotoluene	33.3
Di-n-octyl phthalate	30.3
Diphenylamine	22.3
bis(2-Ethylhexyl) phthalate	30
Fluoranthene	16.7
Fluorene	4
Hexachlorobenzene	20

Refer to footnotes at end of table.

Table 3.4.2-4 (Concluded)
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, SVOC Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8270[a] Detection Limit (µg/kg)
Hexachlorobutadiene	12.7
Hexachlorocyclopentadiene	167
Hexachloroethane	22
Indeno(1,2,3-cd)pyrene	16.7
Isophorone	16
2-Methylnaphthalene	16.7
4-Methylphenol	33.3
Naphthalene	16.7
2-Nitroaniline	167
3-Nitroaniline	167
4-Nitroaniline	37
Nitrobenzene	20.3
2-Nitrophenol	17
4-Nitrophenol	167
n-Nitrosodipropylamine	22.7
Pentachlorophenol	167
Phenanthrene	16.7
Phenol	12.7
Pyrene	16.7
1,2,4-Trichlorobenzene	12.7
2,4,5-Trichlorophenol	17.3
2,4,6-Trichlorophenol	27.3

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
SVOC = Semivolatile organic compound.

PCBs

Polychlorinated biphenyl (PCB) analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-5. MDLs for the PCB soil analyses are presented in Table 3.4.2 6. Both Aroclor-1242 and Aroclor-1254 were detected in the 8-foot-bgs duplicate sample. Aroclor-1254 was also detected in the 13-foot-bgs sample collected at this site. No PCBs were detected in the EB associated with these samples.

HE Compounds

High explosive (HE) compound analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-7. MDLs for the HE soil analyses are presented in Table 3.4.2-8. No HE compounds were detected in any soil sample collected. The analytical results for Tetryl (methyl-2,4,6-trinitrophenylnitramine) in the EB were rejected during data validation.

RCRA Metals and Hexavalent Chromium

Resource Conservation and Recovery Act (RCRA) metals and hexavalent chromium analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-9. MDLs for the metals in soil analyses are presented in Table 3.4.2-10. Arsenic and chromium were detected at concentrations above the NMED-approved background levels in the 8-foot-bgs duplicate sample. All other metal concentrations were below background.

Total Cyanide

Total cyanide analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-11. MDLs for the cyanide soil analyses are presented in Table 3.4.2-12. Cyanide was detected in the 8-foot-bgs duplicate and 13-foot-bgs sample from the borehole. No cyanide was detected in the EB associated with these samples.

Radionuclides

Analytical results for the gamma spectroscopy analysis of the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-13. No activities above NMED-approved background levels were detected in any sample analyzed. However, although not detected, the minimum detectable activity (MDA) for one of the uranium-235 analyses exceeded the background activity because the standard gamma spectroscopy count time for soil samples (6,000 seconds) was not sufficient to reach the NMED-approved background activity established for SNL/NM soils. Even though the MDA may be slightly elevated, it is still very low, and the risk assessment outcome for the site is not significantly impacted by its use.

Table 3.4.2-5
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, PCB Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			PCBs (EPA Method 8082[a]) (µg/kg)	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Aroclor-1242	Aroclor-1254
605728	829X-SP1-BH1-8-S	8	ND (1.67)	ND (0.5)
605728	829X-SP1-BH1-8-DU	8	**57.6**	**16.2**
605728	829X-SP1-BH1-13-S	13	ND (1.67)	**3 J (3.33)**
Quality Assurance/Quality Control Sample (µg/L)				
605728	829X-SP1-EB	NA	ND (0.0577)	ND (0.0481)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
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 MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
PCB = Polychlorinated biphenyl.
S = Soil sample.
SP = Seepage pit.

Table 3.4.2-6
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, PCB Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8082[a] Detection Limit (µg/kg)
Aroclor-1016	1
Aroclor-1221	2.82
Aroclor-1232	1.67
Aroclor-1242	1.67
Aroclor-1248	1
Aroclor-1254	0.5
Aroclor-1260	1

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
PCB = Polychlorinated biphenyl.

Table 3.4.2-7
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, HE Compound Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330[a]) (µg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	Tetryl
605728	829X-SP1-BH1-8-S	8	ND (22.1)
605728	829X-SP1-BH1-8-DU	8	ND (22.1)
605728	829X-SP1-BH1-13-S	13	ND (22.1)
Quality Assurance/Quality Control Sample (µg/L)			
605728	829X-SP1-EB	NA	R

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
HE = High explosive(s).
ID = Identification.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
µg/L = Microgram(s) per liter.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
R = Value rejected during data validation.
S = Soil sample.
SP = Seepage pit.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

Table 3.4.2-8
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, HE Compound Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8330[a] Detection Limit (µg/kg)
2-Amino-4,6-dinitrotoluene	18.1
4-Amino-2,6-dinitrotoluene	34.1
1,3-Dinitrobenzene	34.1
2,4-Dinitrotoluene	55
2,6-Dinitrotoluene	48
HMX	48
Nitrobenzene	48
2-Nitrotoluene	24
3-Nitrotoluene	24
4-Nitrotoluene	24
RDX	48
Tetryl	22.1
1,3,5-Trinitrobenzene	29
2,4,6-Trinitrotoluene	48

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
HE = High explosive(s).
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

Table 3.4.2-9
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, Metals Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			Metals (EPA Methods 6000/7000/7196A[a]) (mg/kg)								
Record Number[b]	ER Sample ID	Sample Depth (ft)	Arsenic	Barium	Cadmium	Chromium	Chromium (VI)	Lead	Mercury	Selenium	Silver
605728	829X-SP1-BH1-8-S	8	3.73	165	0.285 J (0.49)	12.3 J	ND (0.0518)	7.51 J	0.00678 J (0.00915)	ND (0.159)	0.626
605728	829X-SP1-BH1-8-DU	8	**5.93**	178	0.243 J (0.5)	**13.6 J**	ND (0.052)	7.31 J	0.00631 J (0.00943)	ND (0.162)	0.403 J (0.5)
605728	829X-SP1-BH1-13-S	13	1.66 J	89.1	0.203 J (0.49)	6.96 J	ND (0.0529)	4.02 J	0.00276 J (0.0092)	0.25 J (0.49)	ND (0.0884)
Background Concentration—North Supergroup[c]			4.4	200	0.9	12.8	NC	11.2	<0.1	<1	<1
Quality Assurance/Quality Control Sample (mg/L)											
605728	829-SP1-EB	NA	ND (0.00224)	ND (0.000222)	ND (0.000313)	0.000773 J (0.005)	ND (0.0054 J) H	ND (0.00172)	ND (0.000047)	ND (0.00281)	ND (0.000835)

Note: Values in **bold** exceed background soil concentrations.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Dinwiddie September 1997.

BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
H = The holding time was exceeded for the associated sample analysis.
ID = Identification.
J = Analytical result was qualified as an estimated value.
J ( ) = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
NA = Not applicable.
NC = Not calculated.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
SP = Seepage pit.

Table 3.4.2-10
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, Metals Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A[a] Detection Limit (mg/kg)
Arsenic	0.202–0.206
Barium	0.0654–0.0667
Cadmium	0.0469–0.0478
Chromium	0.158–0.161
Chromium (VI)	0.0518–0.0529
Lead	0.278–0.284
Mercury	0.000899–0.000927
Selenium	0.159–0.162
Silver	0.0884–0.0902

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.

Table 3.4.2-11
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, Total Cyanide Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			Total Cyanide (EPA Method 9012A[a]) (mg/kg)
Record Number[b]	ER Sample ID	Sample Depth (ft)	
605728	829X-SP1-BH1-8-S	8	ND (0.0419)
605728	829X-SP1-BH1-8-DU	8	**0.0493 J (0.25)**
605728	829X-SP1-BH1-13-S	13	**0.0495 J (0.227)**
Quality Assurance/Quality Control Sample (mg/L)			
605728	829-SP1-EB	NA	ND (0.00172)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
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 MDL but is less than the practical quantitation limit, shown in parentheses.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
mg/L = Milligram(s) per liter.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
SP = Seepage pit.

Table 3.4.2-12
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, Total Cyanide Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 9012A[a] Detection Limit (mg/kg)
Total Cyanide	0.0381–0.0419

[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.

Table 3.4.2-13
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results
September 2002
(On-Site Laboratory)

Sample Attributes			Activity (EPA Method 901.1[a]) (pCi/g)							
Record Number[b]	ER Sample ID	Sample Depth (ft)	Cesium-137		Thorium-232		Uranium-235		Uranium-238	
			Result	Error[c]	Result	Error[c]	Result	Error[c]	Result	Error[c]
605731	829-SP1-BH1-8-S	8	ND (0.0386)	--	0.908	0.431	0.0946	0.186	ND (0.554)	--
605731	829-SP1-BH1-8-DU	8	ND (0.0296)	--	1	0.461	**ND (0.231)**	--	ND (0.737)	--
605731	829-SP1-BH1-13-S	13	ND (0.029)	--	0.755	0.362	0.0972	0.182	ND (0.714)	--
Background Activity—North Supergroup[d]			0.084	NA	1.54	NA	0.18	NA	1.3	NA

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.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
MDA = Minimum detectable activity.
NA = Not applicable.
ND ( ) = Not detected above the MDA, shown in parentheses.
ND ( ) = Not detected, but the MDA (shown in parentheses) exceeds background activity.
pCi/g = Picocurie(s) per gram.
S = Soil sample.
SP = Seepage pit.
-- = Error not calculated for nondetect results.

Gross Alpha/Beta Activity

Gross alpha/beta activity analytical results for the two soil samples and one duplicate collected from the sump location borehole are summarized in Table 3.4.2-14. No gross alpha or beta activity was detected above the New Mexico-established background levels (Miller September 2003) in any of the samples. These results indicate no significant levels of radioactive material are present in the soil at the site.

Table 3.4.2-14
Summary of DSS Site 276, Former Building 829X Silver Recovery Sump
Confirmatory Soil Sampling, Gross Alpha/Beta Activity Analytical Results
September 2002
(Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 900.0[a]) (pCi/g)			
			Gross Alpha		Gross Beta	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Result	Error[c]	Result	Error[c]
605728	829X-SP1-BH1-8-S	8	12.6	3.55	16.6	1.29
605728	829X-SP1-BH1-8-DU	8	12.6	3.13	18.4	1.33
605728	829X-SP1-BH1-13-S	13	15.8	3.7	16.6	1.29
Background Activity[d]			17.4	NA	35.4	NA
Quality Assurance/Quality Control Sample (pCi/L)						
605672	829X-SP1-EB	NA	0.111	0.275	0.229	0.39

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]Two standard deviations about the mean detected activity.
[d]Miller September 2003.
BH = Borehole.
DSS = Drain and Septic Systems.
DU = Duplicate sample.
EB = Equipment blank.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
NA = Not applicable.
pCi/g = Picocurie(s) per gram.
pCi/L = Picocurie(s) per liter.
S = Soil sample.
SP = Seepage pit.

3.4.3 Soil Sampling Quality Assurance/Quality Control Samples and Data Validation Results

Throughout the DSS Project, quality assurance/quality control samples were collected at an approximate frequency of 1 per 20 field samples. These included duplicate, EB, and TB samples. Typically, samples were shipped to the laboratory in batches of up to 20 samples, so that any one shipment might contain samples from several sites. Aqueous EB samples were collected at an approximate frequency of 1 per 20 site samples. The EB samples were analyzed for the same analytical suite as the soil samples in that shipment. The analytical

results for the EB samples appear only on the data tables for the site where they were collected. However, the results were used in the data validation process for all the samples in that batch.

Aqueous TB samples, for VOC analysis only, were included in every sample cooler containing VOC soil samples. The analytical results for the TB samples appear on the VOC data tables for the sites in that shipment. The results were used in the data validation process for all the samples in that batch. No VOCs were detected in either of the two TBs for DSS Site 276 (Table 3.4.2-1).

A set of aqueous EB samples were collected following the completion of soil sampling in the Former Building 829X Silver Recovery Sump in September 2002. With the exception of gamma spectroscopy, the EB samples were analyzed for the same constituents as the soil samples collected at that time. No VOCs, PCBs, cyanide, or elevated gross alpha/beta activity were detected in any of the EB samples. A trace amount of the SVOC diethylphthalate as well as chromium were detected in the EB samples. The EB analytical result for the HE compound Tetryl was rejected during data validation. The EB analysis for hexavalent chromium was performed outside of the method holding time.

As shown in Tables 3.4.2-1, 3.4.2-3, 3.4.2-5, 3.4.2-7, 3.4.2-9, 3.4.2-11, 3.4.2-13, and 3.4.2-14, to assess the precision and repeatability of sampling and analytical procedures, duplicate soil samples (designated 'DU') were collected and analyzed at the off-site laboratory for VOCs, SVOCs, PCBs, HE compounds, metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity.

As shown in Tables 3.4.2-1, 3.4.2-5, and 3.4.2-11, the VOC 2-butanone, two PCBs, and cyanide were detected in the 8-foot-bgs duplicate sample but not in the primary sample from the borehole. As shown in Tables 3.4.2-3 and 3.4.2-7, no SVOCs or HE compounds were detected in either the primary or duplicate 8-foot-bgs samples from the borehole.

As shown in Table 3.4.2-9, arsenic and chromium concentrations were comparable in the primary and duplicate 8-foot-bgs samples, but exceeded the NMED-approved background concentrations in the duplicate sample. All other metal concentrations were comparable in both the primary and duplicate 8-foot-bgs samples.

As shown in Table 3.4.2-13, gamma spectroscopy activities were comparable for three of the four radionuclides reported. The MDA for the 8-foot-bgs duplicate sample analysis exceeded the NMED-approved background and cannot be compared with the activity reported for the primary sample. Gross alpha/beta results for the 8-foot-bgs primary and duplicate sample analyses are comparable (Table 3.4.2-14).

All laboratory data were reviewed and verified/validated according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994) or SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). Annex C contains the data validation reports for the samples collected at this site. In addition, SNL/NM Department 7713 (Radiation Protection Sample Diagnostics [RPSD] Laboratory) reviewed all gamma spectroscopy results according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). The data are acceptable for use in this request for a determination of CAC without controls.

3.5 Site Sampling Data Gaps

Analytical data from the site assessment were sufficient for characterizing the nature and extent of possible COC releases. There are no further data gaps regarding characterization of DSS Site 276.

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4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 276, the Former Building 829X Silver Recovery Sump, is based upon the COCs identified in the soil samples collected from beneath the sump at this site. This section summarizes the nature and extent of contamination and the environmental fate of the COCs.

4.1 Nature and Extent of Contamination

Potential COCs at DSS Site 276 are VOCs, SVOCs, PCBs, HE compounds, RCRA metals, hexavalent chromium, cyanide, and radionuclides. No SVOCs or HE compounds were detected in these samples. One VOC and two PCBs were detected in these samples. Arsenic and chromium were detected in the duplicate sample above the NMED-approved maximum background concentrations for SNL/NM North Area Supergroup soils (Dinwiddie September 1997). Hexavalent chromium was not detected in any sample, but because it does not have a quantified background screening concentration, it is unknown whether this COC exceeds background. When a metal concentration exceeded its maximum background screening value, it was considered further in the risk assessment process. Cyanide was detected in two samples, but because it also does not have a quantified background screening concentration, it is unknown whether this COC exceeds background. None of the four representative gamma spectroscopy radionuclides were detected at activities exceeding the corresponding background levels. However, the MDA for one of the uranium-235 analyses exceeded the corresponding background activity. Finally, no gross alpha/beta activity was detected above the New Mexico-established background levels.

4.2 Environmental Fate

Potential COCs may have been released into the vadose zone via aqueous effluent spilled inside the silver recovery sump. Possible secondary release mechanisms include the uptake of COCs that may have been released into the soil beneath the silver recovery sump (Figure 4.2-1). The depth to the regional groundwater aquifer at the site (approximately 555 feet bgs) most likely precludes migration of potential COCs into the groundwater system. The potential pathways to receptors include soil ingestion, dermal contact, and inhalation, which could occur as a result of receptor exposure to contaminated subsurface soil at the site. No intake routes through plant, meat, or milk ingestion are considered appropriate for either the industrial or residential land-use scenarios. Annex D provides additional discussion on the fate and transport of COCs at DSS Site 276.

Table 4.2-1 summarizes the potential COCs for DSS Site 276. All potential COCs were retained in the conceptual model and were evaluated in both the human health and ecological risk assessments. The current and future land use for DSS Site 276 is industrial (DOE et al. September 1995).

The potential human receptors at the site are considered to be an industrial worker and resident. The exposure routes for the receptors are dermal contact and ingestion/inhalation; however, these are realistic possibilities only if contaminated soil is excavated at the site. The

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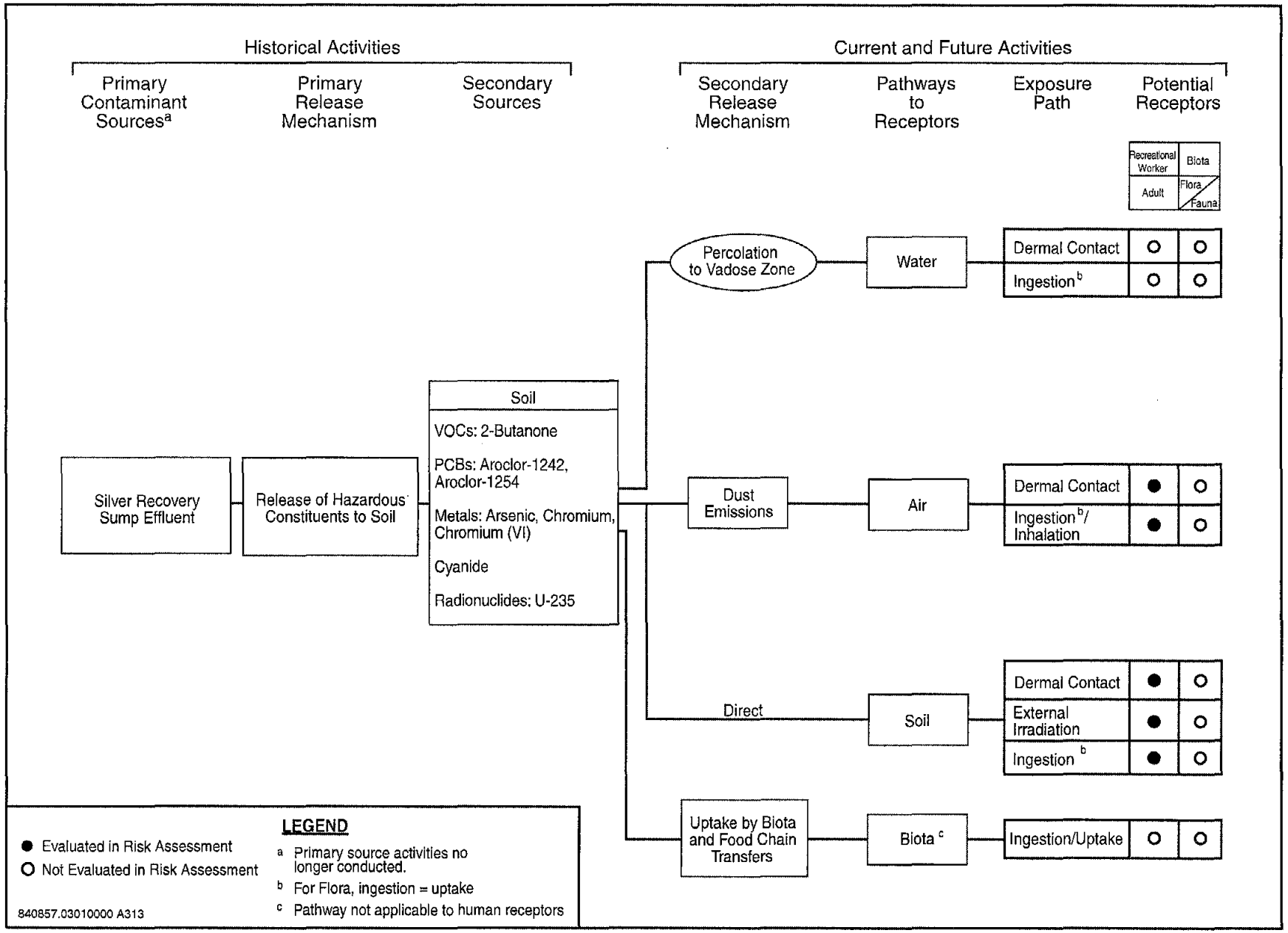

Figure 4.2-1

Conceptual Site Model Flow Diagram for DSS Site 276, Former Building 829X Silver Recovery Sump

Table 4.2-1
Summary of Potential COCs for DSS Site 276, Former Building 829X Silver Recovery Sump

COC Type		Number of Samples[a]	COCs Detected or with Concentrations Greater than Background or Nonquantified Background	Maximum Background Limit/North Supergroup[b] (mg/kg)	Maximum Concentration[c] (All Samples) (mg/kg)	Average Concentration[d] (mg/kg)	Number of Samples Where COCs Detected or with Concentrations Greater than Background or Nonquantified Background[e]
VOCs		3	2-Butanone	NA	0.0076	0.0046	2
SVOCs		3	None	NA	NA	NA	None
PCBs		3	Aroclor-1242	NA	0.0576	0.0198	1
		3	Aroclor-1254	NA	0.0162	0.0065	2
HE Compounds		3	None	NA	NA	NA	None
RCRA Metals		3	Arsenic	4.4	5.93	3.77	1
		3	Chromium	12.8	13.6 J	10.95	1
Hexavalent Chromium		3	Hexavalent Chromium	NC	ND (0.0529)	0.0261	None
Cyanide		3	Cyanide	NC	0.0495 J	0.0399	2
Radionuclides (pCi/g)	Gamma Spectroscopy	3	Uranium-235	0.18	ND (0.231)	NC[f]	1
	Gross Alpha	3	None	NA	NA	NA	None
	Gross Beta	3	None	NA	NA	NA	None

[a]Number of samples includes duplicates and splits.
[b]Dinwiddie September 1997.
[c]Maximum concentration is either the maximum amount detected, or for radionuclides, the greater of either the maximum detection or the maximum MDA above background.
[d]Average concentration includes all samples except blanks. The average is calculated as the sum of detected amounts and one-half of the MDLs for nondetect results, divided by the number of samples.
[e]See appropriate data table for sample locations.
[f]An average MDA is not calculated because of the variability in instrument counting error and the number of reported nondetect activities for gamma spectroscopy.

COC = Constituent of concern.
DSS = Drain and Septic Systems.
HE = High explosive(s).
J = Analytical result was qualified as an estimated value.
MDA = Minimum detectable activity.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
NA = Not applicable.
NC = Not calculated.
ND ( ) = Not detected above the MDL or MDA, shown in parentheses.
PCB = Polychlorinated biphenyl.
pCi/g = Picocurie(s) per gram.
RCRA = Resource Conservation and Recovery Act.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

major exposure route modeled in the human health risk assessment is soil ingestion for COCs. The inhalation pathway is included because of the potential to inhale dust and volatiles. The dermal pathway is included because of the potential for receptors to be exposed to the contaminated soil.

No pathways to groundwater and no intake routes through flora or fauna are considered appropriate for either the industrial or residential land-use scenarios. Annex D provides additional discussion of the exposure routes and receptors at DSS Site 276.

4.3 Site Assessment

Site assessment at DSS Site 276 included risk assessments for both human health and ecological risk. This section briefly summarizes the site assessment results, and Annex D discusses the risk assessment performed for DSS Site 276 in more detail.

4.3.1 Summary

The site assessment concluded that DSS Site 276 poses no significant threat to human health under either the industrial or residential land-use scenarios. Ecological risks were found to be insignificant because no pathways exist.

4.3.2 Risk Assessments

Risk assessments were performed for both human health and ecological risk at DSS Site 276. This section summarizes the results.

4.3.2.1 Human Health

DSS Site 276 has been recommended for an industrial land-use scenario (DOE et al. September 1995). Because VOCs, PCBs, arsenic, chromium, hexavalent chromium, cyanide, and uranium-235 were detected, are present above background, have nonquantified background values, or have MDAs above background, it was necessary to perform a human health risk assessment analysis for the site, which included these COCs. Annex D provides a complete discussion of the risk assessment process, results, and uncertainties. The risk assessment process provides a quantitative evaluation of the potential adverse human health effects from constituents in the site's soil by calculating the hazard index (HI) and excess cancer risk for both industrial and residential land-use scenarios.

The HI calculated for the COCs at DSS Site 276 is 0.02 for the industrial land-use scenario, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). The incremental HI risk, determined by subtracting risk associated with background from potential nonradiological COC risk (without rounding), is 0.00. The excess cancer risk for DSS Site 276 COCs is 4E-6 for an industrial land-use scenario. 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 estimated

incremental excess cancer risk is 9.59E-7. Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 276 is 0.27 for the residential land-use scenario, which is less than the numerical standard of 1.0 suggested by risk assessment guidance (EPA 1989). The incremental HI risk, determined by subtracting risk associated with background from potential nonradiological COC risk (without rounding), is 0.07. The excess cancer risk for DSS Site 276 COCs is 2E-5 for a residential land-use scenario. 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 slightly above the suggested acceptable risk value. The estimated incremental excess cancer risk is 3.95E-6. Both the incremental HI and incremental excess cancer risk are below NMED guidelines.

For the radiological COCs, one of the constituents (uranium-235) had an MDA value greater than the corresponding background value. The incremental total effective dose equivalent (TEDE) and corresponding estimated cancer risk from radiological COCs are much lower than the EPA guidance values. The estimated TEDE is 7.3E-3 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 estimated incremental excess cancer risk value is 6.2E-8 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional controls is 1.9E-2 mrem/yr with an associated estimated incremental excess risk of 1.8E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 276 is eligible for unrestricted radiological release.

The incremental nonradiological and radiological carcinogenic risks are tabulated and summed in Table 4.3.2-1.

Table 4.3.2-1
Summation of Incremental Nonradiological and Radiological Risks from
DSS Site 276, Former Building 829X Silver Recovery Sump Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	9.59E-7	6.2E-8	1.0E-6
Residential	3.95E-6	1.8E-7	4.1E-6

DSS = Drain and Septic Systems.

Uncertainties associated with the calculations are considered small relative to the conservatism of the 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.

4.3.2.2 Ecological

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 Annex D,

Sections IV, VII.2, and VII.2.1). 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.

All COCs at DSS Site 276 are located at depths of 5 feet bgs or greater. Therefore, no complete ecological pathways exist at this site, and a more detailed ecological risk assessment is not necessary.

4.4 Baseline Risk Assessments

This section discusses the baseline risk assessments for human health and ecological risk.

4.4.1 Human Health

Because the results of the human health risk assessment summarized in Section 4.3.2.1 indicate that DSS Site 276 poses insignificant risk to human health under both the industrial and residential land-use scenarios, a baseline human health risk assessment is not required for this site.

4.4.2 Ecological

Because the results of the ecological risk assessment summarized in Section 4.3.2.2 indicate that no complete pathways exist at DSS Site 276, a baseline ecological risk assessment is not required for the site.

5.0 RECOMMENDATION FOR CORRECTIVE ACTION COMPLETE WITHOUT CONTROLS DETERMINATION

5.1 Rationale

Based upon field investigation data and the human health and ecological risk assessment analyses, a determination of CAC without controls is recommended for DSS Site 276 for the following reasons:

- 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 because no complete pathways exist at the site.

5.2 Criterion

Based upon the evidence provided in Section 5.1, a determination of CAC without controls (NMED April 2004) is recommended for DSS Site 276. This is consistent with the NMED's NFA Criterion 5, which states, "the SWMU/AOC [Area of Concern] 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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ANNEX A
Contamination Assessment Report for Soil Sampling at Building 829X

CONTAMINATION ASSESSMENT REPORT FOR SOIL SAMPLING AT BUILDING 829X

Volume 1
Report and Appendix A

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April 1995

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1.0 Introduction

Building 829X is located in Technical Area I, Sandia National Laboratories/New Mexico (SNL/NM), west of Gate 4, at the northern terminus of 6th Street (Figure 1-1). The building was demolished in 1994, following completion of building materials sampling (IT Corporation [IT], 1994). All that remains of Building 829X is a concrete slab, approximately 4,000 square feet (ft) in area, and a sump located just west of the southwest corner of the slab. The sump is circular, approximately 7 ft in diameter and 8 ft deep, and has a hinged, heavy-gauge steel cover.

1.1 History

Building 829 was constructed in 1948 and used either for office space or by the Graphic Arts Services Organization throughout its lifetime (IT, 1994). Chemical use included solvents, paints, and photoprocessing solutions. Chromic acid was used in the building and disposed of in sinks that drained into the sanitary sewer line. There is no evidence that radioactive materials were ever used in the building.

Operations at Building 829X also included a silver recovery system, which consisted of a collection tank located below ground level in the sump on the west side of the building. The silver recovery equipment has been removed but the sump remains. It is likely that solutions draining into the recovery system also spilled onto the gravel-covered soil floor of the sump.

At one time, plutonium assays were performed in Building 830, located immediately east of Building 829X. Because of the proximity of Building 830, the potential exists for very low-level radioactive contamination of peripheral soils at Building 829X.

1.2 Previous Investigations

IT conducted a site information audit during July through September, 1993, to identify any hazardous or radioactive materials that may have been used at the building, possibly contaminating the structure. The results of the audit and inspection are contained in the "Site Inspection Report for Decontamination and Demolition of Building 829X" (IT, 1993). Additionally, an asbestos survey of the building was conducted under the SNL/NM asbestos program (SGA/PBS, 1989) prior to the information audit and site inspection.

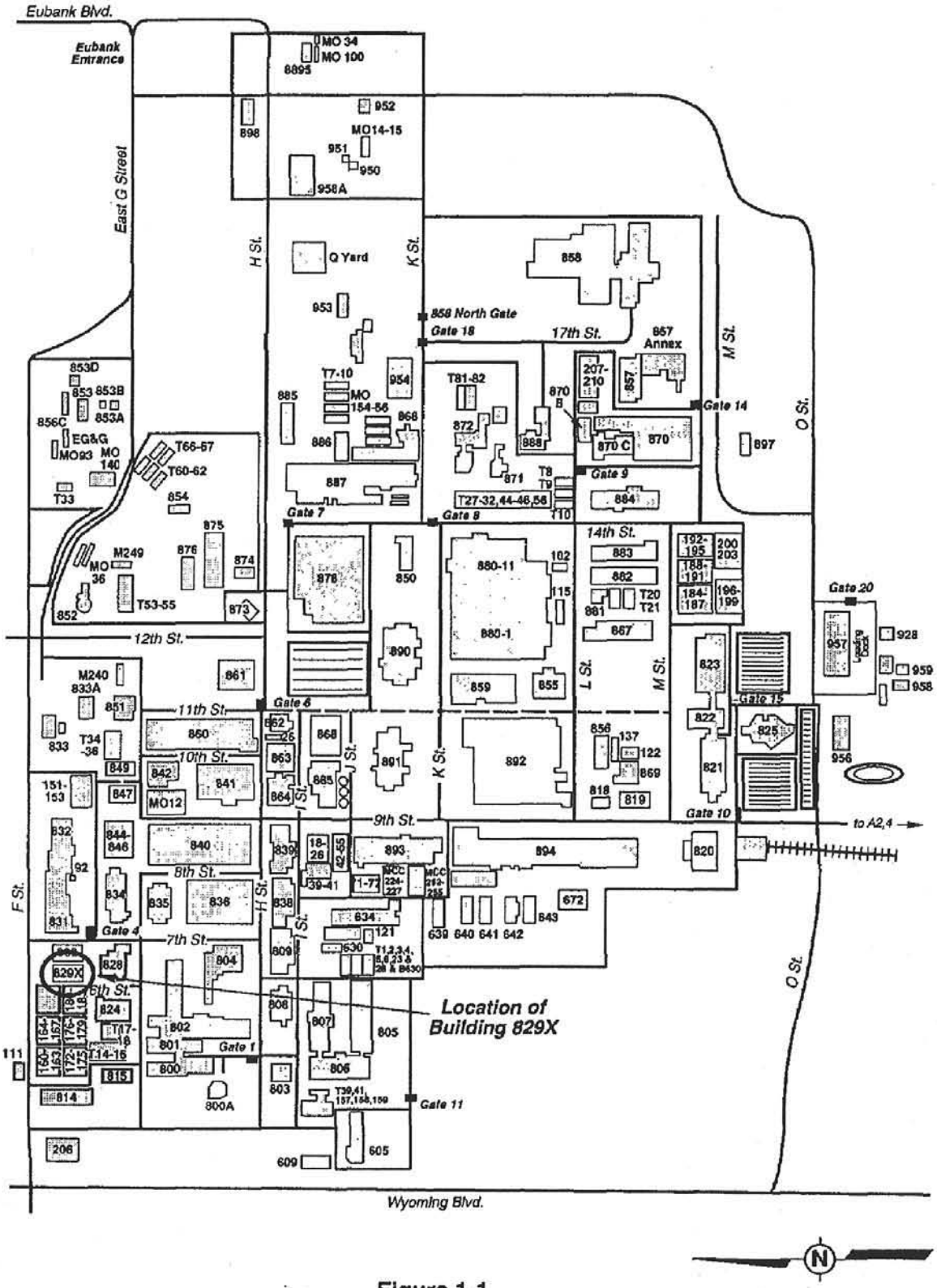

Figure 1-1
Location of Building 829X in Technical Area I
Sandia National Laboratories/New Mexico

A television inspection of the sanitary sewer line adjacent to and east of Building 829X was completed in October 1993. The inspection revealed offset joints and cracks in the sewer lines near the building. The site information audit reported that a silver recovery system was operated at the building, with the silver recovery tank located in the sump west of the building.

Following completion of the site audit and inspection and approval of the "Site-Specific Sampling Plan for Contamination Assessment of Building 829X" (SAP) (IT, 1994), IT conducted sampling of building materials in May and June of 1994. The building was subsequently demolished and building materials disposed of as directed by SNL/NM Generator Interface Department 7572, based on sampling results.

1.3 Sampling and Analysis Objectives

The SAP for contamination assessment, including soils, at Building 829X was approved by the SNL/NM Project Leader on May 19, 1994. Soil sampling at Building 829X took place on December 20, 1994, and was performed in accordance with applicable sections of the SAP. This contamination assessment report presents results of the soil sampling effort.

Sampling was conducted to determine whether or not soils surrounding the building contain contaminants that are subject to regulation as toxic characteristic waste under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) hazardous waste regulations, Code of Federal Regulations, Title 40, Part 261.24 (40 CFR 261.24). Soils at Building 829X were also sampled to determine whether or not further investigation under the SNL/NM Environmental Restoration (ER) Project is required at this site. ER Project action levels for potentially contaminated soils are obtained from RCRA proposed Subpart S (40 CFR 264.521), and are provided in the SAP. Background values for certain metals and radionuclides in soil and groundwater at SNL/NM have recently become available in the draft document "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project" (SNL/NM, 1994). Although background values were not included as action levels in the SAP, they are provided in this report.

2.0 Sampling Activities

Soil sampling was carried out at Building 829X on December 20, 1994. Soils were sampled from three zones in the vicinity of the former building:

- Soil samples were collected from six locations along the sewer line, at points where the television survey indicated five offset joints and one minor crack through which leakage of building effluent may have occurred. Samples were collected from approximately 2.5 ft (the depth of the sewer line) to 4 ft below the ground surface, and analyzed for the full suite of potential contaminants, including volatile organic compounds (VOC), semivolatile organic compounds (SVOC), total RCRA metals, gamma-emitting radionuclides, and tritium.

- Four locations in the bottom of the silver recovery sump were sampled over the interval from 0 to 12 inches below the sump bottom. (An overlying gravel layer was pushed aside before soil samples were collected). One sample was analyzed for the full suite of potential contaminants and the other three for silver only.

- Soils peripheral to the building were sampled at four evenly-spaced locations along a north-south line approximately 25 ft east of Building 829X. The sampling interval was from 0 to 40 inches below the ground surface. Each sample was analyzed for gamma-emitting radionuclides and isotopic plutonium.

Three different types of samples were collected during soil sampling activities at Building 829X:

- Investigative soil samples were collected at each sample location to provide ER Project data needs, as described above. One duplicate investigative soil sample was collected from a designated location along the sewer line.

- Waste characterization samples were composited from designated locations along the sewer line and in the silver recovery sump. These samples were analyzed for toxicity characteristic (TC) metals, isotopic uranium, and thorium. In addition, a waste characterization composite sample of decontamination fluids was analyzed for City of Albuquerque Wastewater Discharge parameters.

- Field quality control (QC) samples, including field blanks, equipment rinsate blanks, and trip blanks, were collected in the field during sampling and decontamination activities.

Sample locations are shown on Figure 2-1; sample numbers, locations, types, and analytical parameters are listed in Tables 2-1, 2-2, and 2-3. Field documentation is included in Appendix A.

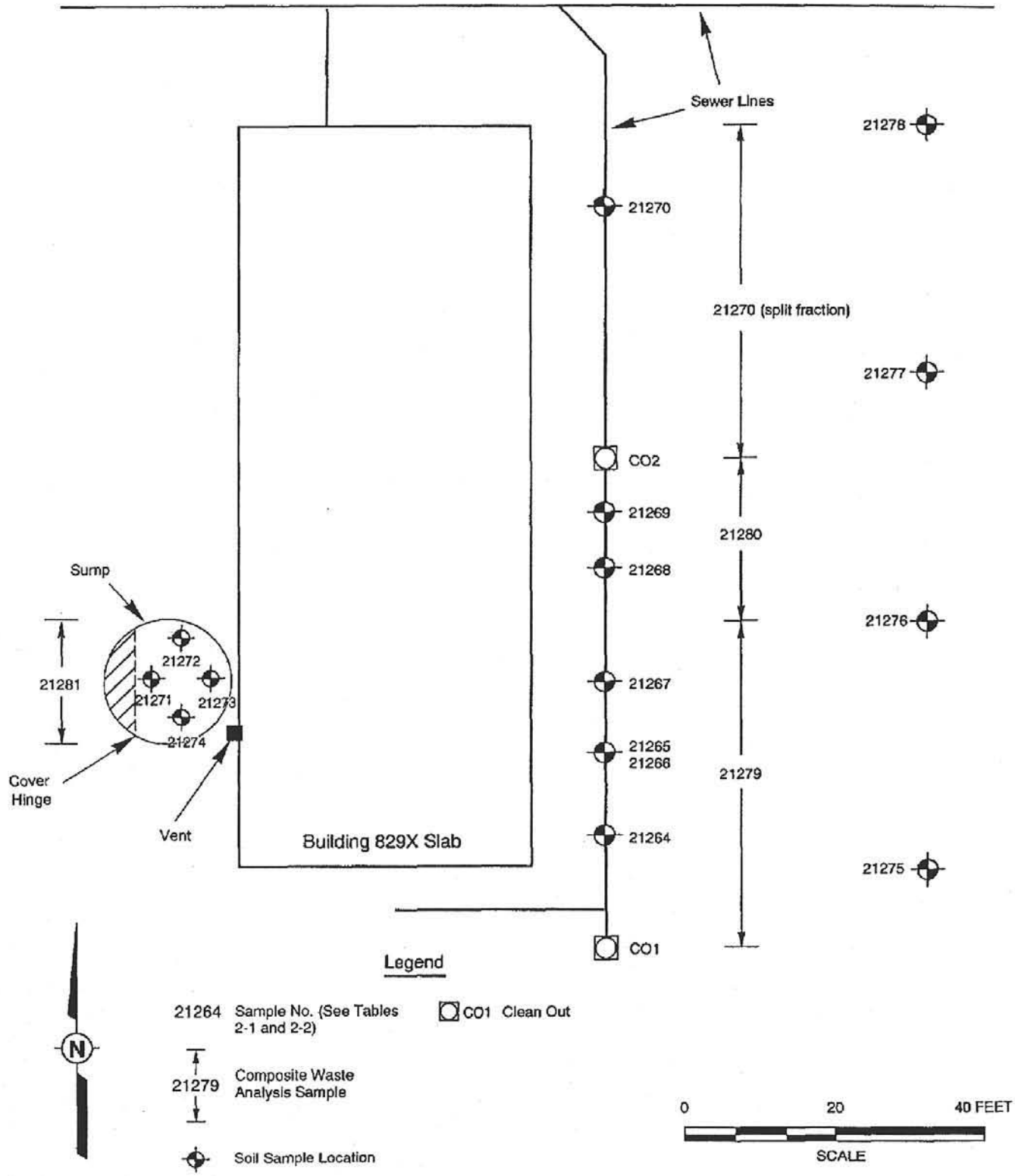

Figure 2-1
Soil Sampling Locations at Building 829X
Sandia National Laboratories/New Mexico

Table 2-1

Investigative Soil Samples Collected at Building 829X Sandia National Laboratories/New Mexico

SMO Sample No.	ER Sample No.	Sample Description	Analyses Requested
21264	T1-829-BH001-004S	Minor offset joint in sewer line, 8 ft north of CO1, 2.5-4 fbgs.	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21265	T1-829-BH002-004S	Minor crack in sewer line, 20 ft north of CO1, 2.5-4 fbgs.	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21266	T1-829-BH003-004S	duplicate of 21265 (20 ft north of CO1)	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21267	T1-829-BH004-004S	Minor offset joint in sewer line, 31 ft north of CO1, 2.5-4 fbgs.	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21268	T1-829-BH005-004S	Minor offset joint in sewer line, 41 ft north of CO1, 2.5-4 fbgs.	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21269	T1-829-BH006-004S	Minor offset joint in sewer line, 53 ft north of CO1, 2.5-4 fbgs.	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21270	T1-829-BH007-004S	Slight offset in sewer line, 83 ft north of CO1, 2.5-4 fbgs.	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium, TCLP Metals, Isotopic uranium and thorium
21271	T1-829-DW001-001SS	Center of sump, 0-12" bgs	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21272	T1-829-DW002-001SS	Perimeter of sump, 0-12" bgs	Total Silver
21273	T1-829-DW003-001SS	Perimeter of sump, 0-12" bgs	Total Silver
21274	T1-829-DW004-001SS	Perimeter of sump, 0-12" bgs	Total Silver
21275	T1-829-GP001-3.3S	25 ft E of SE corner of 829X, 0-40" bgs	Gamma Spectroscopy, Isotopic plutonium
21276	T1-829-GP002-3.3S	34 ft N of 21275, 0-40" bgs	Gamma Spectroscopy, Isotopic plutonium
21277	T1-829-GP003-3.3S	68 ft N of 21275, 0-40" bgs	Gamma Spectroscopy, Isotopic plutonium
21278	T1-829-GP004-3.3S	101 ft N of 21275, 0-40" bgs	Gamma Spectroscopy, Isotopic plutonium

CO = Cleanout.
SVOC = Semivolatile organic compounds.
TCLP = Toxicity characteristic leaching procedure.
VOC = Volatile organic compounds.

Table 2-2

Waste Characterization Samples Collected at Building 829X Sandia National Laboratories/New Mexico

SMO Sample No.	ER Sample No.	Sample Description	Analyses Requested
21270	T1-829-BH007-004S	Waste characterization sample for one location	TCLP Metals, Isotopic uranium and thorium
21279	T1-829-BH008-004C	Composite of 21264 – 21267	TCLP Metals, Isotopic uranium and thorium
21280	T1-829-BH009-004C	Composite of 21268 – 21269	TCLP Metals, Isotopic uranium and thorium
21281	T1-829-DW005-001C	Composite of sump samples	TCLP Metals, Isotopic uranium and thorium
21282	T1-829-DF001-000C	Composite of decontamination fluids	TOC, TOX, Priority Pollutant Metals, Gross Alpha, Gross Beta

TCLP = Toxicity Characteristic Leaching Procedure.
TOC = Total organic carbon.
TOX = Total organic halogen.

Table 2-3

Field Quality Control Samples Collected at Building 829X Sandia National Laboratories/New Mexico

SMO Sample No.	ER Sample No.	Sample Description	Analyses Requested
21270	T1-829-BH007-004S	MS/MSD requested	VOC, SVOC, Total Metals
21283	T1-829-EB001-000W	Equipment rinsate blank	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21284	T1-829-FB001-000W	Field blank at sewer line	VOC, SVOC, Total Metals, Gamma Spectroscopy, Tritium
21285	T1-829-FB002-000W	Field blank at sump	Total Silver
21286	T1-829-TB001-000W	Trip blank	VOC only
21287	T1-829-TB002-000W	Trip blank	VOC only

MS/MSD = Matrix spike/matrix spike duplicate.
QC = Quality control.
SVOC = Semivolatile organic compounds
VOC = Volatile organic compounds.

2.1 Investigative Soil Samples

Investigative soil samples were collected from the sewer line, the silver recovery sump, and from the peripheral soils between Buildings 829X and 830. Details of collection of these samples are provided below.

2.1.1 Sewer Line

Soil samples were collected from six locations along the sewer line on the east side of Building 829X. A power auger was used to reach the top of the sampling interval, then soil samples were collected from the interval using a hand auger. The bottom of the sewer line was found at a depth of approximately 2.5 ft below the ground surface (bgs); therefore, the sampling interval was from 2.5 to 4 ft bgs. Sample locations were placed approximately one foot to the east of the sewer line to avoid rupturing the line during sample collection. Constituents of concern analyzed in soil samples collected from locations adjacent to the sewer line were VOCs, SVOCs, metals, gamma-emitting radionuclides and tritium. The soil along the sewer line was a reddish-brown sandy silt with some fine gravels (less than 10 percent).

2.1.2 Silver Recovery Sump

Soil samples from the floor of the silver recovery sump were collected using a hand auger. Before using the auger it was necessary to push aside (using a shovel) six to eight inches of gravel covering the soil. Soil samples were collected from four locations in the sump: the center, and the northernmost, easternmost, and southernmost points inside the perimeter of the sump. The only constituent of concern analyzed in perimeter samples was silver, although the centrally-located sample was analyzed for the full suite of constituents (VOCs, SVOCs, metals, gamma-emitting radionuclides and tritium). The soil in the bottom of the sump was a dark brown to black moist silty clay.

2.1.3 Peripheral Soils

Soil samples were collected from four evenly-spaced locations along a north-south line between Buildings 829X and 830 using the Geoprobe™. The sampling interval included all soil in the 1-1/2 inch core from 0 to 40 inches below the ground surface. Constituents of concern were gamma-emitting radionuclides and isotopic plutonium. The peripheral soils were brown to reddish-brown silty sands with lenses of fine gravel.

2.2 Waste Characterization Samples

Samples were collected to determine the hazardous waste characteristics of excess materials produced during soil sampling at Building 829X. These materials included excess soils from sewer line locations and fluids produced during equipment decontamination, both of which are described below.

2.2.1 Composite Soil Samples

Sewer line soil sampling locations were combined to make up waste management composite samples. During collection of soil samples from sewer line locations, excess soil was retained in a stainless steel bowl. Upon completion of sample collection for the designated composite group, a sample of the excess soils was collected for analysis of toxicity characteristic metals and isotopic uranium and thorium. Remaining excess soil was bagged and containerized in accordance with the Building 829X Waste Management Plan (WMP).

2.2.2 Decontamination Fluid Sample

A sample of decontamination fluid was collected to determine the appropriate waste disposal method. Sampling equipment used to collect Building 829X soil samples was washed between sampling locations using a solution of nonphosphate detergent in tap water, then rinsed by spraying with deionized water. The spray rinse was performed over the wash container; therefore, only one container of decontamination fluid was generated during this project. Following completion of the final decontamination, a sample of the decontamination fluid was collected in laboratory-prepared sample containers. The remaining decontamination fluid was containerized in accordance with the WMP. The aqueous decontamination fluid sample was analyzed for parameters requested by the SNL/NM Generator Interface Department 7572 (total organic carbon [TOC], total organic halogen [TOX], priority pollutant metals and gross alpha and beta activity). In addition, a field measurement was made of the pH of the containerized decontamination fluid.

2.3 Field Quality Control Samples

Four types of field quality control (QC) samples were collected during soil contamination assessment sampling at Building 829X:

- Field duplicate soil sample
- Aqueous field blank samples
- Equipment rinsate sample
- Aqueous trip blank samples

In addition, one soil sample was designated for matrix spike/matrix spike duplicate (MS/MSD) analysis.

2.3.1 Field Duplicate Sample

In order to assess the overall sampling and analysis system precision, one field duplicate soil sample was collected. The field duplicate sample was analyzed for the same parameters as the corresponding soil sample. The duplicate soil sample was collected from the sewer line sample location 20 feet north of Cleanout 1 (sample numbers 21265 and 21266).

2.3.2 Field Blank Sample

Field blank samples were collected to assess potential sample contamination resulting from ambient field conditions. A field blank sample consists of deionized water poured into laboratory-prepared sample containers in the field. One field blank sample was collected near the sewer line and analyzed for the full suite of parameters requested for sewer line soil samples. A second field blank sample was collected near the sump and analyzed for total silver only.

2.3.3 Equipment Rinsate Sample

An equipment rinsate sample was collected to assess the effectiveness of the decontamination procedure and determine whether or not samples may have been contaminated by the sampling equipment. The rinsate sample was collected after decontamination of the sampling equipment by pouring deionized water over and through the sampling equipment into laboratory-prepared containers. The equipment rinsate blank sample was analyzed for all parameters for which soil samples from Building 829X were analyzed.

2.3.4 Trip Blanks

Trip blank samples were submitted to assess the potential for VOC contamination of samples during shipping, storage, and handling at the site or during analysis at the laboratory. The analytical laboratory prepared the trip blank samples, which accompanied the sample containers during shipment to the field and back to the laboratory, and were then analyzed for VOCs. Two trip blank samples were included with the shipment of soil and aqueous samples collected at Building 829X.

2.3.5 Matrix Spike Sample

A matrix spike sample consists of known concentrations of the constituents of interest added to a designated soil sample, to assess the impact of the sample matrix on the accuracy of the

analytical procedure. The matrix spike is considered a field QC sample because the field team must indicate to the laboratory which sample requires matrix spike analysis. Of the Building 829X samples, matrix spike analysis was requested for the sewer line sample located 83 feet north of Cleanout 1 (sample number 21270).

2.4 Sampling Methodology

Samples were collected from the three zones at Building 829X using equipment and methods listed in the SAP and deemed appropriate by the field sampling team in a preliminary walk-through reconnaissance of the site. Field documentation is included in Appendix A.

2.4.1 Field Monitoring Procedure

As required by the Building 829X HASP, sample locations along the sewer line were monitored for organic vapors, using a photoionization detector (PID), immediately upon completion of the borehole. The PID was calibrated according to the manufacturer's instructions prior to going to the field on the same day that monitoring and sampling occurred. Field monitoring found no occurrence of organic vapors above background values in any of the sewer line boreholes or in the breathing zone.

2.4.2 Soil Sample Collection Procedures

The soils adjacent to Building 829X were sampled using tools that were properly decontaminated in accordance with procedures described in the SAP. Soil for VOC analysis was transferred directly from the sample collection device into the sample container immediately upon collection. Following collection of the VOC fraction the remaining soil from a given location was placed in a clean stainless steel bowl where it was mixed and homogenized before being placed into sample containers. Excess soil was retained to be used in composite waste characterization samples (Section 2.2.1).

2.4.3 Sample Handling Procedures

Upon being filled, sample containers were immediately capped, labelled, and sealed with custody tape. Although chemical preservation was not required for any soil sample fractions, the samples were placed on ice in the field and cooled to approximately 4 degrees Celsius. Sample custody documentation was completed in the field as each sample was collected.

2.5 Equipment Decontamination

All building material sample collection equipment, including Geoprobe™ drill shoes and acetate sleeves, augers, stainless steel bowls and spoon, were decontaminated before use at

each sampling location. The decontamination procedure consisted of a tap water and detergent wash, followed by a spray rinse with deionized water. The equipment was then allowed to air dry for several minutes before reassembly or reuse.

2.6 Sample Management

Samples were handled in a manner that maintained sample integrity from collection through analysis. The field sampling team delivered the samples within 24 hours of collection to the SNL/NM Sample Management Office (SMO), who prepared the samples for shipment in accordance with procedures for sample management and custody as specified in the "Environmental Programs Department (7720) Procedure for Sample Management and Custody, Revision 0" (QA 08-01) (SNL/NM, 1991a). Samples for chemical analysis were shipped via overnight carrier to the analytical laboratory, or hand-delivered by SNL/NM SMO personnel, as appropriate.

SNL/NM Analysis Request and Chain of Custody Records were completed as specified in the SNL/NM "Environmental Programs Department (7720) Procedure for Sample Management and Custody, Revision 0" (QA 08-01) (SNL/NM, 1991a). The SMO reviewed sample documentation for completeness and retained sample documentation until analytical reports were received from the laboratories. Completed sample documentation is included with the associated analytical reports in Appendices B and C of this report.

3.0 Analytical Data Summary

Three laboratories provided analytical services for the contamination assessment of Building 829X. Samples for VOC, SVOC, and metals analyses were shipped to Quanterra Incorporated in Arvada, Colorado. Gamma spectroscopy was performed by SNL/NM Department 7715. Samples requiring gross alpha, gross beta, tritium, and isotopic (plutonium, uranium, and thorium) analysis were sent to TMA/Eberline in Albuquerque, New Mexico. Analytical methods, QC information, and analytical results are described below. Analytical reports are provided in Appendices B and C.

3.1 Analytical Methods

The methods used to analyze the samples collected at Building 829X were EPA-approved or other validated methods, listed in the SAP. Composite soil samples for waste characterization were first prepared using EPA Method 1311, toxicity characteristic leaching procedure (TCLP), then analyzed by the appropriate method listed in the SAP.

Gamma spectroscopy analysis was performed on soil and aqueous samples using a hyper-pure germanium detector coupled to a multichannel analyzer and counted for 60 or 100 minutes. Tritium, gross alpha and gross beta analyses were performed using EPA-approved methodology. Isotopic analyses (uranium, plutonium, and thorium) were performed using laboratory-specific methods meeting critical level requirements specified in the SAP. Detection limits for cobalt and cesium species in the gamma spectroscopy analysis were higher than the limits specified in the SAP.

3.2 Analytical Results

The following subsections describe the analytical results for the soil samples collected at Building 829X. Detectable constituent results of the sample analyses for three sampling zones are summarized in the following subsections and in data tables at the end of this section. Table 3-1 summarizes organic compounds detected, Table 3-2 lists metals detected, and Table 3-3 summarizes radionuclides detected in Building 829X soil and QC samples. Additional information can be found in the analytical data reports contained in Appendices B and C.

Quanterra analytical results for organic compounds reported "J" values for some compounds. A "J" indicates an estimated value for a compound detected at a level less than the reporting

limit but greater than the method detection limit. Analytical results flagged as "J" values are included in data summary tables in this report; however, because "J" values may represent false-positive concentrations, care should be used when interpreting these data. In addition, "J" values should not be used for relative percent difference (RPD) calculations because they are estimated values.

In the Quanterra analytical reports some results are flagged with a "B" qualifier. The "B" flag indicates that the compound identified was also detected in associated laboratory method blank analyses. Quanterra reports do not perform blank correction calculations for these findings, nor are such corrections included in this report.

In Tables 3-1 through 3-3, investigation sample analytical results are compared to the applicable action levels specified in the SAP, and/or SNL/NM background values (SNL/NM, 1994). Specifically data for organic compounds and metals are compared to action levels listed in proposed Subpart S to 40 CFR 264.521 (a)(2)(i-iv), Appendix A. No action levels are currently proposed for radionuclides in soil; therefore, the results from Building 829X soil samples are compared to SNL/NM background values. In order to provide additional information for contamination assessment, metals results were also compared to current SNL/NM background values. Waste characterization sample analytical results were compared to toxicity characteristic regulatory limits listed in 40 CFR 261.24 for hazardous chemical constituents. Waste characterization criteria for radionuclides have not been made available and SNL/NM Department 7572 will evaluate the analytical data to determine whether or not soil waste materials are considered radioactive waste.

3.2.1 Sewer Line Samples

A total of 7 soil samples (including one duplicate) collected from 6 locations along the sewer line east of Building 829X were submitted for laboratory analysis. The samples were analyzed for VOCs, SVOCs, total metals, gamma-emitting radionuclides, and tritium. The analytical results for Building 829X sewer line soil samples are summarized below.

Six VOCs were reported in sewer line soil samples; however all of these findings were estimated "J" values and most of the compounds (except toluene) were also "B" values found in the associated laboratory method blank analyses. Twelve SVOCs (one phthalate and eleven polynuclear aromatic hydrocarbons [PAH]) were reported; all of these findings were estimated "J" values except for 840 micrograms per kilogram (µg/kg) of phenanthrene in one

sample (from the location 31 ft north of Cleanout 1). Phenanthrene is a component of asphalt commonly found in soils in proximity to paved areas.

Five metals were detected in all of the sewer line soil samples: arsenic (2.6 milligrams per kilogram [mg/kg] to 4.5 mg/kg), barium (126 mg/kg to 233 mg/kg), chromium (5.6 mg/kg to 12.2 mg/kg), lead (4.2 mg/kg to 20.4 mg/kg), and nickel (6.1 mg/kg to 12.8 mg/kg). Mercury was found in three samples at values of 0.30 mg/kg, 2.9 mg/kg, and 3.5 mg/kg. All of the metal detections in sewer line soil samples were at concentrations less than their action levels with one exception. The sample located 31 ft north of Cleanout 1 (Sample no. 21267) had a lead concentration of 20.4 mg/kg, which is greater than the 95th percentile of the background value range (15.0 mg/kg), but within the overall SNL/NM range of background values for lead (1.0-110.0 mg/kg) (SNL/NM, 1994). A second sample (no. 21269), located 53 ft north of Cleanout 1, had a lead concentration of 14.9 mg/kg, which approaches the 95th percentile background value.

Of the six metals detected in sewer line soil samples, four (arsenic, barium, chromium, and nickel) had their highest values in the sample location 20 ft north of Cleanout 1, and two (lead and mercury) had the highest value at 31 ft north of Cleanout 1. Mercury detections were restricted to the three sample locations between 31 ft and 53 ft north of Cleanout 1.

All of the sewer line soil samples contained detectable gamma-emitting radionuclide activities. All gamma spectroscopy findings for sewer line soil samples fall within the background range for radionuclides in soil at SNL/NM (SNL/NM, 1994).

Tritium was reported for the duplicate samples from the sample location 20 ft north of Cleanout 1, at 230 ± 140 and 260 ± 150 picocuries per liter (pCi/L), equal to or slightly above the minimum detectable activity (MDA) of 230 pCi/L. Tritium was not detected in any other sewer line investigative soil samples. Tritium was also detected in the field blank sample associated with the sewer line investigative samples at 330 pCi/L (Section 3.3.2).

3.2.2 Sump Samples

Soil samples from four locations on the floor of the sump located west of Building 829X were submitted for laboratory analysis. One sample, from the center of the sump, was analyzed for VOCs, SVOCs, total metals, gamma-emitting radionuclides, and tritium; the other three samples, from the periphery of the sump floor, were analyzed for total silver only.

The analytical results for soil samples from Building 829X silver recovery sump are summarized below.

One VOC (methylene chloride) and three SVOCs (all PAH compounds) were reported for the sample from the center of the sump. All four compounds were reported as estimated "J" values and the VOC was also a "B" value, found in the associated laboratory method blank.

Silver was reported in three of the four samples at 7.8 mg/kg, 17.2 mg/kg, and 125 mg/kg; the highest value was in the sample from the center of the sump and silver was not detected at the northern perimeter location. Five other metals were reported for the full-suite central sample: arsenic (5.1 mg/kg), barium (120 mg/kg), chromium (8.4 mg/kg), nickel (8.6 mg/kg), and selenium (2.7 mg/kg). Except for silver, all metals detected in soil samples from the silver recovery sump were at concentrations less than their respective action levels and background values. Although silver findings did not exceed the Subpart S action level, all 3 detections exceeded the 95th percentile background value and 2 of the three exceeded the range of background values for silver at SNL/NM (SNL/NM, 1994).

The soil sample from the center of the sump contained detectable gamma-emitting radionuclide activities. All gamma spectroscopy findings for the sump soil sample fall within the background range for radionuclides in soil at SNL/NM (SNL/NM, 1994).

Tritium was detected in the central sump soil sample at a concentration of 230 ± 140 pCi/L, equal to the MDA.

3.2.3 Peripheral Soil Samples

Soil samples from four locations along a north-south line between Buildings 829X and 830 were submitted for laboratory analysis for gamma-emitting radionuclides and isotopic plutonium. Analytical results for the peripheral soil samples are discussed below.

All of the samples contained detectable gamma-emitting radionuclide activities. Three radionuclides slightly exceeded SNL/NM background values in the peripheral soils. In the southernmost sample (no. 21275), uranium-238 occurred at 1.26 ± 0.618 pCi/g, compared to a background 95th percentile value of 1.1 pCi/g. The next sample to the north (no. 21276) was found to contain 0.862 ± 0.148 pCi/g of bismuth-214, just above its background 95th percentile value of 0.8 pCi/g. Radium-224 was detected in the northernmost sample at 1.19 ± 0.524 pCi/g which exceeds the 95th percentile value of 0.968 pCi/g.

Peripheral soil samples were also analyzed for isotopic plutonium, which was not detected in any of the samples.

3.2.4 Waste Characterization Soil Samples

Three composite samples of sewer line soils and one composite sample of sump soil were analyzed for TCLP metals, isotopic uranium, and isotopic thorium. No waste soil was generated from the peripheral soil samples; therefore, no waste characterization samples or analyses were required for this zone. In addition, one waste characterization sample was collected from decontamination fluids accumulated during this sampling event. Analytical results for soil and aqueous waste characterization samples are discussed below. Metals results for composite soil samples are compared to the toxicity characteristic maximum contaminant levels listed in 40 CFR 261.24, Table 1. Metals results from the decontamination fluid sample are compared to maximum allowable concentrations listed in City of Albuquerque Ordinance 8-9-3M, Sewer Use and Wastewater Control (City of Albuquerque, 1990). No standards have been established for TOC or TOX. Waste characterization analytical results are included with investigative soil sample results in Tables 3-1 through 3-3.

Sewer Line. Barium was reported for all three composite soil samples collected along the sewer line, at concentrations of 0.55 milligrams per liter (mg/L), 0.91 mg/L, and 1.1 mg/L. Barium was also reported for the associated laboratory method blank sample, at 0.92 mg/L. The laboratory report narrative noted that barium frequently occurs as an artifact of the filter media used at the laboratory for this analysis. One composite sewer line sample also contained 0.00016 mg/L of mercury and 0.077 mg/L of selenium. Both of these occurrences are estimated "J" values. All TC metals detections are well below their respective TC action levels.

Isotopic uranium and thorium detections in sewer line samples did not exceed background values at SNL/NM (SNL/NM, 1994).

Sump. The composite soil sample from the silver recovery sump was found to contain 0.73 mg/L of barium, 0.00016 mg/L of mercury (a "J" value), and 0.051 mg/L of silver. All three of these findings are below the TC action level.

Isotopic uranium and thorium were detected in the waste characterization sample from the sump; they did not exceed SNL/NM background values (SNL/NM, 1994).

Decontamination Fluid. Ten priority pollutant metals detected in the aqueous decontamination fluid sample were barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, silver (estimated "J" value), and zinc. All metals detections were below City of Albuquerque maximum allowable concentrations for discharge into the public sewer system. The decontamination fluid sample was also found to contain 70.3 mg/L of TOC and 43.8 micrograms per liter (µg/L) of TOX; no discharge standards currently exist for these two analyses. Field pH measurement of the containerized decontamination fluid yielded a value of 7.0, within the range allowed by City of Albuquerque regulations for discharge into public sewer systems.

Gross alpha activity of the decontamination fluid was reported at 27 ± 13 pCi/L and gross beta activity was 51 ± 10 pCi/L. No background range is specified for these analyses, and no action levels are specified in Subpart S or the SAP.

3.3 Quality Control Summary

Field and laboratory QC samples were analyzed so that data quality could be evaluated. The following subsections summarize the QC data and findings.

3.3.1 Data Verification and Validation

Verification and validation of chemical measurement data were performed in accordance with the SNL/NM Environmental Operations Center "Verification and Validation of Chemical and Radiochemical Data" Revision 0 (TOP 94-03) (SNL/NM, 1994). Data validation was performed using SNL/NM DV-1 and DV-2 checklists, which are included with the analytical reports in Appendices B and C. Data validation was not required or performed for SNL/NM Department 7715 gamma spectroscopy data.

3.3.2 Field Quality Control Data

Field QC samples (Section 2.2) submitted to Quanterra during sampling activities at Building 829X included two trip blanks, one field duplicate sample, two field blanks, one equipment rinsate blank, and one matrix spike analysis. Results for the QC samples are included in Tables 3-1 through 3-3 and in the analytical data reports in Appendix B, and are discussed below.

Trip Blanks. Two aqueous trip blank samples were shipped with the Building 829X samples and analyzed for VOCs. No VOCs were reported for these trip blank samples at levels above the laboratory reporting limit. Soil sample results and the associated trip blank results indicate that there was no significant sample contamination by VOCs from field or shipment sources.

Field Duplicate Samples. One duplicate sample of sewer line soils was collected from the sample location 20 ft north of Cleanout 1. The duplicate sample was collected independently from a location adjacent to the original sample, and submitted as a blind sample with a unique sample number and identity so the QC function could not be determined by the laboratory. The duplicate sample was analyzed for the same chemical and radionuclide parameters as its counterpart.

Table 3-4 compares the results of duplicate analyses and calculates relative percent difference (RPD) values for each analytical pair. Calculation of RPD is possible only when the original sample and duplicate both show detectable results. Results flagged as "J" values are estimates and are not appropriate for RPD calculation. Overall precision indicated by the RPD measurements provides an estimate for the heterogeneity of the sampled medium plus variability within the analytical procedures. The SAP calls for an acceptance limit for precision of 20% or less for metals analyses. The high RPD value for lead (41.6%) may be due to inherent inhomogeneity of the soil sampled. High RPD values for 3 radionuclides probably reflect variable analytical criteria (primarily minimum detectable activity, which is unique to each analysis) as well as heterogeneity of the media analyzed. These values should not adversely affect interpretation of the analytical data relative to these thresholds.

Field Blanks. One aqueous full-suite field blank sample was collected near the sewer line, and one aqueous field blank sample for total silver analysis only was collected near the sump at Building 829X. No VOCs, SVOCs, or gamma-emitting radionuclides were detected in the full-suite field blank at levels above the reporting limit, and no metals were detected in either field blank sample. Tritium was reported at 330 ± 140 pCi/L. The results obtained from analysis of field blank samples indicate no contamination of the soil samples from ambient conditions at the site with the possible exception of tritium at the sewer line.

Equipment Rinsate Blanks. One equipment rinsate blank sample was collected following completion of soil sampling and final equipment decontamination at Building 829X. No

contaminants of interest (VOCs, SVOCs, metals, gamma-emitting radionuclides, or tritium) were detected above the laboratory reporting limit in the rinsate blank. These results indicate that decontamination procedures were effective and project samples were not cross-contaminated by the sampling equipment.

Matrix Spike Analysis. Matrix spike and matrix spike duplicate analyses were performed to assess sample matrix effects on analytical accuracy and in accordance with requirements of the SAP. The field team supervisor designated the soil sample from the northernmost location along the sewer line for matrix spike analysis on the Analysis Request/Chain of Custody Record that accompanied the samples to Quanterra. The matrix spike was performed for all parameters on the sample leachate in accordance with approved laboratory procedures. Matrix spike results were reported in the laboratory analytical data report (Appendix B) as percent recovery and RPD calculations.

3.3.3 Laboratory Quality Control Data

Laboratory QC samples were analyzed at the laboratories, and the data were included in the analytical reports with cross references to the corresponding Building 829X investigative samples. Laboratory QC data include organic surrogate spike, duplicate control sample, single control sample, and method blank analyses. For the chemical analyses, the analytical data sheets for each sample include the nominal reporting limit for the parameters reported. Quality control excursions are discussed in the narrative to the Quanterra analytical report, noted on the DV-2 checklist (Appendix B), and listed in Section 3.4. Matrix spike analyses were performed by the laboratory in accordance with the SAP and are discussed above.

Surrogate Spike Analyses. All surrogate spike percent recoveries were within laboratory or method acceptance limits.

Laboratory Quality Control Findings. Several laboratory quality control findings relating to internal standard and control sample compound recoveries are discussed in the analytical report narrative and noted on the data review checklists. The findings either do not apply to Building 829X soil sampling because most contaminants reported were below regulatory action levels, or do not significantly affect data quality based upon the laboratory review of the sample data and the entire set of quality control data for the analytical batch.

Quantitation limits were less than applicable regulatory limits for most analyses. All investigative samples called for in the SAP were collected and analyzed. Consequently, data completeness approached 100 per cent. Laboratory quality control results are acceptable. Minor nonconformances to the SAP with regard to laboratory QC findings are documented in laboratory analytical reports included in Appendix B and listed in Section 3.4, below.

3.4 Nonconformance

A nonconformance is an unplanned and unintended deviation from the established sampling and analysis plan or procedures. No nonconformances occurred during field soil sample collection activities at Building 829X. Two variances to the SAP occurred after the SAP was approved and before sampling of Building 829X soils began. Isotopic uranium and isotopic thorium were added to analyses required for composite soil samples at the request of SNL/NM Department 7572. Analyses for TOC and TOX were added to analytical requirements for the decontamination fluid sample by SNL/NM Department 7573. One analytical laboratory (Quanterra) reported several nonconformances during sample analysis; however, the validity of analytical results was not adversely affected. The laboratory nonconformances are noted on DV2 worksheets in Appendix B and are discussed below.

Seven samples required dilution in order to perform analysis, thereby raising the detection limit. SVOC analysis of sewer line samples 21265 and 21266 (duplicate samples from the location 20 ft north of the cleanout) required adjustment of the detection limit to compensate for reduced volume of the extract. Sewer line samples 21268 and 21269 (41 and 53 ft north of the cleanout) required dilution for mercury analysis to compensate for high concentrations of the target analyte present in the samples. Sump sample 21273 required dilution for silver analysis due to the high concentration of iron in the sample. The reporting limit for metals analysis of sample 21282 (decontamination fluid) was raised due to matrix interference. Sample 21282 also required dilution for TOC analysis due to the concentration of the target analyte present in the sample.

Three nonconformances occurred during laboratory control sample analyses. In one case, the accuracy for trichloroethene in the laboratory QC sample analysis was below the acceptable lower limit; however, MS/MSD results for the compound were acceptable and no further action was required. In the same QC sample analysis, 4-bromofluorobenzene exceeded its QC limit, while dinitrotoluene exceeded its QC limit in another QC analysis. The effect would be a high reporting bias if either target compound was detected in the associated soil

sample. Since neither compound was detected in the associated soil sample, these nonconformances do not adversely affect analytical results.

Contaminants were reported for all four VOC method blank analyses. The compounds detected – acetone, 2-butanone, 2-hexanone, methylene chloride, and 4-methyl-2-pentanone – are all common laboratory contaminants. Barium contamination in the metals method blank analysis is a consistent artifact of the TCLP filter media, and the levels detected are within acceptable tolerances. Analytical results for soil and field QC sample analyses are not blank-corrected.

Table 3-1

Summary of Organic Compounds Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
	Sewer Line Soil Samples		
21264 **T1-829-BH001-004S** Minor offset joint in sewer line 8 ft N of CO1, 2.5-4 ft bgs.	Total VOC	µg/kg	µg/kg
	Acetone	3.7 BJ	8e+06
	Methylene chloride	3.3 BJ	9e+04
	Total SVOC	µg/kg	
	Phenanthrene	42 J	NE
21265 **T1-829-BH002-004S** Minor offset joint in sewer line 20 ft N of CO1, 2.5-4 ft bgs.	Total VOC	µg/kg	µg/kg
	Acetone	7.2 BJ	8e+06
	2-Butanone (MEK)	1.9 BJ	4e+06
	2-Hexanone	1.2 BJ	NE
	Methylene chloride	4.8 BJ	9e+04
	Toluene	1.0 J	2e+07
	Total SVOC	ND	NA
21266 **T1-829-BH003-004S** Minor offset joint in sewer line 20 ft N of CO1, 2.5-4 ft bgs. *Field duplicate of 21265*	Total VOC	µg/kg	µg/kg
	Methylene chloride	4.6 BJ	9e+04
	4-Methyl-2-pentanone (MIBK)	1.0 BJ	NE
	Total SVOC	µg/kg	µg/kg
	bis(2-Ethylhexyl)phthalate	68 J	5e+04
21267 **T1-829-BH004-004S** Minor offset joint in sewer line 31 ft N of CO1, 2.5-4 ft bgs.	Total VOC	µg/kg	µg/kg
	Acetone	6.0 J	8e+06
	Methylene chloride	2.7 BJ	9e+04
	Total SVOC	µg/kg	µg/kg
	Acenaphthene	33 J	NE
	Phenanthrene	840	NE
	Anthracene	36 J	NE
	Fluoranthene	230 J	NE
	Pyrene	180 J	NE
	Benzo(a)anthracene	99 J	NE
	bis(2-Ethylhexyl)phthalate	40 J	5e+04
	Chrysene	120 J	NE
	Benzo(b)fluoranthene	190 J	NE
	Benzo(a)pyrene	130 J	NE
	Indeno(1,2,3-cd)pyrene	68 J	NE
	Benzo(g,h,i)perylene	82 J	NE

Refer to footnotes at end of table.

Table 3-1 *(Continued)*

Summary of Organic Compounds Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
21268 **T1-829-BH005-004S** Minor offset joint in sewer line 41 ft N of CO1, 2.5-4 ft bgs.	Total VOC Methylene chloride	µg/kg 2.5 BJ	µg/kg 9e+04
	Total SVOC Phenanthrene Fluoranthene Pyrene Benzo(b)fluoranthene	µg/kg 160 J 48 J 43 J 35 J	 NE NE NE NE
21269 **T1-829-BH006-004S** Minor offset joint in sewer line 53 ft N of CO1, 2.5-4 ft bgs.	Total VOC Methylene chloride	µg/kg 2.9 BJ	µg/kg 9e+04
	Total SVOC Phenanthrene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(a)pyrene	µg/kg 200 J 98 J 78 J 66 J 58 J 84 J 50 J	 NE NE NE NE NE NE NE
21270 **T1-829-BH007-004S** Minor offset joint in sewer line 83 ft N of CO1, 2.5-4 ft bgs. *MS/MSD requested*	Total VOC Methylene chloride Total SVOC	µg/kg 3.4 BJ ND	µg/kg 9e+04 NA
Silver Recovery Sump Soil Samples			
21271 **T1-829-DW001-001SS** Center of sump, 0-12" bgs	Total VOC Methylene chloride	µg/kg 3.8 BJ	µg/kg 9e+04
	Total SVOC Phenanthrene Fluoranthene Pyrene	µg/kg 120 J 38 J 34 J	µg/kg NE NE NE
21272 **T1-829-DW002-001SS** Northern perimeter of sump, 0-12" bgs	NS		
21273 **T1-829-DW003-001SS** Eastern perimeter of sump, 0-12" bgs	NS		
21274 **T1-829-DW004-001SS** Southern perimeter of sump, 0-12" bgs	NS		

Refer to footnotes at end of table.

Table 3-1 *(Continued)*

Summary of Organic Compounds Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
	Peripheral Soil Samples		
21275 **T1-829-GP001-3.3S** 25 ft E of SE corner of Bldg 829X, continuous 1" core, 0–40" bgs	NS		
21276 **T1-829-GP002-3.3S** 34 ft N of 21275, continuous 1" core, 0–40" bgs	NS		
21277 **T1-829-GP003-3.3S** 68 ft N of 21275, continuous 1" core, 0–40" bgs	NS		
21278 **T1-829-GP004-3.3S** 101 ft N of 21275, continuous 1" core, 0–40" bgs	NS		
	Waste Characterization Samples		
21279 **T1-829-BH008-004C** Composite of 21264 through 21267.	NS		
21280 **T1-829-BH009-004C** Composite of 21268 and 21269.	NS		
21281 **T1-829-DW005-001C** Composite of sump samples.	NS		
21282 **T1-829-DF001-000C** Decontamination fluid	Total Organic Carbon Total Organic Halogen	70.3 mg/L 43.8 mg/L	NA NA
	Field Quality Control Samples		
21283 **T1-829-EB001-000W** Equipment rinsate blank	Total VOC Acetone Methylene chloride Total SVOC	µg/L 2.0 J 2.4 BJ ND	 NA NA NA
21284 **T1-829-FB001-000W** Aqueous field blank at sewer line	Total VOC Acetone Methylene chloride Total SVOC bis(2-Ethylhexyl)phthalate	µg/L 2.2 J 2.3 BJ µg/L 1.1 J	 NA NA NA

Table 3-1 *(Continued)*

Summary of Organic Compounds Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]
21285 **T1-829-FB002-000W** Aqueous field blank at sump	NS		
21286 **T1-829-TB001-000W** Aqueous lab-prep. trip blank	Total VOC Methylene chloride	µg/L 3.6 BJ	 NA
21287 **T1-829-TB002-000W** Aqueous lab-prep. trip blank	Total VOC Methylene chloride	µg/L 3.6 BJ	 NA

[a] Action levels obtained from 40 CFR 264.521 (a)(2)(i-iv), RCRA Proposed Subpart S.
B = Compound also found in method blank.
CO = Cleanout.
ft bgs = feet below ground surface.
J = Compound detected but below the contract-required quantitation limit (the value given is an estimate).
MS/MSD = Matrix spike/matrix spike duplicate.
NA = Not applicable.
ND = Not detected.
NE = Not established in source cited.
NS = Not sampled (analysis not required).
SVOC = Semivolatile organic compounds.
t = Sample diluted due to concentration of target compounds.
Units: µg/kg = microgram per kilogram; µg/L = microgram per liter; mg/kg = milligram per kilogram; mg/L = milligram/liter.
VOC = Volatile organic compounds.

Table 3-2

Summary of Metals Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
Sewer Line Soil Samples				
21264 **T1-829-BH001-004S** Minor offset joint in sewer line 8 ft N of CO1, 2.5-4 ft bgs.	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	4.3	80	NE
	Barium	126	4000	398.1
	Chromium	5.6	400[c]	22.90
	Lead	4.5 J	NE	15.0
	Nickel	6.1	2000	15.39
21265 **T1-829-BH002-004S** Minor offset joint in sewer line 20 ft N of CO1, 2.5-4 ft bgs.	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	4.5	80	NE
	Barium	233	4000	398.1
	Chromium	12.2	400[c]	22.90
	Lead	9.3	NE	15.0
	Nickel	12.8	2000	15.39
21266 **T1-829-BH003-004S** Minor offset joint in sewer line 20 ft N of CO1, 2.5-4 ft bgs. *Field duplicate of 21265*	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	3.7	80	NE
	Barium	192	4000	398.1
	Chromium	11.8	400[c]	22.90
	Lead	6.1	NE	15.0
	Nickel	12.6	2000	15.39
21267 **T1-829-BH004-004S** Minor offset joint in sewer line 31 ft N of CO1, 2.5-4 ft bgs.	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	2.8	80	NE
	Barium	158	4000	398.1
	Chromium	7.0	400[c]	22.90
	Lead	20.4	NE	15.0
	Mercury	0.30	20	NE
	Nickel	8.7	2000	15.39
21268 **T1-829-BH005-004S** Minor offset joint in sewer line 41 ft N of CO1, 2.5-4 ft bgs.	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	3.0	80	NE
	Barium	146	4000	398.1
	Chromium	7.8	400[c]	22.90
	Lead	9.9	NE	15.0
	Mercury	3.5	20	NE
	Nickel	6.7	2000	15.39
21269 **T1-829-BH006-004S** Minor offset joint in sewer line 53 ft N of CO1, 2.5-4 ft bgs.	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	2.6	80	NE
	Barium	205	4000	398.1
	Chromium	7.3	400[c]	22.90
	Lead	14.9	NE	15.0
	Mercury	2.9	20	NE
	Nickel	8.2	2000	15.39

Refer to footnotes at end of table.

Table 3-2 *(Continued)*

Summary of Metals Detected in Soil and Field QC Samples, Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
21270 **T1-829-BH007-004S** Minor offset joint in sewer line 83 ft N of CO1, 2.5-4 ft bgs. Includes TCLP fraction. *MS/MSD requested*	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	2.9	80	NE
	Barium	220	4000	398.1
	Chromium	7.3	400[c]	22.90
	Lead	4.2 J	NE	15.0
	Nickel	6.8	2000	15.39
	TCLP Metals	mg/L	mg/L	mg/L
	Barium	0.55 B	100.0	1.89
Silver Recovery Sump Soil Samples				
21271 **T1-829-DW001-001SS** Center of sump, 0-12" bgs	Total Metals	mg/kg	mg/kg	mg/kg
	Arsenic	5.1	80	NE
	Barium	120	4000	398.1
	Chromium	8.4	400[c]	22.90
	Nickel	8.6	2000	15.0
	Selenium	2.7	NE	NE
	Silver	125	200	4.0
21272 **T1-829-DW002-001SS** Northern perimeter of sump, 0-12" bgs	Total Silver	ND	200 mg/kg	4.0 mg/kg
21273 **T1-829-DW003-001SS** Eastern perimeter of sump, 0-12" bgs	Total Silver	17.2 mg/kg	200 mg/kg	4.0 mg/kg
21274 **T1-829-DW004-001SS** Southern perimeter of sump, 0-12" bgs	Total Silver	7.8 mg/kg	200 mg/kg	4.0 mg/kg
Peripheral Soil Samples				
21275 **T1-829-GP001-3.3S** 25 ft E of SE corner of Bldg 829X, continuous 1" core, 0–40" bgs	NS			
21276 **T1-829-GP002-3.3S** 34 ft N of 21275, continuous 1" core, 0–40" bgs	NS			
21277 **T1-829-GP003-3.3S** 68 ft N of 21275, continuous 1" core, 0–40" bgs	NS			

Refer to footnotes at end of table.

Table 3-2 *(Continued)*

Summary of Metals Detected in Soil and Field QC Samples, Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
21278 **T1-829-GP004-3.3S** 101 ft N of 21275, continuous 1" core, 0–40" bgs	NS			
Waste Characterization Samples				
21279 **T1-829-BH008-004C** Composite of 21264 through 21267.	TCLP Metals Barium	mg/L 1.1 B	mg/L 100.0	 NA
21280 **T1-829-BH009-004C** Composite of 21268 and 21269.	TCLP Metals Barium Mercury Selenium	mg/L 0.91 B 0.00016 J 0.077 J	mg/L 100.0 0.2 1.0	 NA NA NA
21281 **T1-829-DW005-001C** Composite of sump samples.	TCLP Metals Barium Mercury Silver	mg/L 0.73 B 0.00016 J 0.051	mg/L 100.0 0.2 5.0	 NA NA NA
21282 **T1-829-DF001-000C** Decontamination fluid	Total Metals[d] Barium Cadmium Chromium Copper Lead Manganese Mercury Nickel Silver Zinc	mg/L 0.16 0.021 0.018 0.25 0.034 0.54 0.0015 1.3 0.0054 J 1.0	mg/L[e] 20.0 2.8 20.0 16.5 3.2 20.0 0.1 12.0 5.0 28.0	NA
Field Quality Control Samples				
21283 **T1-829-EB001-000W** Equipment rinsate blank	Total Metals	ND	NA	NA
21284 **T1-829-FB001-000W** Aqueous field blank at sewer line	Total Metals	ND	NA	NA
21285 **T1-829-FB002-000W** Aqueous field blank at sump	Total Silver	ND	NA	NA
21286 **T1-829-TB001-000W** Aqueous lab-prep. trip blank	NS			

Refer to footnotes at end of table.

Table 3-2 *(Continued)*

Summary of Metals Detected in Soil and Field QC Samples, Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Analyte	Result	Action Level[a]	Background[b]
21287 **T1-829-TB002-000W** Aqueous lab-prep. trip blank	NS			

[a] Action levels (except TCLP) obtained from 40 CFR 264.521 (a)(2)(i-iv), RCRA proposed Subpart S. TCLP action levels are maximum contaminant levels obtained from 40 CFR 261.24, Table 1, Maximum Concentration of Contaminants for the Toxicity Characteristic.
[b] 95th Upper Tolerance Limit or 95th Percentile from Table 7-1, Summary of Background Concentrations for Metals in Soils, in "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project" (SNL/NM, draft, October 1994).
[c] Hexavalent chromium only.
[d] Priority Pollutant list.
[e] Maximum Allowable Concentration (grab sample criteria), Section 8-9-3M, City of Albuquerque Ordinance, Chapter VIII, Article IX, Sewer Use and Wastewater Control, 1990.
B = Compound also found in method blank.
CO = (sewer line) cleanout.
ft bgs = feet below ground surface.
J = Compound detected but below the contract-required quantitation limit (the value given is an estimate).
NA = Not applicable.
ND = Not detected.
NE = Not established in source cited.
NS = Not sampled (analysis not required).
TCLP = Toxicity characteristic leaching procedure.
Units: mg/kg = milligram per kilogram; mg/L = milligram per liter.

Table 3-3

Summary of Radionuclides Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
Sewer Line Soil Samples			
21264 **T1-829-BH001-004S** Minor offset joint in sewer line 8 ft N of CO1, 2.5-4 ft bgs.	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.362 ± 0.279	2.89
	Ra-226	1.25 ± 0.463	1.94
	Pb-214	0.524 ± 0.151	0.90
	Bi-214	0.636 ± 0.127	0.8
	Th-232	0.553 ± 0.202	1.258
	Ra-228	0.853 ± 0.256	1.05
	Th-228	0.562 ± 0.338	NE
	Ra-224	0.894 ± 0.456	0.968
	Pb-212	0.592 ± 0.188	1.0795
	Bi-212	0.772 ± 0.325	2.7
	Tl-208	0.617 ± 0.141	NE
	K-40	18.2 ± 2.77	25.34
	Tritium	ND	NE
21265 **T1-829-BH002-004S** Minor offset joint in sewer line 20 ft N of CO1, 2.5-4 ft bgs.	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.709 ± 0.388	2.89
	Ra-226	1.33 ± 0.471	1.94
	Pb-214	0.584 ± 0.165	0.90
	Bi-214	0.629 ± 0.123	0.8
	Th-232	0.563 ± 0.201	1.258
	Ra-228	0.606 ± 0.201	1.05
	Th-228	0.530 ± 0.323	NE
	Ra-224	0.531 ± 0.325	0.968
	Pb-212	0.627 ± 0.196	1.0795
	Bi-212	0.954 ± 0.352	2.7
	Tl-208	0.549 ± 0.132	NE
	K-40	16.6 ± 2.52	25.34
	Tritium	260 ± 150 pCi/L	NE
21266 **T1-829-BH003-004S** Minor offset joint in sewer line 20 ft N of CO1, 2.5-4 ft bgs. *Field duplicate of 21265*	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	1.16 ± 0.448	2.89
	Ra-226	1.11 ± 0.428	1.94
	Pb-214	0.588 ± 0.166	0.90
	Bi-214	0.619 ± 0.122	0.8
	Th-232	0.551 ± 0.195	1.258
	Ra-228	0.782 ± 0.226	1.05
	Ra-224	0.563 ± 0.383	0.968
	Pb-212	0.604 ± 0.190	1.0795
	Bi-212	0.773 ± 0.328	2.7
	Tl-208	0.575 ± 0.130	NE
	K-40	14.9 ± 2.30	25.34
	Tritium	230 ± 140 pCi/L	NE

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
21267 **T1-829-BH004-004S** Minor offset joint in sewer line 31 ft N of CO1, 2.5-4 ft bgs.	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	1.12 ± 0.432	2.89
	Ra-226	0.996 ± 0.397	1.94
	Pb-214	0.531 ± 0.151	0.90
	Bi-214	0.556 ± 0.111	0.8
	Th-232	0.549 ± 0.197	1.258
	Ra-228	0.727 ± 0.218	1.05
	Ac-228	0.785 ± 0.181	NE
	Th-228	0.538 ± 0.326	NE
	Ra-224	0.518 ± 0.293	0.968
	Pb-212	0.599 ± 0.188	1.0795
	Bi-212	1.01 ± 0.353	2.7
	Tl-208	0.681 ± 0.145	NE
	Cs-137	0.0924 ± 0.0289	0.92[b]
	K-40	20.2 ± 3.00	25.34
	Tritium	ND	NE
21268 **T1-829-BH005-004S** Minor offset joint in sewer line 41 ft N of CO1, 2.5-4 ft bgs.	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.553 ± 0.324	2.89
	Ra-226	0.787 ± 0.355	1.94
	Pb-214	0.524 ± 0.149	0.90
	Bi-214	0.572 ± 0.114	0.8
	Th-232	0.571 ± 0.203	1.258
	Ra-228	0.547 ± 0.193	1.05
	Ac-228	0.697 ± 0.166	NE
	Th-228	0.430 ± 0.292	NE
	Ra-224	0.767 ± 0.350	0.968
	Pb-212	0.609 ± 0.190	1.0795
	Bi-212	0.566 ± 0.290	2.7
	Tl-208	0.579 ± 0.129	NE
	Cs-137	0.0560 ± 0.0225	0.92[b]
	K-40	17.8 ± 2.68	25.34
	Tritium	ND	NE
21269 **T1-829-BH006-004S** Minor offset joint in sewer line 53 ft N of CO1, 2.5-4 ft bgs.	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.695 ± 0.369	2.89
	Ra-226	0.729 ± 0.365	1.94
	Pb-214	0.512 ± 0.150	0.90
	Bi-214	0.523 ± 0.112	0.8
	Th-232	0.490 ± 0.188	1.258
	Ra-228	0.605 ± 0.212	1.05
	Th-228	0.590 ± 0.365	NE
	Ra-224	0.500 ± 0.348	0.968
	Pb-212	0.583 ± 0.185	1.0795
	Tl-208	0.670 ± 0.152	NE
	K-40	18.8 ± 2.86	25.34
	Tritium	ND	NE

Refer to footnotes at end of table.

Table 3-3 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
21270 **T1-829-BH007-004S** Minor offset joint in sewer line 83 ft N of CO1, 2.5-4 ft bgs.	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.756 ± 0.398	2.89
	Ra-226	1.24 ± 0.492	1.94
	Pb-214	0.570 ± 0.165	0.90
	Bi-214	0.578 ± 0.124	0.8
	Th-232	0.562 ± 0.211	1.258
	Ra-228	0.735 ± 0.256	1.05
	Th-228	0.574 ± 0.372	NE
	Ra-224	0.555 ± 0.387	0.968
	Pb-212	0.677 ± 0.214	1.0795
	Bi-212	0.668 ± 0.359	2.7
	Tl-208	0.692 ± 0.158	NE
	K-40	16.4 ± 2.57	25.34
	Tritium	ND	NE
	Iso-Thorium		
	Th-230	0.75 ± 0.14	NE
	Th-232	0.98 ± 0.16	1.05
	Iso-Uranium		
	U-233/234	0.78 ± 0.17	1.0[c]
	U-235	0.020 ± 0.022	0.168
	U-238	0.84 ± 0.18 B	1.1
Silver Recovery Sump Soil Samples			
21271 **T1-829-DW001-001SS** Center of sump, 0-12" bgs	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.672 ± 0.324	2.89
	Ra-226	1.02 ± 0.393	1.94
	Pb-214	0.473 ± 0.136	0.90
	Bi-214	0.516 ± 0.105	0.8
	Th-232	0.595 ± 0.206	1.258
	Ra-228	0.725 ± 0.212	1.05
	Ac-228	0.797 ± 0.179	NE
	Th-228	0.577 ± 0.313	NE
	Ra-224	0.473 ± 0.277	0.968
	Pb-212	0.579 ± 0.181	1.0795
	Bi-212	0.879 ± 0.328	2.7
	Tl-208	0.602 ± 0.132	NE
	K-40	14.4 ± 2.21	25.34
	Tritium	230 ± 140 pCi/L	NE
21272 **T1-829-DW002-001SS** Northern perimeter of sump, 0-12" bgs	NS		
21273 **T1-829-DW003-001SS** Eastern perimeter of sump, 0-12" bgs	NS		

Table 3-3 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
21274 **T1-829-DW004-001SS** Southern perimeter of sump, 0-12" bgs	NS		
Peripheral Soil Samples			
21275 **T1-829-GP001-3.3S** 25 ft E of SE corner of Bldg 829X, continuous 1" core, 0–40" bgs	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	U-238	1.26 ± 0.618	1.1
	Th-234	0.946 ± 0.590	2.89
	Ra-226	1.09 ± 0.374	1.94
	Pb-214	0.640 ± 0.175	0.90
	Bi-214	0.646 ± 0.115	0.8
	Th-232	0.624 ± 0.201	1.258
	Ra-228	0.806 ± 0.197	1.05
	Ac-228	0.791 ± 0.160	NE
	Th-228	0.526 ± 0.268	NE
	Ra-224	0.468 ± 0.294	0.968
	Pb-212	0.592 ± 0.183	1.0795
	Bi-212	0.639 ± 0.243	2.7
	Tl-208	0.581 ± 0.117	NE
	K-40	20.9 ± 2.99	25.34
	Iso-Plutonium		
	Pu-238	ND	NE
	Pu-239/240	ND	NE
21276 **T1-829-GP002-3.3S** 34 ft N of 21275, continuous 1" core, 0–40" bgs	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.840 ± 0.341	2.89
	Ra-226	1.11 ± 0.389	1.94
	Pb-214	0.726 ± 0.198	0.90
	Bi-214	0.862 ± 0.148	0.8
	Th-232	0.584 ± 0.204	1.258
	Ra-228	0.911 ± 0.216	1.05
	Ac-228	0.790 ± 0.163	NE
	Th-228	0.386 ± 0.255	NE
	Ra-224	0.520 ± 0.274	0.968
	Pb-212	0.653 ± 0.203	1.0795
	Bi-212	0.825 ± 0.284	2.7
	Tl-208	0.669 ± 0.134	NE
	K-40	19.0 ± 2.75	25.34
	Iso-Plutonium		
	Pu-238	ND	NE
	Pu-239/240	ND	NE

Table 3-3 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
21277 **T1-829-GP003-3.3S** 68 ft N of 21275, continuous 1" core, 0–40" bgs	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	U-238	0.890 ± 0.515	1.1
	Th-234	0.224 ± 0.179	2.89
	Ra-226	1.10 ± 0.362	1.94
	Pb-214	0.567 ± 0.157	0.90
	Bi-214	0.584 ± 0.103	0.8
	Th-232	0.637 ± 0.201	1.258
	Ra-228	0.733 ± 0.176	1.05
	Ac-228	0.719 ± 0.144	NE
	Th-228	0.434 ± 0.231	NE
	Ra-224	0.551 ± 0.334	0.968
	Pb-212	0.581 ± 0.180	1.0795
	Bi-212	0.896 ± 0.254	2.7
	Tl-208	0.607 ± 0.118	NE
	K-40	16.0 ± 2.32	25.34
	Iso-Plutonium		
	Pu-238	ND	NE
	Pu-239/240	ND	NE
21278 **T1-829-GP004-3.3S** 101 ft N of 21275, continuous 1" core, 0–40" bgs	Gamma Spec	pCi/g ± 2-sigma	pCi/g
	Th-234	0.865 ± 0.506	2.89
	Ra-226	0.847 ± 0.412	1.94
	Pb-214	0.552 ± 0.161	0.90
	Bi-214	0.534 ± 0.117	0.8
	Th-232	0.718 ± 0.266	1.258
	Ra-228	0.885 ± 0.266	1.05
	Ac-228	0.782 ± 0.203	NE
	Ra-224	1.19 ± 0.524	0.968
	Pb-212	0.604 ± 0.195	1.0795
	Bi-212	0.845 ± 0.378	2.7
	Tl-208	0.706 ± 0.161	NE
	K-40	17.6 ± 2.77	25.34
	Iso-Plutonium		
	Pu-238	ND	NE
	Pu-239/240	ND	NE
Waste Characterization Samples			
21279 **T1-829-BH008-004C** Composite of 21264 through 21267.	Iso-Thorium		
	Th-230	0.95 ± 0.17	NE
	Th-232	1.1 ± 0.18	1.258
	Iso-Uranium		
	U-233/234	0.90 ± 1.6	1.0[c]
	U-235	ND	0.168
	U-238	0.94 ± 0.16 B	1.1

Table 3-3 *(Continued)*

Summary of Radionuclides Detected in Soil and Field QC Samples, Collected at Building 829X, Sandia National Laboratories/New Mexico

Sample Number and Location	Isotope	Result	Background[a]
21280 **T1-829-BH009-004C** Composite of 21268 and 21269.	Iso-Thorium Th-230 Th-232 Iso-Uranium U-233/234 U-235 U-238	pCi/g ± 2-sigma 0.96 ± 0.16 1.2 ± 0.18 0.93 ± 0.17 0.038 ± 0.026 0.86 ± 0.16 B	pCi/g NE 1.258 1.0[c] 0.168 1.1
21281 **T1-829-DW005-001C** Composite of sump samples.	Iso-Thorium Th-230 Th-232 Iso-Uranium U-233/234 U-235 U-238	pCi/g ± 2-sigma 1.0 ± 0.25 1.2 ± 0.26 0.96 ± 0.18 ND 0.80 ± 0.15 B	pCi/g NE 1.258 1.0[c] 0.168 1.1
21282 **T1-829-DF001-000C** Decontamination fluid	 Gross Alpha Gross Beta	pCi/g ± 2-sigma 27 ± 13 pCi/L 51 ± 10 pCi/L	pCi/g NE NE
Field Quality Control Samples			
21283 **T1-829-EB001-000W** Equipment rinsate blank	Gamma Tritium	ND ND	
21284 **T1-829-FB001-000W** Aqueous field blank at sewer line	Gamma Tritium	ND 330 ± 140 pCi/L	 NE
21285 **T1-829-FB002-000W** Aqueous field blank at sump	NS		
21286 **T1-829-TB001-000W** Aqueous lab-prep. trip blank	NS		
21287 **T1-829-TB002-000W** Aqueous lab-prep. trip blank	NS		

[a] 95th Upper Tolerance Limit or 95th Percentile from Table 7-2, Summary of Background Concentrations for Radionuclides in Soils, in "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project" (SNL/NM, draft, October 1994).
[b] Background value applies to surface soils only (0-2 ft bgs).
[c] Background value established for U-234 only.
B = Compound also found in associated method blank sample.
bgs = below ground surface.
ND = Not detected at the associated minimal detectable activity.
NE = Not established in source cited.
NS = Not sampled (analysis not required).
Radionuclides: Ac = actinium, Bi = bismuth, K = potassium, Pb = lead, Pu = plutonium, Ra = radium, Th = thorium, Tl = thallium, U = uranium.
Units: pCi/g = picocuries per gram, pCi/L = picocuries per liter.

Table 3-4

Calculation of Relative Percent Difference for Duplicate Soil Samples Collected at Building 829X, Sandia National Laboratories/New Mexico

Parameter	Result A Sample # 21265	Result B Sample #21266	RPD %
VOCs	ND	ND	NC
SVOCs	ND	ND	NC
Metals, mg/L			
Arsenic	4.5	3.7	19.5
Barium	233	192	19.3
Chromium	12.2	11.8	3.3
Lead	9.3	6.1	41.6
Nickel	12.8	12.6	1.6
Radionuclides, pCi/g			
Th-234	0.709	1.16	48.3
Ra-226	1.33	1.11	18.0
Pb-214	0.584	0.588	0.7
Bi-214	0.629	0.619	1.6
Th-232	0.563	0.551	2.2
Ra-228	0.606	0.782	25.4
Th-228	0.53	ND	NC
Ra-224	0.531	0.563	5.9
Pb-212	0.627	0.604	3.7
Bi-212	0.954	0.773	21.0
Tl-208	0.549	0.575	4.6
K-40	16.6	14.9	10.8
Tritium	260	230	12.3

NC = Not calculable.
ND = Not detected above laboratory reporting limit.
RPD = Relative percent difference = {(|Result A – Result B|)/([Result A + Result B]/2)} X 100.

4.0 Summary and Recommendations

Soils in the vicinity of Building 829X were sampled to determine whether processes and materials used in the building have caused contamination of the surrounding soils. Soil samples were collected from three zones: adjacent to the sewer line serving the building, on the floor of the silvery recovery sump at the southwest corner of the building, and in a north-south zone between Buildings 829X and 830 that may have been affected by plutonium assay processes used in Building 830. Investigative soil samples from each location were analyzed for specific constituents of concern. In addition, field quality control samples were collected, and composite soil samples were submitted for waste characterization analyses.

Analytical results for chemical parameters (VOCs, SVOCs, and metals) in investigative soil samples were compared to action levels set forth in RCRA Proposed Subpart S (40 CFR 264.521 [a][2][i-iv]). Metals results were also compared to SNL/NM background values listed in the draft document "Background Concentrations of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project" (SNL/NM, draft, October 1994) as were radionuclides detections. Waste characterization samples were compared to RCRA toxicity characteristic maximum contaminant levels designated in 40 CFR 261.24, except for the decontamination fluid sample, which was compared to City of Albuquerque wastewater discharge limits. Waste characterization criteria for radiochemistry data is not yet available and Department 7572 will evaluate the radionuclide analyses to determine whether or not radioactive wastes exist at the site.

4.1 Summary

The results of chemical analyses for VOCs and SVOCs performed on investigative soil samples from Building 829X found no compounds at concentrations that exceeded the proposed RCRA Subpart S action levels. Phenanthrene, for which there is no proposed action level, occurred in one sewer line sample at 840 µg/kg. This compound is often present in environmental samples as an artifact of asphalt pavement.

No metal concentrations exceeded proposed RCRA Subpart S action levels and most metals values were within the 95th percentile of background values for SNL/NM except for lead in one sewer line sample (sample no. 21267) and silver in the sump samples (samples 21271, 21273, and 21274).

Radionuclides were reported at levels within the 95th percentile of SNL/NM background values except for radium-224 (sample 21278), uranium-238 (sample 21275), and bismuth-214 (sample 21276), which slightly exceeded the background values in the peripheral soils between Buildings 829X and 830.

Analyses of field quality control samples found no constituents of concern at levels that impact the interpretation of the associated investigative samples with the possible exception of tritium in a field blank sample from the septic line area. Waste characterization results for composite soil samples also found no constituents of concern above regulatory limits; nor were any compounds reported in the decontamination fluid above discharge limits.

4.2 Recommendations

Based on the results presented in this report and summarized above, the following recommendations are made for actions required prior to removal of the slab and reuse of the site of Building 829X:

- All radioactive data contained in this report should be evaluated by SNL/NM Generator Interface Department 7572 to determine whether or not the soils investigation materials are considered radioactive waste.

- The phenanthrene finding in the sewer line soil sample located 31 ft north of Cleanout 1 is probably related to the use of asphalt paving in the vicinity of Building 829X. Because no action levels have been established for this compound, its presence should be evaluated by the ER Project to determine whether or not further investigation is required.

- Silver was detected in the silver recovery sump, at values that are less than the proposed Subpart S action level, but clearly greater than background values at SNL/NM. The ER Project must evaluate the feasibility of No Further Action or Corrective Measures alternatives. The contamination at this site is likely to be localized and a Voluntary Corrective Measure involving simple excavation and offsite disposal of a small volume of soil should be feasible.

- The concentrations of lead detected in the sewer line sample collected 31 ft north of Cleanout 1 exceeds the 95th percentile of SNL/NM background values for lead. Likewise, the radium-224, uranium-238, and bismuth-214 concentrations measured in some soils peripheral to buildings 829X and 830 also exceed the 95th percentile and bismuth exceeds the overall range of background values. A statistical comparison of the investigation sample distribution to the background data distribution should be performed to confirm that these soils are not contaminated. In the case of bismuth-214, this may require additional

sampling. Alternatively, a risk assessment analysis could be used to evaluate the feasibility of no further action at this location.

5.0 References

IT Corporation (IT), 1994, "Site-Specific Sampling and Analysis Plan for Contamination Assessment of Building 829X," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1994, draft "Background Concentration of Constituents of Concern to the Sandia National Laboratories/New Mexico Environmental Restoration Project," Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1993a, "Site Inspection Report for Decontamination and Demolition of Building 829X," Sandia National Laboratories/ New Mexico, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1993b, "ES&H Manual," *MN471001*, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1991a, "Environmental Programs Department (7720) Procedure for Sample Management and Custody," *QA 08-01*, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), 1991b, "Environmental Programs Department (7720) Procedure for Validation of Measurement Data," *QA 11-01*, Sandia National Laboratories, Albuquerque, New Mexico.

SGA/PBS, see Spence-Geiger Associates, Inc./PBS Environmental, Inc.

SNL/NM, see Sandia National Laboratories/New Mexico.

Spence-Geiger Associates, Inc./PBS Environmental, Inc. (SGA/PBS), 1989, "Building 829X Asbestos Survey," Albuquerque, New Mexico.

U.S. Environmental Protection Agency (EPA), 1986, "Test Methods for Evaluating Solid Waste Physical/Chemical Methods," *SW-846*, 3rd ed., Washington, D.C.

The remaining portions of this report:

- **Appendix A - Field Documentation;**
- **Appendix B – Quanterra Analytical Reports and Sample Control Documentation;**
- **Appendix C - SNL/NM Department 7715 and TMA/Eberline Analytical Reports and Sample Control Documentation,**

are available through the SNL/NM Environmental Safety & Health and Security Record Center

ANNEX B
DSS Site 276
Gore-Sorber™ Passive Soil-Vapor Survey Analytical Results

GORE
Creative Technologies Worldwide

W. L. GORE & ASSOCIATES, INC.

100 CHESAPEAKE BLVD., P.O. BOX 10 • ELKTON, MARYLAND 21922-0010 • PHONE: 410/392-7600
FAX: 410/506-4780

GORE-SORBER® EXPLORATION SURVEY
GORE-SORBER® SCREENING SURVEY

June 6, 2002

Mike Sanders
Sandia National Laboratories
Mail Stop 0719
1515 Eubank, SE
Building 9925, Room 108
Albuquerque, NM 87123

Site Reference: Non-ER Drain & Septic, Kirtland AFB, NM
Gore Production Order Number: 10960025

Dear Mr. Sanders:

Thank you for choosing a GORE-SORBER® Screening Survey.

The attached package consists of the following information (in duplicate):

- **Final report**
- **Chain of custody and analytical data table (included in Appendix A)**
- **Stacked total ion chromatograms (included in Appendix A)**

Please contact our office if you have any questions or comments concerning this report. We appreciate this opportunity to be of service to Sandia National Laboratories, and look forward to working with you again in the future.

Sincerely,
W.L. Gore & Associates, Inc.

Jay W. Hodny, Ph.D.
Associate

Attachments
cc: Andre Brown (W.L. Gore & Associates, Inc.)

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W. L. GORE & ASSOCIATES, INC.

100 CHESAPEAKE BLVD., P.O. BOX 10 • ELKTON, MARYLAND 21922-0010 • PHONE: 410/392-7600
FAX: 410/506-4780

GORE-SORBER® Screening Survey
Final Report

Non-ER Drain & Septic
Kirtland AFB, NM

June 6, 2002

Prepared For:
Sandia National Laboratories
Mail Stop 0719, 1515 Eubank, SE
Albuquerque, NM 87123

W.L. Gore & Associates, Inc.

Written/Submitted by:
Jay W. Hodny, Ph.D., Project Manager

Reviewed/Approved by:
Jim E. Whetzel, Project Manager

Analytical Data Reviewed by:
Jim E. Whetzel, Chemist

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GORE-SORBER® Screening Survey
Final Report

REPORT DATE: June 6, 2002 **AUTHOR:** JWH

SITE INFORMATION

Site Reference: Non-ER Drain & Septic, Kirtland AFB, NM
Customer Purchase Order Number: 28518
Gore Production Order Number: 10960025 **Gore Site Code:** CCT, CCX

FIELD PROCEDURES

 # Modules shipped: 142
Installation Date(s): 4/23,24,25,26,29,30/2002; 5/1,6/2002
 # Modules Installed: 135
Field work performed by: Sandia National Laboratories

Retrieval date(s): 5/8,9,10,14,15,16,21/2002
 # Modules Retrieved: 131
 # Modules Lost in Field: 4
 # Modules Not Returned: 1

Exposure Time: ~15 **[days]**
 # Trip Blanks Returned: 3
 # Unused Modules Returned: 3

Date/Time Received by Gore: 5/17/2002 @ 2:00 PM; 5/24/2002@1:30PM **By:** MM
Chain of Custody Form attached: √
Chain of Custody discrepancies: None
Comments:
Modules #179227, -228, and -229 were identified as trip blanks.
Modules #179137, -138, -140, and -141 were not retrieved and considered lost from the field.
Module #179231 was not returned.
Modules #179230, 232, and –233 were returned unused.

GORE-SORBER® Screening Survey
Final Report

ANALYTICAL PROCEDURES

W.L. Gore & Associates' Screening Module Laboratory operates under the guidelines of its Quality Assurance Manual, Operating Procedures and Methods. The quality assurance program is consistent with Good Laboratory Practices (GLP) and ISO Guide 25, "General Requirements for the Competence of Calibration and Testing Laboratories", third edition, 1990.

Instrumentation consists of state of the art gas chromatographs equipped with mass-selective detectors, coupled with automated thermal desorption units. Sample preparation simply involves cutting the tip off the bottom of the sample module and transferring one or more exposed sorbent containers (sorbers, each containing 40mg of a suitable granular adsorbent) to a thermal desorption tube for analysis. Sorbers remain clean and protected from dirt, soil, and ground water by the insertion/retrieval cord, and require no further sample preparation.

Analytical Method Quality Assurance:
The analytical method employed is a modified EPA method 8260/8270. Before each run sequence, two instrument blanks, a sorber containing 5µg BFB (Bromofluorobenzene), and a method blank are analyzed. The BFB mass spectra must meet the criteria set forth in the method before samples can be analyzed. A method blank and a sorber containing BFB is also analyzed after every 30 samples and/or trip blanks. Standards containing the selected target compounds at three calibration levels of 5, 20, and 50µg are analyzed at the beginning of each run. The criterion for each target compound is less than 35% RSD (relative standard deviation). If this criterion is not met for any target compound, the analyst has the option of generating second- or third-order standard curves, as appropriate. A second-source reference standard, at a level of 10µg per target compound, is analyzed after every ten samples and/or trip blanks, and at the end of the run sequence. Positive identification of target compounds is determined by 1) the presence of the target ion and at least two secondary ions; 2) retention time versus reference standard; and, 3) the analyst's judgment.

NOTE: All data have been archived. Any replicate sorbers not used in the initial analysis will be discarded fifteen (15) days from the date of analysis.

Laboratory analysis: thermal desorption, gas chromatography, mass selective detection
Instrument ID: # 2 **Chemist:** JW
Compounds/mixtures requested: Gore Standard VOC/SVOC Target Compounds (A1)
Deviations from Standard Method: None
Comments: Soil vapor analytes and abbreviations are tabulated in the Data Table Key (page 6). Module #179091 was returned and noted as damaged, no carbonaceous sorbers; therefore, target compound masses reported in data table cannot be compared to the mass data from the other modules directly.
Module #179101, no identification tag was returned with this module.

GORE-SORBER® Screening Survey
Final Report

DATA TABULATION

 # CONTOUR MAPS ENCLOSED: No contour maps were generated.

NOTE: All data values presented in Appendix A represent masses of compound(s) desorbed from the GORE-SORBER Screening Modules received and analyzed by W.L. Gore & Associates, Inc., as identified in the Chain of Custody (Appendix A). The measurement traceability and instrument performance are reproducible and accurate for the measurement process documented. Semi-quantitation of the compound mass is based on either a single-level (QA Level 1) or three-level (QA Level 2) standard calibration.

General Comments:

- This survey reports soil gas mass levels present in the vapor phase. Vapors are subject to a variety of attenuation factors during migration away from the source concentration to the module. Thus, mass levels reported from the module will often be less than concentrations reported in soil and groundwater matrix data. In most instances, the soil gas masses reported on the modules compare favorably with concentrations reported in the soil or groundwater (e.g., where soil gas levels are reported at greater levels relative to other sampled locations on the site, matrix data should reveal the same pattern, and vice versa). However, due to a variety of factors, a perfect comparison between matrix data and soil gas levels can rarely be achieved.
- Soil gas signals reported by this method cannot be identified specifically to soil adsorbed, groundwater, and/or free-product contamination. The soil gas signal reported from each module can evolve from all of these sources. Differentiation between soil and groundwater contamination can only be achieved with prior knowledge of the site history (i.e., the site is known to have groundwater contamination only).
- QA/QC trip blank modules were provided to document potential exposures that were not part of the soil gas signal of interest (i.e., impact during module shipment, installation and retrieval, and storage). The trip blanks are identically manufactured and packaged soil gas modules to those modules placed in the subsurface. However, the trip blanks remain unopened during all phases of the soil gas survey. Levels reported on the trip blanks may indicate potential impact to modules other than the contaminant source of interest.

GORE-SORBER® Screening Survey
Final Report

- Unresolved peak envelopes (UPEs) are represented as a series of compound peaks clustered together around a central gas chromatograph elution time in the total ion chromatogram. Typically, UPEs are indicative of complex fluid mixtures that are present in the subsurface. UPEs observed early in the chromatogram are considered to indicate the presence of more volatile fluids, while UPEs observed later in the chromatogram may indicate the presence of less volatile fluids. Multiple UPEs may indicate the presence of multiple complex fluids.

Project Specific Comments:

- Stacked total ion chromatograms (TICs) are included in Appendix A. The six-digit serial number of each module is incorporated into the TIC identification (e.g.: 123456S.D represents module #123456).
- No target compounds were detected on the trip blanks and/or the method blanks. Thus, target analyte levels reported for the field-installed modules that exceed trip and method blank levels, and the analyte method detection limit, have a high probability of originating from on-site sources.
- A small subset of modules was placed at each of several site locations; therefore no contour mapping was performed. Larger and more comprehensive soil gas surveys may be warranted at the individual sites where elevated soil gas levels were observed.

GORE-SORBER® Screening Survey
Final Report

KEY TO DATA TABLE
Non-ER Drain & Septic, Kirtland AFB, NM

UNITS

µg	micrograms (per sorber), reported for compounds
MDL	method detection limit
bdl	below detection limit
nd	non-detect

ANALYTES

BTEX	combined masses of benzene, toluene, ethylbenzene and total xylenes (Gasoline Range Aromatics)
BENZ	benzene
TOL	toluene
EtBENZ	ethylbenzene
mpXYL	m-, p-xylene
oXYL	o-xylene
C11,C13&C15	combined masses of undecane, tridecane, and pentadecane (C11+C13+C15) (Diesel Range Alkanes)
UNDEC	undecane
TRIDEC	tridecane
PENTADEC	pentadecane
TMBs	combined masses of 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene
135TMB	1,3,5-trimethylbenzene
124TMB	1,2,4-trimethylbenzene
ct12DCE	cis- & trans-1,2-dichloroethene
t12DCE	trans-1,2-dichloroethene
c12DCE	cis-1,2-dichloroethene
NAPH&2-MN	combined masses of naphthalene and 2-methyl naphthalene
NAPH	naphthalene
2MeNAPH	2-methyl naphthalene
MTBE	methyl t-butyl ether
11DCA	1,1-dichloroethane
$CHCl_3$	chloroform
111TCA	1;1,1-trichloroethane
12DCA	1,2-dichloroethane
CCl_4	carbon tetrachloride
TCE	trichloroethene
OCT	octane
PCE	tetrachloroethene
ClBENZ	chlorobenzene
14DCB	1,4-dichlorobenzene

BLANKS

TBn	unexposed trip blanks, travels with the exposed modules
method blank	QA/QC module, documents analytical conditions during analysis

APPENDIX A:

1. CHAIN OF CUSTODY
2. DATA TABLE

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 10960025

W. L. Gore & Associates, Inc., Survey Products Group
100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

Instructions: Customer must complete ALL shaded cells

Customer Name: SANDIA NATIONAL LABS	Site Name: NON-ER DUAIN+ SEPTIC B
Address: ACCOUNTS PAYABLE MS0154	Site Address: ~~KIVL 2ND~~ AFB, NM KIRTLAND
P.O.BOX 5130	
ALBUQUERQUE NM 87185 U.S.A.	Project Manager: MIKE SANDERS
Phone: 505-284-3303	Customer Project No.:
FAX: 505-284-2614	Customer P.O. #: 28518 Quote #: 211946

Serial # of Modules Shipped			# of Modules for Installation 135 # of Trip Blanks 7		
# 179087 - # 179144	# 179087 - # 179134	Total Modules Shipped: 142 Pieces			
# 179150 - # 179233	# 179135 - # 179136	Total Modules Received: 142 Pieces			
# - #	# 179139 - #	Total Modules Installed: 135 Pieces			
# - #	# 179142 - # 179144	Serial # of Trip Blanks (*Client Decides*)	#		
- #	# 179150 - # 179151	# 179227	#	#	
- #	# - #	#	#	#	
- #	# - #	#	#	#	
- #	# - #	#	#	#	
# - #	# - #	#	#	#	
# - #	# - #	#	#	#	
Prepared By: Aurora Vigil		#	#	#	
Verified By: Mary Ann Maghi		#	#	#	

Installation Performed By:
Name (*please print*): GILBERT QUINTANA
Company/Affiliation: SNL/NM

Installation Method(s) (*circle those that apply*):
Slide Hammer Hammer Drill Auger
Other: GEOPROBE

Installation Start Date and Time: 4/23/02 1081ST : (AM) PM
Installation Complete Date and Time: 5/6/02 1094O : (AM) PM

Retrieval Performed By:
Name (*please print*): GILBERT QUINTANA
Company/Affiliation: SNL/NM

Total Modules Retrieved: Pieces
Total Modules Lost in Field: Pieces
Total Unused Modules Returned: Pieces

Retrieval Start Date and Time: 5/8/02 / / : AM PM
Retrieval Complete Date and Time: / / : AM PM

	Date	Time		Date	Time
Relinquished By: Affiliation: W.L. Gore & Associates, Inc	3-4-02	17:00	Received By: Mike Sander Affiliation: Sandia / ER	3-6-02	
Relinquished By: William J Kelly Affiliation: 6135	5-14-02	12:58	Received By: Affiliation:		
Relinquished By: Affiliation			Received By: Mary Ann Maghi Affiliation: W.L. Gore & Associates, Inc.	5/17/02	14:00

GORE-SORBER® Screening Survey Chain of Custody

For W.L. Gore & Associates use only
Production Order # 10960025

W. L. Gore & Associates, Inc., Survey Products Group
100 Chesapeake Boulevard • Elkton, Maryland 21921 • Tel: (410) 392-7600 • Fax (410) 506-4780

Instructions: Customer must complete ALL shaded cells

Customer Name: SANDIA NATIONAL LABS	Site Name: NON-ER DUAIN+ SEPTIC
Address: ACCOUNTS PAYABLE MS0154	Site Address: ~~KIVL 2ND~~ AFB, NM
P.O.BOX 5130	KIRTLAND
ALBUQUERQUE NM 87185 U.S.A.	Project Manager: MIKE SANDERS
Phone: 505-284-3303	Customer Project No.:
FAX: 505-284-2616	Customer P.O. #: 28518 Quote #: 211946

Serial # of Modules Shipped				# of Modules for Installation 135	# of Trip Blanks 7	
# 179087	- # 179144	#179152	- #179187	Total Modules Shipped: 142 Pieces		
# 179150	- # 179233	#179188	- #179226	Total Modules Received: 142 Pieces		
#	- #	#	- #	Total Modules Installed: 135 Pieces		
#	- #	#	- #	Serial # of Trip Blanks (Client Decides)		#
	- #	#	- #	#179228	#	#
	- #	#	- #	#179229	#	#
	- #	#	- #	#	#	#
#	- #	#	- #	#	#	#
#	- #	#	- #	#	#	#
#	- #	#	- #	#	#	#
Prepared By: [signature]				#	#	#
Verified By: Mary Anne Marghi				#	#	#

Installation Performed By:	Installation Method(s) (*circle those that apply*):
Name (*please print*): GILBERT QUINTANA	Slide Hammer Hammer Drill Auger
Company/Affiliation: SNL/NM	Other: GEOPROBE
Installation Start Date and Time: 4/23/02 1081ST	: AM PM
Installation Complete Date and Time: 5/6/02 109401	: AM PM
Retrieval Performed By:	Total Modules Retrieved: 74 Pieces
Name (*please print*): GILBERT QUINTANA	Total Modules Lost in Field: 4 Pieces
Company/Affiliation: SNL/NM	Total Unused Modules Returned: 3 Pieces
Retrieval Start Date and Time: 5/8/02 / /	: AM PM
Retrieval Complete Date and Time: / /	: AM PM

	Date	Time		Date	Time
Relinquished By [signature] Affiliation: W.L. Gore & Associates, Inc.	3-4-02	12:00	Received By: Mike Sanders Affiliation: Sandia ; 6133	3-7-02	
Relinquished By William J Riley Affiliation: Sandia N.L. 6135	5-21-02	0935	Received By: Affiliation:		
Relinquished By Affiliation			Received By: Mary Anne Marghi Affiliation: W.L. Gore & Associates, Inc.	5-24-02	13:3

FORM 8R.8
1/08/01

GORE-SORBER® Screening Survey
Installation and Retrieval Log

SITE NAME & LOCATION

LINE #	MODULE #	INSTALLATION DATE/TIME	RETRIEVAL DATE/TIME	EVIDENCE OF LIQUID HYDROCARBONS (LPH) or HYDROCARBON ODOR (Check as appropriate) LPH	ODOR	NONE	MODULE IN WATER (check one) YES	NO	COMMENTS	
13.	179129	4/25/02, 1428	5-10-02, 1047						1026/6584-65-	3
14.	179130	1437	5-10-02, 1051						↓	1
15.	179131	1442	5-10-02, 1053						1025/6584-	1
46.	179132	1446	↓						↓	2
47.	179133	↓ 1504	5-10-02, 11:06						↓	3
48.	179134	4/26/02, 0905	5-10-02 1247						1093/6584-	1
49.	179135	0914	↓ 1254						↓	4
50.	179136	0930	5-10-02, 1305							2
51.	179137	0938	Lost							3
52.	179138	0948	Lost						↓	5
53.	179139	1018	5-10-02, 1322						1031/6600-	2
54.	179140	1026	Lost						↓	3
55.	179141	1030	Lost							4
56.	179142	1038	5-10-02, 1343						↓	1
57.	179143	1136	5-10-02, 11:36						276/829X-	2
	179144	1142	↓						↓	3
	179150	1150	↓						↓	4
	179151	↓ 1155	5-10-02, 11:54						↓	1
	179152	4/29/02, 0814	5-14-02 09:42						1084/6505-	1
62.	179153	0822	↓						↓	5
63.	179154	0829	↓						↓	3
64.	179155	0903	↓						↓	2
65.	179156	0845	5-14-02 ↓ 1021						↓	4
66.	179157	0930	05-14-02 0949						1083/6570-	4
67.	179158	0934	↓						↓	1
68.	179159	0940	↓						↓	2
69.	179160	0948	↓ 0940						↓	3
70.	179161	1050	05-14-02, 1025						1032/6610-	1
71.	179162	1100	↓						↓	2
72.	179163	1110	↓						↓	4
73.	179164	1114	↓						↓	3
74.	179165	1120	↓						↓	5
75.	179166	1126	05-14-02, 11:03						↓	6
76.	179167	1222	05-14-02, 11:06						1120/6643-	2
77.	179168	1230	↓						↓	3
78.	179169	1237	↓						↓	4
79.	179170	1242	05-14-02 ↓ 11:32						↓	1
80.	179171	1320	5-14-02 - 0844						1034/6710-	4
81.	179172	1325	↓ 0917						↓	3
82.	179173	1332	↓ 0851						↓	2
83.	179174	1340	↓ 0855						↓	1
	179175	↓ 1423	5-14-02, 0814						1035/6715- ↓	4

DSS SITE 276

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
SANDIA NATIONAL LABS, ALBUQUERQUE, NM
GORE STANDARD TARGET VOCs/SVOCs (A1)
NON-ER DRAIN AND SEPTIC, KIRTLAND AFB, NM
SITES CCT AND CCX - PRODUCTION ORDER #10960025

DATE ANALYZED	SAMPLE NAME	BTEX, ug	BENZ, ug	TOL, ug	EtBENZ, ug	mpXYL, ug	oXYL, ug	C11, C13, &C15, ug	UNDEC, ug	TRIDEC, ug	PENTADEC, ug	TMBs, ug
	MDL=		0.03	0.02	0.01	0.01	0.01		0.02	0.01	0.02	
5/21/2002	179125	0.10	nd	0.08	nd	0.02	nd	0.05	0.04	0.01	bdl	0.00
5/21/2002	179126	0.00	nd	nd	nd	bdl	nd	0.04	0.03	0.02	bdl	0.00
5/21/2002	179127	0.09	nd	0.05	nd	0.02	0.01	0.04	0.04	bdl	bdl	0.00
5/21/2002	179128	0.07	nd	0.05	nd	0.02	nd	0.08	0.04	0.01	0.03	0.00
5/21/2002	179129	0.02	nd	nd	nd	0.02	nd	0.06	0.03	0.03	bdl	0.00
5/21/2002	179130	0.21	nd	0.15	nd	0.04	0.02	0.15	0.07	0.03	0.05	0.00
5/21/2002	179131	nd	nd	nd	nd	nd	nd	0.07	0.04	0.01	0.02	nd
5/21/2002	179132	nd	nd	nd	nd	nd	nd	0.05	bdl	0.02	0.02	0.00
5/21/2002	179133	0.08	nd	0.08	nd	nd	nd	0.19	0.04	0.09	0.05	nd
5/21/2002	179134	nd	nd	nd	nd	nd	nd	0.05	0.03	0.02	bdl	0.00
5/21/2002	179135	0.11	nd	0.10	nd	0.01	nd	0.16	0.04	0.04	0.08	0.00
5/21/2002	179136	0.09	nd	0.09	nd	nd	nd	0.04	0.02	0.01	bdl	0.00
5/21/2002	179139	nd	nd	nd	nd	nd	nd	0.68	0.07	0.10	0.51	0.00
5/21/2002	179142	0.11	nd	0.07	nd	0.03	0.01	0.25	0.12	0.07	0.06	0.00
5/21/2002	179143	nd	nd	nd	nd	nd	nd	0.07	0.03	0.02	0.03	nd
5/21/2002	179144	0.17	nd	0.09	0.02	0.05	0.01	0.08	0.04	0.01	0.02	0.00
5/21/2002	179150	0.40	nd	0.19	0.04	0.13	0.04	0.07	0.05	0.02	bdl	0.00
5/21/2002	179151	nd	nd	nd	nd	nd	nd	0.03	0.03	bdl	bdl	0.00
5/28/2002	179152	0.09	nd	0.05	nd	0.03	0.02	0.19	0.06	0.02	0.11	0.08
5/28/2002	179153	0.13	nd	0.08	nd	0.04	0.02	0.13	0.03	0.02	0.08	0.13
5/28/2002	179154	nd	nd	nd	nd	nd	nd	0.11	0.02	0.01	0.07	0.00
5/28/2002	179155	nd	nd	nd	nd	nd	nd	0.06	bdl	0.02	0.04	0.00
5/28/2002	179156	nd	nd	nd	nd	nd	nd	0.22	0.15	0.01	0.06	0.00
5/28/2002	179157	nd	nd	nd	nd	nd	nd	0.12	0.04	0.02	0.06	0.00
5/28/2002	179158	0.01	nd	nd	nd	0.01	nd	0.11	0.05	0.01	0.05	0.00
5/28/2002	179159	0.00	nd	nd	nd	bdl	nd	0.07	0.03	0.01	0.03	0.00
5/28/2002	179160	nd	nd	nd	nd	nd	nd	0.02	bdl	0.02	bdl	0.00
5/28/2002	179161	0.00	nd	nd	nd	bdl	nd	0.08	0.03	0.02	0.03	0.00
5/28/2002	179162	0.01	nd	nd	nd	0.01	nd	0.10	0.03	0.03	0.04	0.00
5/28/2002	179163	0.01	nd	nd	nd	0.01	nd	0.07	0.02	0.02	0.03	0.00
5/28/2002	179164	0.02	nd	nd	nd	0.02	bdl	0.14	0.06	0.02	0.06	0.00
5/28/2002	179165	nd	nd	nd	nd	nd	nd	0.08	0.03	bdl	0.05	0.00
5/28/2002	179166	0.00	nd	bdl	nd	nd	nd	0.05	0.03	0.01	bdl	0.00
5/28/2002	179167	nd	nd	nd	nd	nd	nd	0.02	0.02	bdl	bdl	0.00
5/28/2002	179168	0.04	nd	0.03	nd	0.01	nd	0.09	0.04	0.02	0.03	0.00
5/28/2002	179169	nd	nd	nd	nd	nd	nd	0.06	0.03	0.01	0.02	nd
5/28/2002	179170	0.03	nd	nd	nd	0.03	nd	0.06	0.04	0.02	bdl	0.00
5/28/2002	179171	nd	nd	nd	nd	nd	nd	0.04	0.03	0.02	bdl	0.00

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

GORE SORBER SCR[redacted]G SURVEY ANALYTICAL RESULTS
SANDIA NATIONAL LABS, ALBUQUERQUE, NM
GORE STANDARD TARGET VOCs/SVOCs (A1)
NON-ER DRAIN AND SEPTIC, KIRTLAND AFB, NM
SITES CCT AND CCX - PRODUCTION ORDER #10960025

SAMPLE NAME	124TMB, ug	135TMB, ug	ct12DCE, ug	t12DCE, ug	c12DCE, ug	NAPH&2-MN, ug	NAPH, ug	2MeNAPH, ug	MTBE, ug	11DCA, ug	111TCA, ug	12DCA, ug
MDL=	0.03	0.02		0.14	0.03		0.01	0.02	0.04	0.04	0.02	0.02
179125	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
179126	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179127	nd	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179128	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179129	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179130	bdl	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179131	nd	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179132	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	bdl	nd
179133	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
179134	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179135	bdl	bdl	nd	nd	nd	0.02	0.02	bdl	nd	nd	nd	nd
179136	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179139	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179142	bdl	bdl	nd	nd	nd	0.01	0.01	bdl	nd	nd	nd	nd
179143	nd	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179144	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179150	bdl	bdl	nd	nd	nd	0.02	0.02	bdl	nd	nd	bdl	nd
179151	bdl	nd	nd	nd	nd	nd	nd	nd	nd	nd	bdl	nd
179152	0.06	0.03	nd	nd	nd	0.11	0.05	0.06	nd	nd	nd	nd
179153	0.09	0.03	nd	nd	nd	0.16	0.09	0.07	nd	nd	nd	nd
179154	bdl	bdl	nd	nd	nd	0.04	0.02	0.02	nd	nd	nd	nd
179155	bdl	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179156	bdl	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179157	bdl	bdl	nd	nd	nd	0.03	nd	0.03	nd	nd	nd	nd
179158	bdl	bdl	nd	nd	nd	0.04	0.02	0.03	nd	nd	nd	nd
179159	bdl	bdl	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179160	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179161	nd	bdl	nd	nd	nd	0.11	0.05	0.06	nd	nd	nd	nd
179162	bdl	nd	nd	nd	nd	0.05	0.02	0.03	nd	nd	nd	nd
179163	bdl	bdl	nd	nd	nd	0.02	0.02	bdl	nd	nd	nd	nd
179164	bdl	bdl	nd	nd	nd	0.04	0.02	0.02	nd	nd	nd	nd
179165	bdl	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179166	bdl	nd	nd	nd	nd	0.04	0.02	0.02	nd	nd	nd	nd
179167	bdl	nd	nd	nd	nd	0.04	nd	0.04	nd	nd	nd	nd
179168	bdl	bdl	nd	nd	nd	0.07	0.02	0.04	nd	nd	nd	nd
179169	nd	nd	nd	nd	nd	0.00	nd	bdl	nd	nd	nd	nd
179170	bdl	nd	nd	nd	nd	0.02	0.02	bdl	nd	nd	nd	nd
179171	bdl	bdl	nd	nd	nd	0.08	0.03	0.05	nd	nd	nd	nd

DSC Site 224

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of the individual compounds were reported as bdl.

GORE SORBER SCREENING SURVEY ANALYTICAL RESULTS
SANDIA NATIONAL LABS, ALBUQUERQUE, NM
GORE STANDARD TARGET VOCs/SVOCs (A1)
NON-ER DRAIN AND SEPTIC, KIRTLAND AFB, NM
SITES CCT AND CCX - PRODUCTION ORDER #10960025

SAMPLE NAME	TCE, ug	OCT, ug	PCE, ug	14DCB, ug	CHCl3, ug	CCl4, ug	CIBENZ, ug
MDL=	0.02	0.02	0.01	0.01	0.03	0.03	0.01
179125	0.03	nd	1.24	nd	nd	nd	nd
179126	nd	nd	0.52	nd	nd	nd	nd
179127	nd	nd	0.55	nd	nd	nd	nd
179128	nd	nd	nd	nd	nd	nd	nd
179129	nd	nd	0.01	nd	nd	nd	nd
179130	nd	0.12	0.02	nd	nd	nd	nd
179131	nd	nd	nd	nd	nd	nd	nd
179132	nd	nd	0.75	nd	nd	nd	nd
179133	nd	nd	0.18	nd	nd	nd	nd
179134	nd	nd	0.33	nd	nd	nd	nd
179135	nd	nd	0.38	bdl	nd	nd	nd
179136	nd	nd	0.65	nd	0.05	nd	nd
179139	nd	nd	0.14	nd	nd	nd	nd
179142	nd	0.12	0.42	nd	nd	nd	nd
179143	0.41	nd	0.25	nd	nd	nd	nd
179144	0.84	0.13	0.21	nd	nd	nd	nd
179150	2.50	0.14	0.18	bdl	nd	nd	nd
179151	0.71	nd	0.32	nd	nd	nd	nd
179152	nd	nd	0.06	0.02	nd	nd	nd
179153	nd	nd	0.03	nd	0.08	nd	nd
179154	nd	nd	nd	nd	nd	nd	nd
179155	nd	nd	nd	nd	nd	bdl	nd
179156	nd	nd	nd	nd	nd	nd	nd
179157	nd	nd	0.38	nd	nd	nd	nd
179158	nd	nd	0.56	nd	nd	nd	nd
179159	nd	nd	0.60	nd	nd	nd	nd
179160	nd	nd	0.37	nd	nd	nd	nd
179161	nd	nd	nd	nd	nd	nd	nd
179162	nd	nd	bdl	nd	nd	nd	nd
179163	nd	nd	nd	nd	nd	nd	nd
179164	nd	nd	0.01	nd	nd	nd	nd
179165	nd	nd	nd	nd	nd	nd	nd
179166	nd	nd	nd	nd	nd	nd	nd
179167	nd	nd	nd	nd	nd	nd	nd
179168	nd	nd	nd	nd	nd	bdl	nd
179169	nd	nd	nd	nd	nd	nd	nd
179170	nd	nd	nd	nd	nd	nd	nd
179171	nd	nd	nd	nd	nd	nd	nd

No mdl is available for summed combinations of analytes. In summed columns (eg., BTEX), the reported values should be considered ESTIMATED if any of th ividual compounds were reported as bdl.

ANNEX C
DSS Site 276
Soil Sample Data Validation Results

RECORDS CENTER CODE: ER/1295/DSS/DAT

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Soil Sampling
PROJECT/TASK: 7223_02.03.02
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1089/CF032-03
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 9/25/2002

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	BY
605728	GEL	67794A		10/24/2002	X	X	JAC
605729	GEL	67794B		10/24/2002	X	X	JAC

	NAME	DATE
CORRECTIONS REQUESTED/RECEIVED:	W. Palencia	11/14/02
PROBLEM #:	5306	11/8/02
REVIEW COMPLETED BY/DATE:	W. Palencia	11/14/02
FINAL TRANSMITTED TO/DATE:	Sanders	11/14/02
SENT TO VALIDATION BY/DATE:	Conn	11/21/02
RUSH VALIDATION REQUIRED EST. TAT:	☐	
VALIDATION COMPLETED BY/DATE:	N	12/04/02
TO ERDMS OR RECORDS CENTER BY/DATE:	Gana Conn	Hartor 12/19/02

COMMENTS:

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2

Internal Lab

Batch No. N/A

SMO Use

AR/COC 605728

Dept. No./Mail Stop:	8135/1089	Date Samples Shipped:	9-25-02	Project/Task No.:	7223.02.03.02
Project/Task Manager:	Mike Sanders	Carrier/Waybill No.	13884	SMO Authorization:	
Project Name:	DSS soil sampling	Lab Contact:	Edie Kent 803-556-8171	Contract #: PO 21671	
Record Center Code:	ER/1295/DSS/DAT	Lab Destination:	GEL	SOW ATTACHED BOTH ORDER	
Logbook Ref. No.:	ER 090	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF032-03 04	Send Report to SMO:	Wendy Palencia/505-844-3132		
Location	Tech Area				
Building 6710,803,829	Room			Reference LOV(available at SMO)	67794

☐ 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

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
059903-001	6710/1034-SP1-BH1-14 -S	14'	1034	9-19-02/1115	S	AS	4oz	4c	G	SA	VOC(8260B)	001
059904-001	6710/1034-SP1-BH1-19 -S	19'		1150	S	AS	4oz	4c	G	SA	VOC(8260B)	02
059903-002	6710/1034-SP1-BH1-14 -S	14'		1120	S	AG	500ml	4c	G	SA	see below for parameter	12
059904-002	6710/1034-SP1-BH1-19 -S	19'		1155	S	AG	500ml	4c	G	SA	see below for parameter	13
059905-001	803/1052-SP1-BH1-22 -S	22'	1052	1455	S	AS	4oz	4c	G	SA	VOC(8260B)	03
059906-001	803/1052-SP1-BH1-27 -S	27'		1535	S	AS	4oz	4c	G	SA	VOC(8260B)	04
059905-002	803/1052-SP1-BH1-22 -S	22'		1500	S	AG	500ml	4c	G	SA	see below for parameter	14
059906-002	803/1052-SP1-BH1-27 -S	27'		1540	S	AG	500ml	4c	G	SA	see below for parameter	15
059907-001	829X/276-SP1-BH1-8 -S	8'	276	9-24-02/1350	S	AS	4oz	4c	G	SA	VOC(8260B)	05
059908-001	829X/276-SP1-BH1-13 -S	13'		1410	S	AS	4oz	4c	G	SA	VOC(8260B)	06

RMMA	☐ Yes ☑ No Ref. No.	Sample Tracking	Smo Use
Sample Disposal	☐ Return to Client ☑ Disposal by lab	Date Entered(mm/dd/yy)	
Turnaround Time	☑ Normal ☐ Rush	Entered by:	
Return Samples By:	Level of Rush:	QC Inits.	

Special Instructions/QC Requirements
EDD ☑ Yes ☐ No
Level C Package ☑ Yes ☐ No
*Send report to: Mike Sanders
Dept6135/MS/1089
Phone/505-284/2478
*Please list as separate report.

SVOC(8270C_
PCB(8082)HE(8330)
Total Cyanide(9010)
Cr6+(7197)
RCRA metals(6020, 7000,7471)Gross alpha-beta(900)

Abnormal Conditions on Receipt

Lab Use 4°C

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	J.Lee			Weston/6135/505-284-3309
	[illegible]			[illegible]
	G.Quintana			Shaw/6135/505-284-3309

[illegible]		Org.		Date		Time			
1. Received by		Org.		Date	9-25-02	Time	0915		
2.Relinquished by		Org.		Date	9-25-02	Time	1030		
2. Received by		Org.		Date	9/26/02	Time	0845		
3.Relinquished by		Org.		Date		Time			
3. Received by		Org.		Date		Time			

4.Relinquished by	Org.	Date	Time
4. Received by	Org.	Date	Time
5.Relinquished by	Org.	Date	Time
5. Received by	Org.	Date	Time
6.Relinquished by	Org.	Date	Time
6. Received by	Org.	Date	Time

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

AR/COC 605728

Project Name:		Project/Task Manager:		Project/Task No.: 7220.02.03.02								
Location	Tech Area											
Building	Room	Reference LOV (available at SMO) 67794%										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
059907-002	829X/276-SP1-BH1-8-S	8'	276	9-24-02/1335	S	AG	500ml	4c	G	SA	see below for parameter	
059908-002	829X/276-SP1-BH1-13-S	13'		1415	S	AG	500ml	4c	G	SA	see below for parameter	
059909-001	829X/276-SP1-BH1-8-DU	8'		1400	S	AS	4oz	4c	G	SA	VOC(8260B)	
059910-001	829X/276-SP1-BH1-8-DU	8'		1400	S	AG	500ml	4c	G	SA	see below for parameter	
059911-001	829X/276-SP1-BH1-TB	N/A		1425	DIW	G	3x40ml	HCL	G	TB	VOC(8260B)*	
059926-001	829X/276-SP1-EB			9-25-02/0745	L	G	3x40ml	HCL	G	EB	VOC(8260B)	
059926-002	829X/276-SP1-EB			0750	L	AG	2x1lt	4c	G	EB	SVOC(8270C)	
059926-003	829X/276-SP1-EB			0755	L	AG	2x1lt	4c	G	EB	PCB(8081)	
059926-004	829X/276-SP1-EB			0800	L	AG	2x1lt	4c	G	EB	HE(8330)	
059926-005	829X/276-SP1-EB			0805	L	P	1 lt	NaOH	G	EB	Total Cyanide(9010)	
059926-006	829X/276-SP1-EB			0810	L	P	500ml	4c	G	EB	Hex.Chromium(7196)	
059926-007	829X/276-SP1-EB			0815	L	P	500ml	HNO3	G	EB	RCRA metals(6010,7470)	
059926-008	829X/276-SP1-EB			0820	L	P	1 lt	HNO3	G	EB	Gross Alpha/Beta(900)	
059927-001	829X/276-SP1-TB	N/A		0825	DIW	G	3x40ml	HCL	G	TB	VOC(8260B)	

67798%

Abnormal Condition Upon Receipt

Recipient Initials

LAB USE

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 1

Internal Lab

Batch No. N/A

SMO Use

AR/COC 605729

Dept. No./Mail Stop:	6135/1089	Date Samples Shipped:	9-25-02	Project/Task No.:	7223.02.03.02
Project/Task Manager:	Mike Sanders	Carrier/Waybill No.	13884	SMO Authorization:	DF Fax SMO
Project Name:	DSS soil sampling	Lab Contact:	Edie Kent 803-556-8171	Contract #: PO 21671	
Record Center Code:	ER/1295/DSS/DAT	Lab Destination:	GEL	SEE ATTACHED BOTTLE ORDER	
Logbook Ref. No.:	ER 090	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF032-03	Send Report to SMO:	Wendy Paloncio/505-844-3132		
Location	Tech Area 915				
Building 915-922	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) 677948

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
059912-001	915-922/1003-SP1-BH1-27-S	27'	1093	9-24-02/0835	S	AS	4oz	4c	G	SA	VOC(8260B)	08
059913-001	915-922/1003-SP1-BH1-33-S	33'	↑	0925	S	AS	4oz	4c	G	SA	VOC(8260B)	09
059912-002	915-922/1003-SP1-BH1-27-S	27'	|	0840	S	AG	500ml	4c	G	SA	see below for parameter	19
059913-002	915-922/1003-SP1-BH1-33-S	33'	|	0930	S	AG	500ml	4c	G	SA	see below for parameter	20
059914-001	915-922/1003-SP2-BH1-26-S	26'	|	1100	S	AS	4oz	4c	G	SA	VOC(8260B)	10
059915-001	915-922/1003-SP2-BH1-31-S	31'	|	1130	S	AS	4oz	4c	G	SA	VOC(8260B)	11
059914-002	915-922/1003-SP2-BH1-26-S	26'	|	1105	S	AG	500ml	4c	G	SA	see below for parameter	21
059915-002	915-922/1003-SP2-BH1-31-S	31'	|	1135	S	AG	500ml	4c	G	SA	see below for parameter	22
059916-001	915-922/1003-SP2-TB	N/A	↓	1145	DIW	G	3x40ml	HCL	G	TB	VOC(8260B)	004

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush

Return Samples By: Level of Rush:

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: Mike Sanders
Dept6135/MS/1089
Phone/505-284/2478
SVOC(8270C_ PCB(8082)HE(8330) Total Cyanide(9010) Cr6+(7197) RCRA metals(6020, 7000,7471)Gross alpha-beta(900)
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	J.Lee			Weston/6135/505-284-3309
	~~W.Gibson~~			~~MBM/6133/505-843-3287~~
	G.Quintana			Shaw/6136/505-284-3309

1.Relinquished by		Org. 6135	Date 9-25-02	Time 0915	4.Relinquished by	Org.	Date	Time
1. Received by		Org. 6132	Date 9-25-02	Time 0915	4. Received by	Org.	Date	Time
2.Relinquished by		Org. 6135	Date 9-25-02	Time 1030	5.Relinquished by	Org.	Date	Time
2. Received by		Org. GEL	Date 9/26/02	Time 0945	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

Sample Findings Summary

Site: DSS soil sampling | ARCOC: 605728, 605729 | Data: Organic, Inorganic and Radiochemistry

Sample ID	VOC(8260)	SVOC (8270)	129-00-0 (pyrene)	117-81-7 (bis(2-ethylhexyl)phthalate)	191-24-2 (benzo(g,h,i)perylene)	PCBs (8082)	All HE(8330) compounds	479-45-8 (tetryl)	Metals	7782-49-2 (selenium)	7440-38-2 (arsenic)	7440-47-3 (chromium)	7439-92-1 (lead)	General Chemistry	18540-29-9 (hexavalent chromium)	Radiochemistry
059926-004 829X/276-SP1-EB							P2	R,P2								
059926-006 829X/276-SP1-EB															UJ, HT	
059926-007 829X/276-SP1-EB												J, B				
059903-002 6710/1034-SP1-BH1-14-S	All QC acceptance criteria were met. No data will be qualified.		J			All QC acceptance criteria were met. No data will be qualified.					J	J	J		UJ, A2	All QC acceptance criteria were met. No data will be qualified.
059904-002 6710/1034-SP1-BH1-19-S				333UJ,B								J	J			
059905-002 803/1052-SP1-BH1-22-S			J	333UJ,B							J	J	J			
059906-002 803/1052-SP1-BH1-27-S			J	333UJ,B	J					J, B3		J	J			
059907-002 829X/276-SP1-BH1-8-S				333UJ,B								J	J			
059908-002 829X/276-SP1-BH1-13-S				333UJ,B						J, B3	J	J	J			
059910-002 829X/276-SP1-BH1-8-DU				333UJ,B								J	J			
059912-002 915-922/1003-SP1-BH1-27-S										J, B3	J	J	J			
059913-002 915-922/1003-SP1-BH1-33-S			J	333UJ,B							J	J	J			
059914-002 915-922/1003-SP2-BH1-26-S				333UJ,B							J	J	J			
059915-002 915-922/1003-SP2-BH1-31-S				333UJ,B							J	J	J			

Validated By: K Mal

Date: 12/04/02

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MEMORANDUM

DATE: 12/04/02

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC # 605728, 605729
GEL SDG # 67794 and 67798
Project/Task No. 7223.02.03.02

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 6010 (ICP-AES metals), SW-846 7471/7470 (Hg), SW-846 9012A (total CN) and SW-846 7196A (hexavalent chromium).
Problems were identified with the data package that resulted in the qualification of data.

ICP-AES – Metals Batch # 204452 (Samples 67794-012 through –022)
Selenium was detected in the CCB at a value > DL but < RL. The sample results for 67794-015, -017 and –019 were detect, < 5X the blank value and will be qualified "J, B3".

Sample 67794-012 had an arsenic value < 5X RL. The difference between the sample result and the duplicate result was > RL. All associated sample results were < 5X RL (excluding 67794-013, -015, -016 and –018) and will be qualified "J".

The duplicate RPD for chromium (40%) and lead (45%) was > QC acceptance criteria (35%). All associated sample results were > 5X RL and will be qualified "J".

ICP-AES – Metals Batch # 204455 (Sample 67798 –010)
Chromium was detected in the MB at a value > DL but < RL.
Sample 67798 –010 had a value > DL, < RL and < 5X the blank value and will be qualified "J, B".

Hexavalent Chromium - Batch #205618 (Sample 67794-012)
The MS %R (63/71%) were < QC acceptance criteria (75-125%). Sample 67794-012 was non-detect and will be qualified "UJ, A2".

Hexavalent Chromium – Batch # 204193 (Sample 67798-009)
Sample 67798-009 was received by the laboratory and analyzed after the holding time had expired but within 2X the holding time. The sample result was non-detect and will be qualified "UJ, HT".

Data are acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times/Preservation

All Analyses: The samples were analyzed within the prescribed holding time and properly preserved except as mentioned above in the summary section and as follows:

Sample 67794-015 was received in a broken container in a Ziploc bag. It is not known what affect this will have on the data and therefore, no data will be qualified.

Calibration

All Analyses: The initial and continuing calibration data met QC acceptance criteria.

Blanks

All Analyses: All blank criteria were met except as mentioned above in the summary section and as follows:

ICP-AES – Metals Batch # 204452 (Samples 67794-012 through –022)
Selenium was detected in the CCB at a value > DL but < RL. All associated sample results (excluding 67794-015, -017 and –019) were non-detect and will not be qualified.

Chromium was detected in the EB at a value > DL but < RL. All associated sample results were > 5X the blank values and will not be qualified.

ICP-AES – Metals Batch # 204455 (Sample 67798 –010)
Barium, cadmium and arsenic were detected in the CCB at values > DL but < RL. The sample results were non-detect and will not be qualified.

Hexavalent Chromium – Batch # 204193 (Sample 67798-009)
Hexavalent chromium was detected in the CCB at a value > DL but < RL. The sample result was non-detect and will not be qualified.

Total Cyanide – Batch # 206136 (Sample 67794-022)
Total cyanide was detected in the MB at a value > DL but < RL. The sample result was non-detect and will not be qualified.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analyses

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

Matrix Spike (MS) Analysis

All Analyses: The MS met QC acceptance criteria except as mentioned above in the summary section and as follows:

ICP-AES – Metals Batch # 204455 (Sample 67798 –010)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

CVAA-Hg Batch # 204420 (Sample 67798-010)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

Total Cyanide (Batch #205123) and Hexavalent Chromium (Batch # 205618/204193)
The sample used for the MS was of similar matrix from another SNL SDG. No data will be qualified as a result.

Replicate Analysis

All Analyses: The replicate analysis met QC acceptance criteria except as mentioned above in the summary section and as follows:

ICP-AES – Metals Batch # 204452 (Samples 67794-012 through –022)
Sample 67794-012 had an arsenic value < 5X RL. The difference between the sample result and the duplicate result was > RL. Sample 67794-013, -015, -016 and –018 had values > 5X RL and will not be qualified.

ICP-AES – Metals Batch # 204455 (Sample 67798 –010)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

CVAA-Hg Batch # 204420 (Sample 67798–010)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

Total Cyanide (Batch #205123) and Hexavalent Chromium (Batch # 205618/204193)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified as a result.

ICP Interference Check Sample (ICS)

ICP-AES (All batches): The ICS-AB met QC acceptance criteria.

All Other Analyses: No ICS required.

ICP Serial Dilution

ICP-AES (All batches): The serial dilution met QC acceptance criteria.

ICP-AES – Metals Batch # 204455 (Sample 67798 –010)
The sample used for the serial dilution was of similar matrix from another SNL SDG. No data will be qualified as a result.

All Other Analyses: No serial dilutions required.

Detection Limits/Dilutions

All Analyses: All detection limits were properly reported.

ICP-AES: All soil samples were diluted 2X.

All Other Analyses: No dilutions were performed.

Other QC

All Analyses: An equipment blank and a field duplicate were submitted on the ARCOC. There is however no "required" procedures for validating a field duplicate. No field blank was submitted on the ARCOC.

It should be noted that the COC requested that metals be analyzed by method SW-846 6020.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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MEMORANDUM

DATE: 12/03/02

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC # 605728, -729 GEL SDG # 67794, -98
Project/Task No. 7223.02.03.02

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 8260A/B (VOC), 8270C (SVOC), 8082 (PCBs) and 8330 (HEs). Problems were identified with the data package that resulted in the qualification of data.

SVOC – Batch # 204423 (Sample 67794-012 through –022)
The initial calibration had a correlation coefficient < 0.99 but > 0.90 for pyrene (0.982). Sample 67794-012, -014, -015 and –020 had pyrene values > DL and will be qualified "J".

The CCV had a %D > 40% with a positive bias for bis(2-ethylhexyl)phthalate. All associated sample results (excluding sample 67794-012 and –19) had values > DL and will be qualified "J".
The CCV had a %D > 20% with a positive bias for benzo(g,h,i)perylene (22%). Sample 67794-015 had a value > DL and will be qualified "J".

The MB had a bis(2-ethylhexyl)phthalate value > DL but < RL. All associated sample results (excluding sample 67794-012 and –19) had values > DL , < RL and < 10X the blank value and will be qualified "U, B" at the RL.

HE - Batch # 205512 (Sample 67798-007)
No MSD, LCSD or replicate was extracted with this batch. As there is no measure of precision all the sample results will be qualified "P2".
The sample had a value for tetryl > DL but < RL. The confirmation RPD was > 75% and therefore the sample result will be qualified "R".

Data are acceptable and QC measures appear to be adequate. The following sections discuss the data review and validation.

Holding Times/Preservation

All Analysis: The samples were properly preserved and analyzed within the method prescribed holding time except as follows:

VOC
It should be noted that the sample Review and Receipt form indicated that the VOC containers/vials had headspace. It is not known what affect this will have on the samples and therefore, no data will be qualified.

SVOC, PCBs and HE
Sample 67794-015 was received in a broken container in a Ziploc bag. It is not known what affect this will have on the data and therefore, no data will be qualified.

Calibration

All Analysis: All initial and continuing calibration acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC Batch # 204483
Vinyl acetate had %D > 20% but < 40% in all the CCVs preceding the samples. All associated sample results were non-detect and no data will be qualified.
Carbon disulfide had %D > 20% but < 40% in the CCV preceding sample 67794-006. The sample result was non-detect and no data will be qualified.

VOC Batch # 204910
Carbon disulfide had %D > 20% but < 40% in the CCV preceding the samples. All associated sample results were non-detect and no data will be qualified.

SVOC – Batch # 204423 (Sample 67794-012 through –022)
The initial calibration had a correlation coefficient < 0.99 but > 0.90 for pyrene (0.982). All associated sample results (excluding sample 67794-012, -014, -015 and –020) were non-detect and will not be qualified.

The CCV had a %D > 40% but < 60% with a positive bias for bis(2-ethylhexyl)phthalate (40.4%). Sample 67794-012 and –19 were non-detect and unaffected by a positive bias. No data will be qualified.
The CCV had a %D > 20% with a positive bias for benzo(g,h,i)perylene (22%). All associated sample results (excluding 67794-015) were non-detect and unaffected by a positive bias. No data will be qualified.
Several other compounds in the CCV preceding the samples had a %D > 20% but < 40% (see DV worksheet). All associated sample results were non-detect and no data will be qualified.

SVOC - Batch # 204661 (Sample 67798-005)
The initial calibration had a correlation coefficient < 0.99 but > 0.90 for pyrene (0.982). The sample result was non-detect and will not be qualified.

The CCV had a %D > 40% but < 60% with a positive bias for bis(2-ethylhexyl)phthalate (51%). Several other compounds in the CCV preceding the samples had a %D > 20% but < 40% (see DV worksheet). The sample results were non-detect and no data will be qualified.

Blanks

All Analysis: 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 # 204483
Sample 67798-004 (TB) had a 1,2-dichloropropane value > DL but < RL. All associated sample results were non-detect and no data will be qualified.

SVOC – Batch # 204423 (Sample 67794-012 through –022)
The MB had a bis(2-ethylhexyl)phthalate value > DL but < RL. Sample 67794-012 and –019 were non-detect and will not be qualified.
The EB had a diethylphthalate value > DL but < RL. All associated sample results were non-detect and no data will be qualified.

Surrogates

All Analysis: All surrogate acceptance criteria were met.

Internal Standards (ISs)

All Analysis: All internal standard acceptance criteria were met.

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

All Analysis: All MS/MSD acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC Batch # 204910
No MS/MSD was reported for this batch. The LCS/LCSD met all QC acceptance criteria for accuracy and precision. No data will be qualified.

SVOC – Batch # 204423 and 204661
Several compounds (see DV worksheet) had %R < QC acceptance criteria (75 – 125%). Using professional judgment, no data will be qualified.

SVOC - Batch # 204661
It should be noted that only 500ml (DF=2x) of sample was used for the MS/MSD. It is not known what affect this would have on the extraction procedure and no data will be qualified.

PCB Batch # 204654
It should be noted that the sample used for the MS/MSD was of similar matrix from another SNL SDG. Only 500ml (DF=2x) of sample was used for the MS/MSD. It is not known what affect this would have on the extraction procedure. No data will be qualified.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analysis: The LCS/LCSD acceptance criteria were met with the following exceptions:

VOC Batch # 204483 and 204910
The QC acceptance criteria for the LCS were met by the successful analysis of a second source CCV.
It should be noted that no compound was associated with internal standard 1,4-dichlorobenzene-d4. No data will be qualified as a result.

SVOC – Batch # 204423 and 204661
It should be noted that no compound was associated with internal standard perylene-d12. No data will be qualified as a result.

HE - Batch # 205512 (Sample 67798-007 (EB))
The LCS %R was slightly below QC acceptance criteria for 3-nitrotoluene and 4-nitrotoluene (see DV sheet). However, a MS was performed on sample 67798-007 and all the %Rs were in criteria. There was no more sample remaining to perform a re-extraction. Using professional judgment, no data will be qualified.

Detection Limits/Dilutions

All Analysis: All detection limits were properly reported. Samples were not diluted.

Confirmation Analyses

VOC and SVOC: No confirmation analyses required.

PCB: All confirmation acceptance criteria were met.

HE – Batch # 204696(Sample 67794-012 through –022)
The sample results were non-detect and therefore no confirmation analysis was required.

Other QC

VOC: A trip blank, equipment blank and a field duplicate were submitted on the ARCOC. There is no "required" validation procedure for assessing field duplicates.
It should be noted that vinyl acetate is on the TAL for soils but not for waters.

SVOC, PCB and HE: An equipment blank and a field duplicate were submitted on the ARCOC. There is no "required" validation procedure for assessing field duplicates.
No field blank was submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

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MEMORANDUM

DATE: December 04, 2002

TO: File

FROM: Linda Thal

SUBJECT: Radiochemical Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC 605728 and 605729
GEL SDG # 67794 and 67798 Project/Task No. 7223.02.03.02

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. This validation was performed according to SNL/NM ER Project AOP 00-03.

Summary

All samples were prepared and analyzed with approved procedures using method EPA 900.0 (Gross Alpha/Beta). No problems were identified with the data package that resulted in the qualification of data.

Data are acceptable and 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 prescribed holding times and properly preserved with the following exception:

> Sample 67794-015 was received in a broken container in a Ziploc bag. It is not known what affect this will have on the data and therefore, no data will be qualified.

Calibration

All Analyses: The case narrative stated the instruments used were properly calibrated.

Blanks

No target analytes were detected in the method blank or equipment blank at concentrations > the associated MDAs.

Matrix Spike (MS) Analysis

The MS/MSD analyses met all QC acceptance criteria.

Batch # 204950 (Sample 67798-011)
The sample used for the MS/MSD was of similar matrix from another SNL SDG. No data will be qualified.

Laboratory Control Sample (LCS) Analysis

The LCS analyses met all QC acceptance criteria.

Replicates

The replicate analyses met all QC acceptance criteria.

Batch # 204950 (Sample 67798-011)
The sample used for the replicate was of similar matrix from another SNL SDG. No data will be qualified.

Tracer/Carrier Recoveries

No tracer/carrier required.

Negative Bias

All sample results met negative bias QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported. No samples were diluted.

Other QC

An equipment blank and a field duplicate were submitted on the ARCOC. There are no "required validation procedures for a field duplicate. No field blank was submitted on the ARCOC.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS Soil Sampling Project/Task #: 7223.02.03.02 # of Samples: 22 & 11 Matrix: Soil & H2O

AR/COC #: 605728, 605729 Laboratory Sample IDs: 67794 - 001 thru - 022

Laboratory: GEL 67798 - 001 thru - 011

Laboratory Report #: 67794

QC Element	Analysis										
	Organics				Inorganics				RAD		Other (Hexavalent Chromium)
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN			
1. Holding Times/Preservation	✓	✓	✓	✓	✓	NA	✓	✓	✓		✓ / UJ, H1
2. Calibrations	✓	J / ✓	✓	✓	✓		✓	✓			✓
3. Method Blanks	✓	U, B / ✓	✓	✓	J, B3 / J, B		✓	✓			✓
4. MS/MSD	✓	✓	✓	✓ / P2	✓		✓	✓			UJ, A2 / ✓
5. Laboratory Control Samples	✓	✓	✓	✓	✓		✓	✓			✓
6. Replicates					J / ✓		✓	✓			✓
7. Surrogates	✓	✓	✓	✓							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	EB TB DUP	EB DUP	EB DUP	EB DUP	EB DUP		EB DUP	EB DUP	EB DUP		EB DUP

15 received broken inside ziploc bag

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: 10.04.02

Holding Time and Preservation

Site/Project: DSS soil sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67794 - ~~012~~ 001 thru - 022

Laboratory: GEL Laboratory Report #: 67794 67798 - 001 thru - 011

# of Samples: 22 & 11 Matrix: Soils & H2O

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
67798 - 009	SW- 8346 7196A	24 hours	6 hours 10'	NA	NA	UJ, HT
			9.25 8:10 9.26 14:20			

Reviewed By: R Thal Date: 12.04.02

NJ 10 soils

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS soil sampling AR/COC #: 605728, -29 # of Samples: 11 Matrix: Soils

Laboratory: GEL Laboratory Report #: 67794 Laboratory Sample IDs: 67794 - 001 thru -011

Methods: SW-846 8260A Batch #s: 204483

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20%/ 0.99	CCV %D 20% a 3	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	SB7 Field Dup. RPD	67798-002 Equip. Blanks	67798 001&003 Trip Blanks	67798 -004 TB SA B→11
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						✓			✓	✓	✓				
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															0.267J
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	✓	✓	✓												
1	71-43-2	benzene		0.50						✓			✓	✓	✓				
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				24											
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		.280 *3				✓			✓	✓	✓				
1	75-01-4	vinyl chloride		0.10															
2	1330-20-7	xylenes(total)		0.30															
	cis-	1,2 - Dichloroethene																	
	trans-	1,2 Dichloroethene																	

Comments: Vinyl acetate (soils only)

Notes: Shaded rows are RCRA compounds -26 -27

Reviewed By: [signature] Date: 12.03.02

CCV/LCS same for

According to sample rcv & receipt form, the VOA vials B-18 had headspace. COC 728 & 729

WS 1 of 2

Volatile Organics

Site/Project: _____ AR/COC #: 605728, -29 Batch #s: _____

Laboratory: _____ Laboratory Report #: _____ # 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
IN CRITERIA									

SMC 1: 4-Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

IS 1: Fluorobenzene
IS 2: Chorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments:

9.27 CCV ① & LCS 8.11 SA 1-11 (excl. 6)

9.27 CCV ② & LCS 20.15 Carbon Disulfide & MS/MSD Vinyl Acetate >20%

9.30 CCV ③ & LCS 8.08 SA 6

WS 2 of 2 (TBs & EB)

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Soil Sampling AR/COC #: 605728, -29 # of Samples: 4 Matrix: H2O

Laboratory: GEL Laboratory Report #: 67794 Laboratory Sample IDs: 67798 - 001 thru - 004

Methods: SW-846 8260B Batch #s: 204910

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%												
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	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	✓	✓	✓													
1	71-43-2	benzene		0.50						✓	✓	✓								
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				-20.6												
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		.288 = 3				✓	✓	✓								
1	75-01-4	vinyl chloride		0.10		✓														
2	1330-20-7	xylenes(total)		0.30																
	trans -	1,2 - dichloroethene																		
	cis -	1,2 - dichloroethene																		

Comments: No MS/MSD not reqd.
CCV & LCS same file

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 12.03.02

Volatile Organics

Site/Project: _____ AR/COC #: 605728, -29 Batch #s: _____

Laboratory: _____ Laboratory Report #: _____ # 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
IN CRITERIA									

SMC 1: 4-Bromofluorobenzene
SMC 2: Dibromofluoromethane
SMC 3: Toluene-d8

IS 1: Fluorobenzene
IS 2: Chorobenzene-d5
IS 3: 1,4-Dichlorobenzene-d4

Comments:

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DSS soil sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67794-012 thru 022

Laboratory: GEL Laboratory Report #: 67794 67798-005 (EB)

Methods: SW-846 8270C 1 2

# of Samples: 11 Matrix: SOILS Batch #s: 20H423 20H661 (EB)

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	16818 Field Dup. RPD	67798-005 Equip. Blanks	Field Blanks	2	2	2
						1&2	>.05 1&2	<20%/ .0892	20% 2	1 2	1	2		1	1	1				MS	MSD	DUP
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓	✓ ✓	✓ ✓	✓	✓	NA	✓	✓	✓	✓	✓	NA	✓	✓	✓
1	BN	95-50-1	1,2-Dichlorobenzene		0.40																	
1	BN	541-73-1	1,3-Dichlorobenzene		0.60																	
1	BN	106-46-7	1,4-Dichlorobenzene		0.50						✓	✓		✓	✓	✓				✓	✓	✓
3	A	95-95-4	2,4,5-Trichlorophenol		0.20																	
3	A	88-06-2	2,4,6-Trichlorophenol		0.20						✓	✓		73	✓	✓				✓	✓	✓
2	A	120-83-2	2,4-Dichlorophenol		0.20						✓	✓		✓	✓	✓				✓	✓	✓
2	A	105-67-9	2,4-Dimethylphenol		0.20				-21													
3	A	51-28-5	2,4-dinitrophenol		0.01	✓	✓	.991	✓													
3	BN	121-14-2	2,4-Dinitrotoluene		0.20			✓			✓	✓		✓	✓	✓				✓	✓	✓
3	BN	606-20-2	2,6-Dinitrotoluene		0.20																	
3	BN	91-58-7	2-Chloronaphthalene		0.80																	
1	A	95-57-8	2-Chlorophenol		0.80						✓	✓		✓	✓	✓				✓	✓	✓
2	BN	91-57-6	2-Methylnaphthalene		0.40																	
1	A	95-48-7	2-Methylphenol (o-cresol)		0.70						✓	✓		70	72	✓				65	70	✓
3	BN	88-74-4	2-Nitroaniline		0.01	✓	✓	.987* .99														
2	A	88-75-5	2-Nitrophenol		0.10			✓														
5	BN	91-94-1	3,3'-Dichlorobenzidine		0.01																	
3	BN	99-09-2	3-Nitroaniline		0.01	✓	✓	✓	20													
4	A	534-52-1	4,6-Dinitro-2-methylphenol		0.01	✓	✓	.989* .95	✓													
4	BN	101-55-3	4-Bromophenyl-phenylether		0.10			✓	+24 +24													
3	BN	7005-72-3	4-Chlorophenyl-phenylether		0.40				✓ ✓													
2	A	59-50-7	4-Chloro-3-methylphenol		0.20				✓		✓	✓		✓	✓	✓				✓	✓	✓
2	BN	106-47-8	4-Chloroaniline		0.01				-21													
1	A	106-44-5	4-Methylphenol (p-cresol)		0.60				✓													

Comments: m/p-cresol ✓

Notes: Shaded rows are RCRA compounds. 64 72 ✓

Reviewed By: Khal Date: 10.03.02

Semivolatile Organics

Site/Project: _____ AR/COC #: 605728, -29 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	MS	MSD	RPD
							>.05	<20% / 0.99	20%	1 2										d	d	d
3	BN	100-01-6	4-Nitroaniline	✓	0.01	✓	✓	✓	-33 ✓	✓ ✓			NA				✓	✓	NA			
3	A	100-02-7	4-Nitrophenol		0.01				-24 -22		✓	✓		✓	✓	✓				✓	✓	✓
3	BN	83-32-9	Acenaphthene		0.90				✓ ✓		✓	✓		✓	✓	✓				✓	✓	✓
3	BN	208-96-8	Acenaphthylene		0.90																	
4	BN	120-12-7	Anthracene		0.70																	
5	BN	56-55-3	Benzo(a)anthracene		0.80																	
6	BN	50-32-8	Benzo(a)pyrene		0.70	✓	✓	✓														
6	BN	205-99-2	Benzo(b)fluoranthene		0.70																	
6	BN	191-24-2	Benzo(g,h,i)perylene		0.50				+22 +29													
6	BN	207-08-9	Benzo(k)fluoranthene		0.70	✓	✓	✓	✓ ✓													
2	BN	111-91-1	bis(2-Chloroethoxy)methane		0.30																	
1	BN	111-44-4	bis(2-Chloroethyl)ether		0.70				-20													
1	BN	108-60-1	bis(2-chloroisopropyl)ether		0.01				✓													
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01	✓	✓	✓	+404 +51	84.1J												
5	BN	85-68-7	Butylbenzylphthalate		0.01				+28 +24	✓												
4	BN	86-74-8	Carbazole		0.01				-32 -21													
5	BN	218-01-9	Chrysene		0.70				✓ ✓													
6	BN	53-70-3	Dibenz(a,h)anthracene		0.40	✓	✓	✓														
3	BN	132-64-9	Dibenzofuran		0.80																	
3	BN	84-66-2	Diethylphthalate		0.01													0.87J				
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	✓	✓	.99+ .99														
4	BN	206-44-0	Fluoranthene		0.60			✓														
3	BN	86-73-7	Fluorene		0.90																	
4	BN	118-74-1	Hexachlorobenzene		0.10						✓	✓		✓	✓	✓				✓	✓	✓
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓	✓		71	74	✓				70	✓	✓
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01																	
1	BN	67-72-1	Hexachloroethane		0.30						✓	✓		74	70	✓				72	✓	✓

Comments:

Semivolatile Organics

Site/Project: _____ AR/COC #: 605728, -729 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	LCS B	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	MS	MSD	RPD
						1 2	1 2	<20%/ 1 2	20% 1 2	1 2	1	2		1	1	1				2	2	2
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓		✓ ✓			NA				✓	✓	NA			
2	BN	78-59-1	Isophorone		0.40																	
2	BN	91-20-3	Naphthalene		0.70																	
2	BN	98-95-3	Nitrobenzene		0.20						✓	✓		71	73	✓				69	✓	✓
4	BN	86-30-6	N-Nitrosodiphenylamine (1)		0.01																	
1	BN	621-64-7	N-Nitroso-di-propylamine	✓	0.50						✓	✓		✓	✓	✓				✓	✓	✓
4	A	87-86-5	Pentachlorophenol		0.05	✓	✓	✓			✓	✓		✓	✓	✓				✓	✓	✓
4	BN	85-01-8	Phenanthrene		0.70																	
1	A	108-95-2	Phenol		0.80						✓	✓		✓	✓	✓				✓	✓	✓
5	BN	129-00-0	Pyrene		0.60	✓	✓	.982			✓	✓		✓	✓	✓				✓	✓	✓
			Diphenylamine					✓														

Surrogate Recovery Outliers

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
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)

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)

Comments: 20HH23 MB bis All SA except 12 & 19 333U, B
Pyrene detects 90 J 12, 14, 15, 20
NDs no q.
CCV bis >+40% All tres J ~~NDs~~ LT UJ
15 tre PAHs received broken
benzo ghi perylene tre %D = +22
> DL "J"

20HH61
Pyrene I Cal no q
Bis %D CCV >40 no q
MS/MSD 500mL.

PCBs (SW 846 - Method 8082)

Site/Project: DSS Soil Sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67794 - 012 thru - 022

Laboratory: GEL Laboratory Report #: 67794 67798 - 006 (EB)

Methods: SW-846 8082 , 2

# of Samples: 11 & 1 Matrix: Soils & Water Batch #s: 204381 204654

CAS #	Name	TCL	Intercept	Calib RSD / R^2 ≤20% / 0.99	CCV %D / 20% 2	Method Blanks 1 & 2	LCS 1	LCSD 2	LCS RPD 20%	MS / 2	MSD / 2	MS RPD 20%	76878 Field Dup. RPD	Equip. Blanks	Field Blanks		
12674-11-2	Aroclor-1016	✓	NA	✓ ✓	✓ ✓	✓			NA				✓	✓	NA		
11104-28-2	Aroclor-1221	✓				✓							✓	✓			
11141-16-5	Aroclor-1232	✓				✓							✓	✓			
53469-21-9	Aroclor-1242	✓		✓ ✓	✓	✓							?	✓			
12672-29-6	Aroclor-1248	✓		✓ ✓		✓							✓	✓			
11097-69-1	Aroclor-1254	✓		✓ ✓	✓	✓							?	✓			
11096-82-5	Aroclor-1260	✓		✓ ✓	✓ ✓	✓	✓	✓		✓ ✓	✓ ✓	✓ ✓	✓	✓			

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
IN CRITERIA					

Comments: No new data to ID aroclors

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
IN CRITERIA					

204654 MS/MSD 67821 SVL 504 (only 500 MS)

Reviewed By: KMal Date: 10.03.02

High Explosives (SW 846 Method 8330)

Site/Project: DSS soil sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67794 - 012 thru - 022

Laboratory: GEL Laboratory Report #: 67794 67798 - 007 (EB)

Methods: SW-846 8330 1 2

# of Samples: 11 & 1 Matrix: Soils & H2O Batch #s: 204696 205512 (EB)

CAS #	NAME	T / L	Intercept	Curve R^2 / .99 1 2	CCV %D / 20% 1 2	Method Blanks / U 1 2	LCS 1	LCSD 2	LCS RPD 20%	MS / 1 2	MSD / 1 2	MS RPD / 20% 1 2	Field Dup. RPD	Equip. Blanks U (ug/L)	Field Blanks U
2691-41-0	HMX	✓	NA	✓	✓	✓ ✓	✓	✓	NA	✓ ✓	✓ NA	✓ NA	✓	✓	NA
121-82-4	RDX														
99-35-4	1,3,5-Trinitrobenzene														
99-65-0	1,3-dinitrobenzene														
98-95-3	Nitrobenzene														
479-45-8	Tetryl													0.042 JP.	
118-96-7	2,4,6-trinitrotoluene													✓	
35572-78-2	2-amino-4,6-dinitrotoluene														
1946-51-0	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							72	(73-110)						
99-08-1	3-nitrotoluene							71	(73-110)						
78-11-5	PETN														

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
IN CRITERIA					

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
~~N/A~~					
67798-007	Tetryl	166%			

LT

Comments:

205512
No LCSD, MSD or replicate "P2"

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: 10-04-02

1 of 2 soils

Inorganic Metals

Site/Project: DJJ Soil Sampling AR/COC #: 605728, -29 Laboratory Sample IDs: ~~699~~ 67794 - 012 thru -022

Laboratory: GEL Laboratory Report #:

Methods: SW-846 7471 6010

# of Samples: 11 Matrix: Soil Batch #s: 204140 (Hg) 204152 (Metals)

CAS #/ Analyte	QC Element																			
	ug/l																ug/l			
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	<35% Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	Equip. Blanks	Field Blanks	CCBXS	EBXS
7429-90-5 Al								NA			NA							NA		
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓			
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA	✓	✓			
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓			✓			NO	✓	✓	✓	.773			3.865 ug/l
7440-48-4 Co																				All >
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	✓	✓			
7440-23-5 Na																				
7440-62-2 V					✓															
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			NS	✓	✓	✓	✓			15, 17, 19
7782-49-2 Se	✓	✓	✓	✓	3.06	✓	✓			✓			NA	✓	NA	✓	✓		15.3	
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓			✓			>RL/ ~~ND~~ <35%	✓	NA	✓	✓			<5X
7440-36-0 Sb																				J, B3
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			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

Comments: Dup As sa < 5X RL ∴ RL applies
Diff between sa & dup > RL.
All detects < 5X RL "J"
12, 14, 17, 19, 20, 21, 22
Cr & Pb > 5X RL = "J" 12, 13, 14 ea all sa.

ICP-AES - Soils 2X

Reviewed By: KMal Date: 12-04-02

~~Se in CCB bracketing 12, 13, 14, 15 only~~ ~~ND ND ND <5X J, B3~~ LT
ug/kg → ug/l x 10

WS 2 of 2 FB

Inorganic Metals

Site/Project: DSS soil sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67798-010

Laboratory: GEL Laboratory Report #: 67794

Methods: SW-846 7470 6010B

# of Samples: 1 Matrix: Aqueous Batch #s: 204420 (Hg) 204455 (Metals)

CAS # / Analyte	QC Element																			
					ug/l	ug/l														
	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		
7429-90-5 Al								NA			NA					NA				
7440-39-3 Ba	✓	✓	✓	✓	.429	✓	✓			✓			NA	✓	NA					
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	.343	✓	✓			✓			NA	✓	NA					
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	.567	✓			✓			NA	✓	NA				SA C	SX MB J,B
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					
7440-23-5 Na																				
7440-62-2 V																				
7440-66-6 Zn																				
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓			✓			1	✓	1					
7440-38-2 As	✓	✓	✓	✓	4.0	✓	✓			✓				✓						
7440-36-0 Sb																				
7440-28-0 Tl																				
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			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

Comments: DUP MS SD 204455
67821 SNA

DUP MS 204420
67354 SNA

Reviewed By: [signature] Date: 12.04.02

General Chemistry

Site/Project: DSS soil sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67794-012 thru -022

Laboratory: GEL Laboratory Report #: 67794 67798-008 (TCN EB) 67798-009 (Cr6+ EB)

Methods: SW-846 9012A (TCN) 7196A (Cr6+) 205981 (EB) 204193 (EB)

# of Samples: 11 Matrix: Soils

Batch #s: 205123 (TCN) 012 → 021; 205618 (Cr6+) -012; 206136 (TCN-022); 205620 (Cr6+ 018 → 022)

	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	
205981 67798-008		Total Cyanide		✓	✓	✓	✓	✓	✓	✓	✓	✓	NA		NA	→				→	
205123 67794-012 → 021				✓	✓	✓	✓	✓	✓	NA		✓ ✓			NA NA	NA	NA	✓	✓	NA	
206136 67794-022				✓	✓	✓	✓	.0883 J mg/kg	✓			✓			NA	→	→	✓	✓	NA	MBx5 = 0.4415 SA ND
204193 67798-009		Hexavalent Chromium		✓	✓	✓	.006 mg/L	✓	✓			✓			NA	→				→	SA ND
205618 67794-012 → 021 LT				✓	✓	✓	✓	✓	✓			*✓ ✓ 63/71			NA NA	→	→	✓	✓	NA	
205620 018 → 67794-022				✓	✓	✓	✓	✓	✓			✓			NA	→	→	✓	✓	NA	

Comments: 67798-009 > HT UJ HT
NCR # 5078

205123 ∅
205618 : 67601 DUP / MS (SNL)
204193 : 67608 DUP / MS (SNL)

* Falls within GEL's criteria
NCR # 6532

Reviewed By: [signature] Date: 10.04.02

Radiochemistry

Site/Project: ~~DB~~ LT DSS soil sampling AR/COC #: 605728, -29 Laboratory Sample IDs: 67794 - 012 thru - 022

Laboratory: GEL Laboratory Report #: 67794 67798 - 011. (ES)

Methods: EPA 900.0

# of Samples: 11 Matrix: Soils Batch #s: 205013 204950 (ES)

	Analyte	QC Element												
		Method Blanks	LCS	MS/MSD	Rep RER	Equip. Blanks	Field Dup. RER	Field Blanks	Sample ID	Isotope	IS/Trace	Sample ID	Isotope	IS/Trace
	Criteria	U	20%	25%	<1.0	U	<1.0	U	NA		50-105			50-105
	H3													
	U-238													
	U-234													
	U-235/-236													
	Th-232													
	Th-228													
	Th-230													
	Pu-239/-240													
205013	Gross Alpha	✓	✓	✓ ✓	✓	✓	✓	NA						
	Nonvolatile Beta	✓	✓	✓ ✓	✓	✓	✓	NA						
	Ra-226													
	Ra-28													
	Ni-63													
	Gamma Spec. Am-241													
	Gamma Spec. Cs-137					AF LT								
	Gamma Spec. Co-60													
204950	Gross α	✓	✓	✓ ✓	✓	NA	→	→						
	Nonvolatile β	✓	✓	✓ ✓	✓	NA	→	→						

Parameter	Method	Typical Tracer	Typical Carrier
Iso-U	Alpha spec.	U-232	NA
Iso-Pu	Alpha spec.	Pu-242	NA
Iso-Th	Alpha spec.	Th-229	NA
Am-241	Alpha spec.	Am-242	NA
Sr-90	Beta	Y ingrowth	NA
Ni-63	Beta	NA	Ni by ICP
Ra-226	Deamination	NA	NA
Ra-226	Alpha spec.	Ba-133 or Ra-225	NA
Ra-228	Gamma spec.	Ba-133	NA

Gamma spec. LCS contains: Am-241, Cs-137, and Co-60

Comments:

204950 DUP MS/MSD 67169 (SNL)

Reviewed By: [signature] Date: 10-04-02

Contract Verification Review (CVR)

Project Leader COLLINS Project Name DSS SOIL SAMPLING Case No. 7223_02.03.02

AR/COC No. 605728 & 605729 Analytical Lab GEL SDG No. 67794A & B

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	X				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X		HEXAVALENT CHROMIUM SAMPLE #059926-006 RECEIVED PAST HOLDING TIME	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	M-NITROTOLUENE & P-NITROTOLUENE FAILED RECOVERY LIMITS FOR EXPLOSIVES LCS (aq)
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
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	RPDs FOR ARSENIC, CHROMIUM & LEAD FAILED ACCEPTANCE LIMITS
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	BIS(2-ETHYLHEXYL)PHTHALATE DETECTED IN BLANK CHROMIUM DETECTED IN AQUEOUS BLANK CYANIDE DETECTED IN BLANK
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	1,2-DICHLOROPROPANE DETECTED IN TRIP BLANK DIETHYLPHTHALATE DETECTED IN EQUIPMENT BLANK TETRYL DETECTED IN EQUIPMENT BLANK CHROMIUM DETECTED IN 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	X		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	X		

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	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		
4.4 Radiochemistry a) Instrument run logs provided	X		

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
ALL AQUEOUS	VOC	TECHNICAL NARRATIVE ILLEGIBLE (pg. 306-309)
ALL	GROSS ALPHA / BETA	TECHNICAL NARRATIVE ILLEGIBLE (pg. 789-790)
ALL	GROSS ALPHA / BETA	TECHNICAL NARRATIVE ILLEGIBLE (pg. 806-807)

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 5306 and date correction request was submitted: 11-14-2002

Reviewed by: W. Palencia Date: 11-14-2002 Closed by: W. Palencia Date: 11/19/02

ANNEX D
DSS Site 276
Risk Assessment

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DSS SITE 276: RISK ASSESSMENT REPORT

I. Site Description and History

Drain and Septic Systems (DSS) Site 276, the Former Building 829X Silver Recovery Sump, at Sandia National Laboratories/New Mexico (SNL/NM), is located in Technical Area-I on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The former silver recovery sump consisted of a 6-foot-diameter section of metal culvert buried vertically to a depth of 5.5 feet. The sump contained two 55-gallon, steel drums that collected effluent from a film-processing unit. The sump bottom was unlined, and the drums rested on a layer of loose gravel approximately 6 inches in thickness. Available information indicates that Building 829X was constructed in 1948 (SNL/NM September 2004) and the sump was installed in 1978. The building was demolished in 1994, and the soil surrounding the building, under the septic line piping, and under the sump was sampled in December 1994 (IT April 1995). The metal culvert enclosing the abandoned sump and approximately 1.5 feet of underlying soil and gravel aggregate were removed in September 1999 (IT January 2000).

Environmental concern at DSS Site 276 is based upon the potential for the release of constituents of concern (COCs) in aqueous effluent possibly spilled inside the silver recovery sump at this site. Because operational records were not available, the investigation was planned to be consistent with other DSS site investigations and to sample for possible COCs that may have been released during facility operations.

The ground surface in the vicinity of the site is flat or slopes slightly to the northeast. The closest major drainage is Tijeras Arroyo, located approximately 1.3 miles southeast of the site. No springs or perennial surface-water bodies are located within 2.3 miles of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990).

The area surrounding the former sump location is now paved, and surface-water runoff in the vicinity of the site is directed towards storm sewers. Infiltration of precipitation is almost nonexistent as virtually all of the moisture drains away or undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996).

DSS Site 276 lies at an average elevation of approximately 5,410 feet above mean sea level (SNL/NM April 2003). The groundwater beneath the site occurs in both a shallow and regional aquifer in unconfined conditions in essentially unconsolidated silts, sands, and gravels. The depth to the shallow groundwater system, which has limited lateral extent and is present beneath the north-central portion of KAFB, is approximately 265 feet below ground surface (bgs) at the site. The shallow groundwater system is not used as a water supply source. Depth to the regional groundwater aquifer is approximately 555 feet bgs. Both the City of Albuquerque and KAFB use the regional groundwater aquifer as a water supply source. Groundwater flow in the shallow groundwater system is to the southeast, while that in the regional aquifer is to the northwest beneath the site (SNL/NM May 2003). The nearest production wells are KAFB-1, approximately 3,650 feet to the southwest, and KAFB-3, approximately 5,800 feet to the northwest. The nearest regional aquifer groundwater monitoring well is PGS-2, approximately 550 feet west of the site.

II. Data Quality Objectives

The Data Quality Objectives (DQOs) presented in the "Sampling and Analysis Plan [SAP] for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico" (SNL/NM October 1999) and "Field Implementation Plan [FIP], Characterization of Non-Environmental Restoration Drain and Septic Systems" (SNL/NM November 2001) identified the site-specific sample locations, sample depths, sampling procedures, and analytical requirements for this and many other DSS sites. The DQOs outlined the quality assurance (QA)/quality control (QC) requirements necessary for producing defensible analytical data suitable for risk assessment purposes. The sampling conducted at this site was designed to:

- Determine whether hazardous waste or hazardous constituents were released at the site.
- Characterize the nature and extent of any releases.
- Provide analytical data of sufficient quality to support risk assessments.

Table 1 summarizes the rationale for determining the sampling locations at this site. The source of potential COCs at DSS Site 276 was aqueous effluent possibly spilled inside the silver recovery sump at this site.

Table 1
Summary of Sampling Performed to Meet DQOs

DSS Site 276, Sampling Area	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil beneath the silver recovery sump	Effluent discharged to the environment from the sump	1	NA	Evaluate potential COC releases to the environment from effluent discharged from the sump

COC = Constituent of concern.
DQO = Data Quality Objective.
DSS = Drain and Septic Systems.
NA = Not applicable.

Using a Geoprobe™, the soil samples were collected from two 3- or 4-foot-long sampling intervals at one borehole location at DSS Site 276. Sampling intervals started at 8 and 13 feet bgs in the single sump boring. The soil samples were collected in accordance with the procedures described in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001). Table 2 summarizes the types of confirmatory and QA/QC samples collected at the site and the laboratories that performed the analyses.

The soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), high explosive (HE) compounds, polychlorinated biphenyls (PCBs), Resource Conservation and Recovery Act (RCRA) metals, hexavalent chromium, cyanide, radionuclides, and gross alpha/beta activity. The samples were analyzed by an off-site laboratory (General Engineering Laboratories, Inc.) and the on-site Radiation Protection Sample Diagnostics (RPSD) Laboratory. Table 3 summarizes the analytical methods and the data quality requirements from the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001).

QA/QC samples were collected during the sampling effort according to the Environmental Restoration (ER) Project Quality Assurance Project Plan. The QA/QC samples consisted of two trip blanks (for VOCs only), one field duplicate, and one set of equipment blanks. No significant QA/QC problems were identified in the QA/QC samples.

All of the soil sample results were verified/validated by SNL/NM according to "Verification and Validation of Chemical and Radiochemical Data," Technical Operating Procedure (TOP) 94-03, Rev. 0 (SNL/NM July 1994) or SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). The data validation reports are presented in the associated DSS Site 276 request for a determination of Corrective Action Complete (CAC) without controls. The gamma spectroscopy data from the RPSD Laboratory were reviewed according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). The gamma spectroscopy results are presented in the CAC proposal. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in the request for a determination of CAC without controls. Therefore, the DQOs have been fulfilled.

III. Determination of Nature, Rate, and Extent of Contamination

III.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS Site 276 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, soil sampling, and passive soil-vapor sampling. The DQOs contained in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) 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 DSS Site 276, which is presented in Section 4.0 of the associated request for a determination of CAC without controls. The quality of the data specifically used to determine the nature, migration rate, and extent of contamination is described in the following sections.

Table 2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 276

Sample Type	VOCs	SVOCs	PCBs	HE	RCRA Metals	Hexavalent Chromium	Cyanide	Gamma Spectroscopy Radionuclides	Gross Alpha/Beta
Confirmatory	2	2	2	2	2	2	2	2	2
Duplicates	1	1	1	1	1	1	1	1	1
EBs and TBs[a]	3	1	1	1	1	1	1	0	1
Total Samples	6	4	4	4	4	4	4	3	4
Analytical Laboratory	GEL	GEL	GEL	GEL	GEL	GEL	GEL	RPSD	GEL

[a]TBs for VOCs only.
DSS = Drain and Septic Systems.
EB = Equipment blank.
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
PCB = Polychlorinated biphenyl.
QA/QC = Quality assurance/quality control.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3
Summary of Data Quality Requirements for DSS Site 276

Analytical Method[a]	Data Quality Level	GEL	RPSD
VOCs EPA Method 8260	Defensible	2	None
SVOCs EPA Method 8270	Defensible	2	None
PCBs EPA Method 8082	Defensible	2	None
HE Compounds EPA Method 8330	Defensible	2	None
RCRA Metals EPA Method 6000/7000	Defensible	2	None
Hexavalent Chromium EPA Method 7196A	Defensible	2	None
Total Cyanide EPA Method 9012A	Defensible	2	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	2
Gross Alpha/Beta Activity EPA Method 900.0	Defensible	2	None

Note: The number of samples does not include QA/QC samples such as duplicates, trip blanks, and equipment blanks.
[a]EPA November 1986.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
GEL = General Engineering Laboratories, Inc.
HE = High explosive(s).
PCB = Polychlorinated biphenyl.
QA/QC = Quality assurance/quality control.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

III.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at DSS Site 276 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, HE compounds, PCBs, RCRA metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity. The analytes and methods listed in Tables 2 and 3 are appropriate to characterize the COCs and potential degradation products at DSS Site 276.

III.3 Rate of Contaminant Migration

The silver recovery sump at DSS Site 276 was deactivated in 1994 when Building 829X was demolished. The migration rate of COCs that may have been introduced into the subsurface via the sump at this site was therefore dependent upon the volume of aqueous effluent that might have been discharged to the environment from this system when it was operational. Any migration of COCs from this site after use of the sump was discontinued and the underlying 1.5 feet of soil was removed, would have been predominantly dependent upon infiltrating precipitation. However, it is highly unlikely that sufficient precipitation would have reached the depth at which COCs may have been discharged to the subsurface because the site is now covered by pavement. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at DSS Site 276.

III.4 Extent of Contamination

Subsurface soil samples were collected from a borehole drilled at one location beneath the effluent release point (silver recovery sump) at the site to assess whether releases of effluent from the septic system caused any environmental contamination.

The soil samples were collected at sampling depths starting at 8 and 13 feet bgs beneath the silver recovery sump. Sampling intervals started at the depths at which effluent discharged from the sump would have entered the subsurface environment at the site. This sampling procedure was required by New Mexico Environment Department (NMED) regulators and has been used at numerous DSS-type sites at SNL/NM. The soil samples are considered to be representative of the soil potentially contaminated with the COCs at this site and are sufficient to determine the vertical extent, if any, of COCs.

IV. Comparison of COCs to Background Levels

Site history and characterization activities are used to identify potential COCs. The DSS Site 276 request for a determination of CAC without controls describes the identification of COCs and the sampling that was conducted in order to determine the concentration levels of those COCs across the site. Generally, COCs evaluated in this risk assessment include all detected organic and all 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 4 and 5.

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 this risk assessment consist of both inorganic and organic compounds.

Table 4
Nonradiological COCs for Human Health Risk Assessment at DSS Site 276 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 (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	5.93	4.4	**No**	44[c]	–	**Yes**
Barium	178	200	Yes	170[d]	–	**Yes**
Cadmium	0.285 J	0.9	Yes	64[c]	–	**Yes**
Chromium, total	13.6 J	12.8	**No**	16[c]	–	No
Chromium VI	0.0265[e]	NC	**Unknown**	16[c]	–	No
Cyanide	0.0495 J	NC	**Unknown**	NC	–	**Unknown**
Lead	7.51 J	11.2	Yes	49[c]	–	**Yes**
Mercury	0.0068 J	<0.1	Yes	5,500[c]	–	**Yes**
Selenium	0.25 J	<1	Yes	800[f]	–	**Yes**
Silver	0.626	<1	Yes	0.5[c]	–	No
Organic						
2-Butanone	0.00761	NA	**NA**	1[g]	0.29[g]	No
PCBs[h]	0.0738	NA	**NA**	31,200[c]	6.72[c]	**Yes**

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.
[a]Dinwiddie September 1997, North Area Supergroup.
[b]NMED March 1998.
[c]Yanicak March 1997.
[d]Neumann 1976.
[e]Parameter was not detected. Concentration is one-half the detection limit.
[f]Callahan et al. 1979.
[g]Howard 1990.
[h]The sum of Aroclor-1242 and Aroclor-1254 maximum detections.

Table 4 (Concluded)
Nonradiological COCs for Human Health Risk Assessment at DSS Site 276 with Comparison to the Associated SNL/NM Background Screening Value, BCF, and Log K_{ow}

BCF = Bioconcentration factor.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
J = Estimated concentration.
K_{ow} = Octanol-water partition coefficient.
Log = Logarithm (base 10).
mg/kg = Milligram(s) per kilogram.
NA = Not applicable.
NC = Not calculated.
NMED = New Mexico Environment Department.
PCB = Polychlorinated biphenyl.
SNL/NM = Sandia National Laboratories/New Mexico.
– = Information not available.

Table 5
Radiological COCs for Human Health Risk Assessment at DSS Site 276 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 (0.0386)	0.084	Yes	3,000[d]	**Yes**
Th-232	1	1.54	Yes	3,000[e]	**Yes**
U-235	ND (0.231)	0.18	**No**	900[e]	**Yes**
U-238	ND (0.737)	1.3	Yes	900[e]	**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, North Area Supergroup.
[c]NMED March 1998.
[d]Whicker and Schultz 1982.
[e]Baker and Soldat 1992.
BCF = Bioconcentration factor.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
MDA = Minimum detectable activity.
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.

Table 4 lists the nonradiological COCs and Table 5 lists the radiological COCs for the human health risk assessment at DSS Site 276. All samples were collected from depths of 5 feet bgs or greater; therefore, evaluation of ecological risk was not performed. Both tables show the associated SNL/NM maximum background concentration values (Dinwiddie September 1997). Section VI.4 discusses the results presented in Tables 4 and 5.

V. Fate and Transport

The primary releases of COCs at DSS Site 276 were to the subsurface soil resulting from the discharge of effluents from the silver recovery sump at former Building 829X. 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 mechanisms are considered to be of potential significance as transport mechanisms at this site. Because the site is no longer active, and the site is backfilled and paved over, additional infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at DSS Site 276, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 555 feet bgs, the potential for COCs to reach groundwater through the unsaturated zone above the water table is extremely low.

The COCs at DSS Site 276 include both inorganic and organic constituents. The inorganic COCs include both radiological and nonradiological analytes. With the exception of cyanide, 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-life of the radiological COC (U-235), 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.

The organic COCs at DSS Site 276 are limited to VOCs and PCBs. Organic COCs 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 2-butanone through volatilization is expected to be minimal.

Table 6 summarizes the fate and transport processes that can occur at DSS Site 276. The COCs at this site include both radiological and nonradiological inorganic analytes as well as organic 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 COC is insignificant because of its long half-life.

Table 6
Summary of Fate and Transport at DSS Site 276

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 to moderate

DSS = Drain and Septic Systems.

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 U.S. Environmental Protection Agency (EPA), NMED, and the 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 DSS Site 276. 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

DSS Site 276 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 and volatiles. Soil ingestion is included for the radiological COC 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 DSS Site 276 is approximately 555 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 DSS Site 276.

Pathway Identification

Nonradiological Constituents	Radiological Constituents
Soil ingestion	Soil ingestion
Inhalation (dust and volatiles)	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 concentration to the background screening level. The methodology and results are described in the following sections.

VI.4.1 Methodology

Maximum concentrations of nonradiological COCs are 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 4 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 that do not have either a quantifiable or calculated background screening level are considered in further risk assessment analyses.

For 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 a background value and are 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.

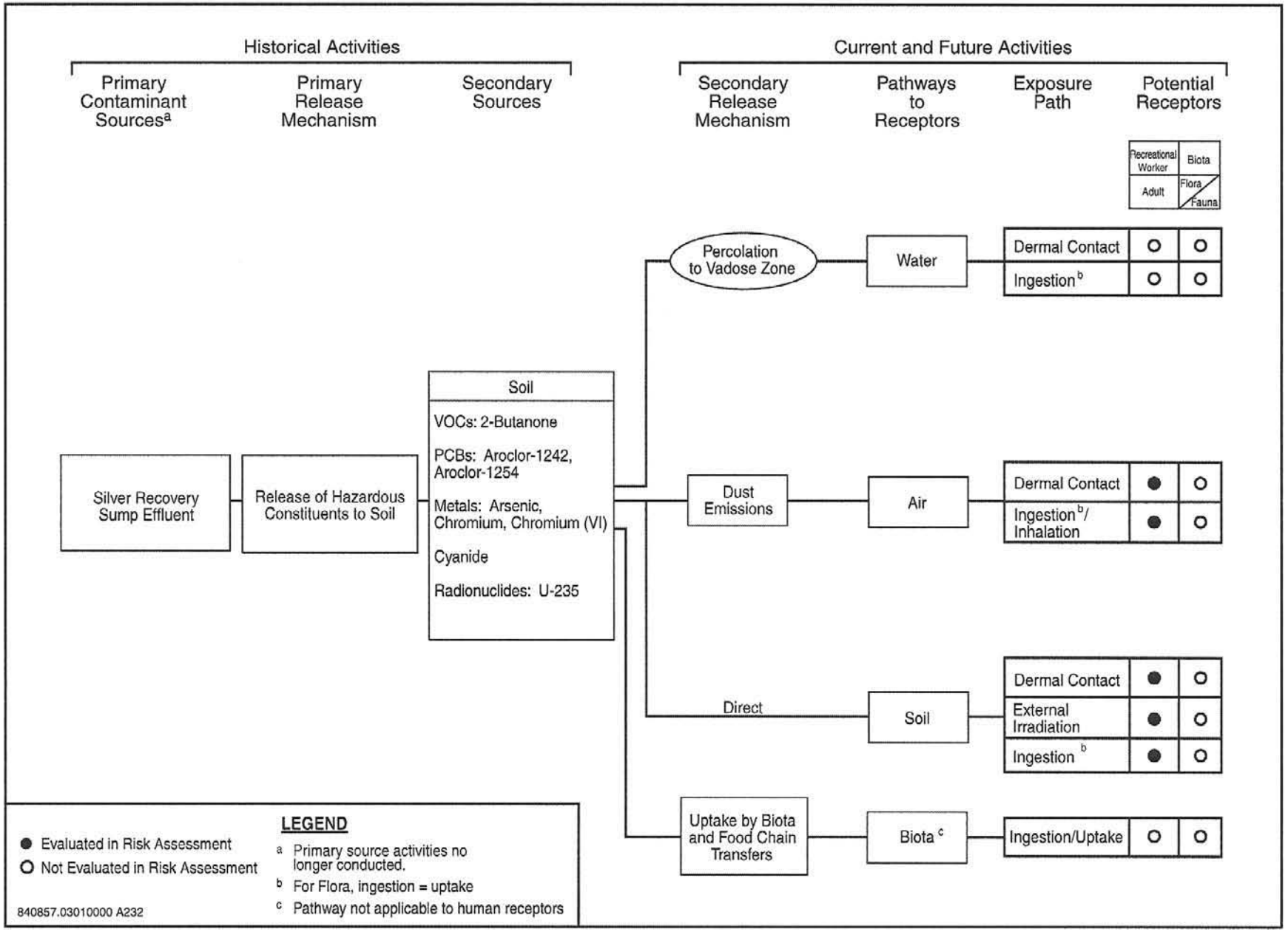

Figure 1

Conceptual Site Model Flow Diagram for DSS Site 276, Former Building 829X Silver Recovery Sump

VI.4.2 Results

Tables 4 and 5 show the DSS Site 276 maximum COC concentrations that were compared to the SNL/NM maximum background values (Dinwiddie September 1997) for the human health risk assessment. For the nonradiological COCs, two constituents were measured at concentrations greater than the background screening values. Two constituents do not have quantified background screening concentrations; therefore it is unknown whether these COCs exceed background. Two constituents are organic compounds that do not have corresponding background screening values.

The maximum concentration value for total PCBs is 0.0738 milligrams (mg)/kilogram (kg). This concentration is less than the EPA screening level of 1 mg/kg (Title 40, Code of Federal Regulations, Part 761). Because the maximum concentration for PCBs at this site is less than the screening value, PCBs are eliminated from further consideration in the human health risk assessment.

For the radiological COCs, one constituent (U-235) exhibited an MDA greater than its background screening level.

VI.5 Step 4. Identification of Toxicological Parameters

Tables 7 (nonradiological) and 8 (radiological) list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 7 were obtained from the Integrated Risk Information System (IRIS) (EPA 2004a) and the Technical Background Document for Development of Soil Screening Levels (NMED February 2004). Dose conversion factors (DCFs) used in determining the excess TEDE values for radiological COCs for the individual pathways were 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 (contamination on the surface 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).

Table 7
Toxicological Parameter Values for DSS Site 276 Nonradiological COCs

COC	RfD_o (mg/kg-d)	Confidence[a]	RfD_{inh} (mg/kg-d)	Confidence[a]	SF_o $(mg/kg-d)^{-1}$	SF_{inh} $(mg/kg-d)^{-1}$	Cancer Class[b]	ABS
Inorganic								
Arsenic	3E-4[c]	M	–	–	1.5E+0[c]	1.5E+1[c]	A	0.03[d]
Chromium	1.5E+0[c]	L	–	–	–	–	D	0.01[d]
Chromium VI	3E-3[c]	L	2.3E-6[c]	L	–	4.2E+1[c]	A	0.01[d]
Cyanide	2E-2[c]	M	–	–	–	–	D	0.1[d]
Organic								
2-Butanone	6E-1[c]	L	2.9E-1[c]	L	–	–	D	0.1[d]

[a]Confidence associated with IRIS (EPA 2004a) database values. Confidence: L = low, M = medium.
[b]EPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2004a):
A = Human carcinogen.
D = Not classifiable as to human carcinogenicity.
[c]Toxicological parameter values from IRIS electronic database (EPA 2004a).
[d]Toxicological parameter values from NMED (February 2004).
ABS = Gastrointestinal absorption coefficient.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
IRIS = Integrated Risk Information System.
mg/kg-d = Milligram(s) per kilogram-day.
$(mg/kg-d)^{-1}$ = 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.
– = Information not available.

Table 8
Radiological Toxicological Parameter Values for DSS Site 276 COCs Obtained from RESRAD Risk Coefficients[a]

COC	SF_o (1/pCi)	SF_{inh} (1/pCi)	SF_{ev} (g/pCi-yr)	Cancer Class[b]
U-235	4.70E-11	1.30E-08	2.70E-07	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.
DSS = Drain and Septic Systems.
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.

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 COC for both the industrial and residential land-use scenarios.

VI.6.1 Exposure Assessment

Appendix 1 provides the equations and parameter input values used in calculating 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, and reflect the reasonable maximum exposure (RME) approach advocated by the RAGS (EPA 1989). For the radiological COC, the coded equation provided in RESRAD computer code is 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 9 shows an HI of 0.02 for the DSS Site 276 nonradiological COCs and an estimated excess cancer risk of 4E-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 10 shows an HI of 0.02 and an estimated incremental excess cancer risk of 3E-6 for the DSS Site 276 associated background constituents under the designated industrial land-use scenario.

For the radiological COC, contribution from the direct gamma exposure pathway is included. For the industrial land-use scenario, a TEDE was calculated that resulted in an incremental TEDE of 7.3E-3 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 1997a), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for DSS Site 276 for the industrial land-use scenario is well below this guideline. The estimated incremental excess cancer risk is 6.2E-8.

For the nonradiological COCs under the residential land-use scenario, the HI is 0.27 with an estimated excess cancer risk of 2E-5 (Table 9). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile 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. Because of the nature of the local soil, other exposure pathways are not considered (see Appendix 1). Table 10 shows an HI of 0.20 and an estimated incremental excess cancer risk of 1E-5 for the DSS Site 276 associated background constituents under the residential land-use scenario.

For the radiological COCs, the incremental TEDE for the residential land-use scenario is 1.9E-2 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 DSS Site 276 for the residential land-use scenario is well below this guideline. Consequently, DSS Site 276 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 incremental excess cancer risk is 1.8E-7. 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 1997a). 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.

Table 9
Risk Assessment Values for DSS Site 276 Nonradiological COCs

COC	Maximum Concentration (mg/kg)	Industrial Land-Use Scenario[a]		Residential Land-Use Scenario[a]	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Inorganic					
Arsenic	5.93	0.02	4E-6	0.27	2E-5
Chromium	13.6 J	0.00	–	0.00	–
Chromium VI	0.0265[b]	–	6E-11	–	1E-10
Cyanide	0.0495 J	0.00	–	0.00	–
Organic					
2-Butanone	0.00761	0.00	–	0.00	–
Total		**0.02**	**4E-6**	**0.27**	**2E-5**

[a]EPA 1989.
[b]Parameter was not detected. Concentration is one-half the maximum detection limit.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
J = Estimated concentration.
mg/kg = Milligram(s) per kilogram.
– = Information not available.

Table 10
Risk Assessment Values for DSS Site 276 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
Arsenic	4.4	0.02	3E-6	0.20	1E-5
Chromium	12.8	0.00	–	0.00	–
Chromium VI	NC	–	–	–	–
Cyanide	NC	–	–	–	–
Total		**0.02**	**3E-6**	**0.20**	**1E-5**

[a]Dinwiddie September 1997, North Area Supergroup.
[b]EPA 1989.
COC = Constituent of concern.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
mg/kg = Milligram(s) per kilogram.
NC = Not calculated.
– = Information not available.

For the nonradiological COCs under the industrial land-use scenario, the HI is 0.02 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is 4E-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 determined risks considering 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 screening concentrations are assumed to have a hazard quotient of 0.00. The incremental HI is 0.00 and the estimated incremental excess cancer risk is 9.59E-7 for the industrial land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under an industrial land-use scenario.

For the radiological COC under the industrial land-use scenario, the incremental TEDE is 7.3E-3 mrem/yr, which is significantly lower than EPA's numerical guideline of 15 mrem/yr. The estimated incremental excess cancer risk is 6.2E-8.

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.27, which is below numerical guidance. The estimated excess cancer risk is 2E-5. 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 slightly above the suggested acceptable risk value. The incremental HI is 0.07 and the estimated incremental cancer risk is 3.95E-6 for the residential land-use scenario. These incremental risk calculations indicate insignificant risk to human health from nonradiological COCs under the residential land-use scenario.

The incremental TEDE for a residential land-use scenario from the radiological component is 1.9E-2 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 1.8E-7.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 276 is based upon an initial conceptual model that was validated with sampling conducted at the site. The sampling was implemented in accordance with the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001). The DQOs contained in these two documents are appropriate for use in risk assessments. The data from soil samples collected at the effluent release point 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, there is no uncertainty associated with the data quality used to perform the risk assessment at DSS Site 276.

Because of the location, history of the site, and future land use (DOE et al. September 1995), 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 the near-surface soil and the location and physical characteristics of the site, there is little 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 are probably overestimated. Maximum measured values of COC concentrations are used to provide conservative results.

Table 7 shows the uncertainties (confidence levels) in nonradiological toxicological parameter values. There is a combination of estimated values and values from the IRIS (EPA 2004a) 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 Health Effects Assessment Summary Tables (EPA 1997b), IRIS (EPA 2004a), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), Risk Assessment Information System (ORNL 2003), or the 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 the nonradiological COCs are within the acceptable range for human health under the industrial land-use scenario compared to established numerical guidance.

For the radiological COC, the conclusion of the risk assessment is that potential effects on human health for both the industrial and residential land-use scenarios are below background 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

DSS Site 276 contains identified COCs consisting of some inorganic, organic, 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 and volatile 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 (0.02) is significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is 4E-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 0.00 and the estimated incremental excess cancer risk is 9.59E-7 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 below the accepted numerical guidance from the EPA. The estimated excess cancer risk is 2E-5. Thus, excess cancer risk is slightly above the acceptable risk value provided by the NMED for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.07 and the

estimated incremental excess cancer risk is 3.95E-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 COC are much lower than EPA guidance values. The estimated TEDE is 7.3E-3 mrem/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 6.2E-8 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 1.9E-2 mrem/yr with an associated estimated incremental excess risk of 1.8E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 276 is eligible for unrestricted radiological release.

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 (EPA 1997a). The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 11.

Table 11
Summation of Incremental Nonradiological and Radiological Risks from DSS Site 276, Former Building 829X Silver Recovery Sump Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	9.59E-7	6.2E-8	1.0E-6
Residential	3.95E-6	1.8E-7	4.1E-6

DSS = Drain and Septic Systems.

Uncertainties associated with the calculations are considered small relative to the conservatism of the 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 DSS Site 276. A component of the NMED Risk-Based Decision Tree (NMED March 1998) is to conduct an ecological risk 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 if warranted by the results of the scoping 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. At the end of the scoping assessment, a determination is made as to whether a more detailed examination of potential ecological risk is necessary.

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 with respect to the existence of complete ecological exposure pathways, an evaluation of bioaccumulation potential, and a summary of 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, all COCs at DSS Site 276 are at depths of 5 feet bgs or greater. Therefore, no complete ecological exposure pathways exist at this site, and no COCs are considered to be COPECs.

VII.2.2 Bioaccumulation

Because no COPECs are associated with this site, bioaccumulation potential was not evaluated.

VII.2.3 Fate and Transport Potential

The potential for the COCs to migrate from the source of contamination to other media or biota is discussed in Section V. As noted in Table 6 (Section V), wind, surface water, and biota (food chain uptake) are expected to be of low significance as transport mechanisms for COCs at this site. Degradation, transformation, and decay of the radiological COC also are 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 are not associated with COCs at this site. Therefore, no COPECs exist at the site, and a more detailed risk assessment was not deemed necessary to predict the potential level of ecological risk associated with the site.

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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, 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)

$$= C \times (CR \times EFD/BW/AT) \times \text{Toxicity Effect} \quad (1)$$

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):

$$I_s = \frac{C_s * IR * EF * ED * \left(1/VF \text{ or } 1/PEF\right)}{BW * AT}$$

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 December 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).

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Brenda

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

MAR 2 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 the New Mexico Environment Department Request for Supplemental Information, SWMU Assessment Reports and Proposals for Corrective Action Complete, Drain and Septic Systems (DSS) Sites 276, 1004, 1031, 1052, 1080, 1087, 1090, 1102, and 1113, DSS Round 7, Environmental Restoration Project at Sandia National Laboratories, New Mexico, EPA ID No. NM589011518, dated January 26, 2005.

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

Sincerely,

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
D. Pepe, NMED-OB
J. Volkerding, DOE-NMED-OB

cc w/o enclosure:
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
M. Sanders, SNL, MS 1087
A. Blumberg, SNL, MS 0141

Sandia National Laboratories
Albuquerque, New Mexico
March 2005

Environmental Restoration Project
Responses to NMED Request for Supplemental Information
SWMU Assessment Reports and Proposals for Corrective Action Complete: Drain and Septic Systems (DSS) Sites 276, 1004, 1031, 1052, 1080, 1087, 1090, 1102, AND 1113, DSS ROUND 7
Dated December 2004

INTRODUCTION

This document responds to a January 26, 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 is due within sixty (60) days of receipt of the letter by SNL/NM, or by March 26, 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).

GENERAL COMMENTS

1. **Shallow ground water is present beneath several of the sites that are included in the subject document (SWMUs 276, 1102, and 1052). This fact is stated in the description of each of these sites. Clarify why this information is neither mentioned when describing the conceptual site model nor taken into account when identifying and evaluating the potential contaminant pathways in the risk assessment reports.**

Response: As noted in each of the three reports, the shallow groundwater aquifer is approximately 265, 267, and 310 feet below ground surface (bgs) at Sites 276 (Building 829X silver recovery sump), 1052 (Building 803 seepage pit), and 1102 (Building 889 septic system) respectively. The shallow groundwater aquifer is limited in extent beneath SNL/NM and Kirtland Air Force Base (KAFB) and is not used as a water supply source. The regional groundwater aquifer is approximately 555, 552, and 535 feet bgs beneath Sites 276, 1052, and 1102, respectively. In addition, infiltration of precipitation is almost nonexistent at these sites as virtually all moisture that falls or flows onto the site subsequently undergoes evapotranspiration.

No significant contaminant of concern (COC) concentrations were detected in soil samples collected in 2002 from beneath these three units. As described in the DSS Site 1052 SWMU Assessment Report (SAR), Site 1052 was one of seven DSS project sites selected by NMED for the installation of a deep soil-vapor monitoring well, to test for the presence of significant volatile organic compound (VOC) soil-vapor concentrations in the deep subsurface at selected DSS sites. Soil vapor samples were collected at depths of 5, 20, 70, 100, and 150 feet bgs in well 1052-VW-01, and total VOC vapor concentrations in all of the samples were much lower than the 10 parts per million by volume (ppmv) action level specified in the "Sampling and Analysis Plan (SAP) for Characterizing and Assessing Potential Releases to the Environment From Septic and Other Miscellaneous Drain Systems at Sandia National Laboratories/New Mexico". Therefore, based on the sampling conducted at these three locations, it was considered unlikely that COCs have or will reach either the shallow or regional aquifers as a result of discharges from these sites. For these reasons, the groundwater pathway for these three sites was not evaluated as part of the risk assessments for these three sites.

2. **The NMED is aware of the typical background levels for gross alpha/beta for the Sandia National Laboratories area. However, the term "New Mexico-established background levels" for gross alpha and gross beta is potentially misleading in that it implies that these levels have been officially approved by the New Mexico Environment Department (NMED), which is not true. In future reports, this phrase should be eliminated from similar discussions of gross alpha/beta activities.**

Response: SNL/NM acknowledges that there are no NMED-approved maximum background levels for gross alpha/beta activities in soil, and did not intend to imply that this was the case. The upper 95th percentile (mean plus 2 standard deviations above the mean) background activities for gross alpha/beta activities of 17.4 and 25.4 picocuries per gram (pCi/g), respectively, are based upon values derived from a gross alpha/beta soil sampling study conducted in November 1990 by the NMED in which soil samples were collected from 40 locations throughout the state. This is the most comprehensive study known to attempt to determine maximum background gross alpha and beta values in soil throughout the state. These background values were used in the DSS SARs to give the detected gross alpha/beta values meaning relative to background activities, instead of presenting the values without comparison. The language in future reports will be modified to remove the implication of official approval of the background values by the NMED.

3. **Each drain and septic system report must include the date that the septic system was abandoned or otherwise inactivated and the date that the septic tank was pumped out and backfilled. If a tank has not been emptied and backfilled, state the date that these activities will occur.**

Response: The dates by which most of the septic systems in SNL/NM Technical Area (TA)-III and the Coyote Test Field (CTF) areas were "removed from service" are based upon two memos written by Mr. Joe Jones (SNL/NM), dated June 21, 1991, and July 26, 1993. In future SARs and RSI responses, for non-TA-III and CTF sites not listed in the Jones memos, additional research will be conducted as needed to determine the year in which a system was abandoned. Also, see the response to Specific Comment #7 below for additional historical information on the Building 803 seepage pit (DSS Site 1052), one of the sites included in DSS Round 7.

All known SNL/NM abandoned septic tanks were inspected in 2004 to determine if they were empty and ready to backfill, or if they contained effluent. Six tanks were found to still contain effluent. As a result, waste characterization samples were collected from these tanks in July 2004 and January 2005. SNL/NM plans to remove the waste in these six tanks and dispose of it according to SNL/NM policy in the spring of 2005. Once the waste has been removed, all of the remaining abandoned SNL/NM septic tanks and seepage pits will be backfilled in place with clean soil by mid-2005. It is anticipated that this backfilling work will commence in approximately mid-May 2005, and will be completed in approximately two months.

As of March 2005, there remain five SNL/NM-owned septic systems that are still in use. These include:

- Building 6020 septic system, 6000 Igloo area
- Building 6030 septic system, 6000 Igloo area
- Building 8895/MO-100 septic system, TA-I
- MO-14/MO-15 septic system, TA-I
- Robotic Vehicle Range septic system, east of TA-II

There are no current plans to close out these active septic systems, and the tanks will be periodically pumped out as required.

4. **Final decisions on the subject reports can not be made until the Quality Control and Gamma Spectrometry Reports addressed in NMED's January 14, 2005, Request for Supplemental Information have been received and approved by the NMED.**

Response: SNL/NM recognizes that final decisions for the proposals for Corrective Action Complete (CAC) for the DSS project sites cannot be made until the above-referenced report is completed. Work on this report is ongoing, and it is anticipated that it will be completed and delivered to the NMED by April 14, 2005, within the required 90-day time frame specified in the applicable Request for Supplemental Information letter.

SPECIFIC COMMENTS

5. **Site 1087: Building 6743 Seepage Pit:**
The report states that the seepage pit at Site 1087 will be backfilled in late 2004 or early 2005, when all inflow plumbing will be disconnected. State whether the seepage pit has been backfilled and the date of this activity.

Response: The seepage pit at this site has not yet been backfilled. SNL/NM plans to backfill this seepage pit, and disconnect the piping from the Building 6743 floor drains to the seepage pit, in mid-2005.

6. **Site 1090: Building 6721 Septic System:**
The NMED does not believe that this site meets residential risk goals, as there are no data supporting an assertion that various semi-volatile organic compounds driving the risk assessment originate from drain field piping. Industrial land use controls will be required for Site 1090. Also, state the detection limits for all samples analyzed for Pyrene that have J-coded values in Table 3.4.2-3.

Response: SNL/NM believes that the most likely source of semivolatile organic compounds (SVOCs) detected in the shallow interval soil samples collected at this site are fragments of the disintegrated bituminous drainfield pipe. If this is the case, the source of the SVOC contamination (piping) still remains at the site, and SNL/NM accepts that the site will be designated Corrective Action Complete with Controls.

As shown on Table 3.4.2-4 of the DSS Site 1090 SAR (the SVOC analytical method detection limit [MDL] table), the MDL for pyrene is 16.7 micrograms per kilogram (µg/kg). The detections of pyrene on Table 3.4.2-3 (the SVOC data summary table) are estimated values that were J-coded during the data validation review process.

7. **Site 1052: Building 803 Seepage Pit:**
Provide the dates when the drainline was disconnected, the seepage pit was abandoned in place, and the discharges were routed to the City of Albuquerque sanitary sewer system.

It is not credible that SNL could not find *any* operational history for Site 1052. NMED currently has offices in Building 803 and at least some of the past uses of this building are known. Provide a description of the known historical operations at this site.

Response: The exact date that the Building 803 seepage pit was abandoned was unknown when the Site 1052 SAR was written in December 2004. However, a report titled "Storm Drain System Cross Connect Project" report produced by an SNL/NM Facilities Engineering group in August 1995 has since been located. This project was performed to investigate the storm and sanitary sewer line drain piping at SNL/NM, and to identify and correct any unauthorized cross connections (from the sanitary sewer system to the storm drain). Most of this work was done at TA-I facilities, and details, including test results for Building 803, are presented in the report. Specifically, the report states that an inspection of the Building 803 sanitary and storm drain systems was conducted on September 16, 1992, and included dye testing and inspections of interior drains. Part of the evaluation process included the introduction of fluorescent dye into various inspection ports (sinks, toilets, floor drains, etc.) in the building and observation for the presence of the dye at various downstream discharge points, to determine if there was a connection.

SNL/NM Facilities Engineering drawings show that a floor drain in the northwest part of Building 803 was connected to the seepage pit on the west side of the building. As part of the September 1992 inspection, it was determined that seepage pit floor drain was filled with concrete. The seepage pit was inspected after completion of the building dye testing, and no dye was observed to have entered the seepage pit. It was therefore concluded that the Building 803 seepage pit had been abandoned at sometime prior to September 16, 1992.

What is meant by the statement "because operational records were not available" (which appears in Section 2.2.2 of the DSS Site 1052 SAR) is that SNL/NM has, for the most part, not determined specifics on activities at this or any other DSS AOC site. It was recognized early in the DSS site investigation process that it would be very difficult, if not impossible to determine with a high degree of certainty complete site histories, and the types and quantities of COCs that may or may not have been discharged to the environment. Therefore, during the negotiation process being conducted with the NMED to determine a technical and decision-making approach to complete environmental investigations at the DSS sites, it was concluded that the most definitive way to determine if COCs are present at the sites would be to collect the same comprehensive set of characterization samples at each site. The "standard suite" of analyses was specified in the SAP, and included VOCs, SVOCs, polychlorinated biphenyls (PCBs), total cyanide, high explosive (HE) compounds, the eight Resource Conservation and Recovery Act (RCRA) metals, hexavalent chromium, radionuclides by gamma spectroscopy, and gross alpha/beta activity.

8. **Site 276: Former Building 829 X Silver Recovery Sump:**
The relationship between the silver sump and the sewer line on the east side of Building 829X is unclear. State whether there is any relationship between these two systems and whether the sewer line is part of SWMU 276.

Low levels of VOCs, SVOCs, and radionuclides were detected in the soil samples collected in 1994 along the sewer line. Describe any remedial activities that were conducted after the collection of these soil samples and whether the sewer line was removed. Data from the samples collected along the sewer line may need to be included in a revised risk assessment for the site.

Response: There is no known direct relationship or connection between the silver recovery sump (on the southwest side of the former Building 829X), and the sewer line on the east side of the building. SWMU 276 includes only the silver recovery sump, and does not include the sewer line. Portions of the August 1995 "Contamination Assessment Report for Soil Sampling at Building 829X" were included as Annex A of the SMWU 276 SAR for completeness, because it presents analytical results for samples collected from beneath the silver recovery sump, as well as other areas around Building 829X. Because the sewer line is not part of SWMU 276, the data from the samples collected along the sewer line is not relevant to the risk assessment for the site.

Available information (SNL/NM Facilities Engineering drawings and computer-aided design (CAD) system maps of sewer lines in TA-I) indicates that the portion of the sewer line in question was removed as part of the demolition activities for this and other nearby buildings. The area of the former Building 829X, and the sewer line and silver recovery sump are now covered by an asphalt parking lot.

9. **Site 1004: Building 6969 Septic System:**
This is an active site. The report does not state whether current operations comply with the applicable laws and regulations nor whether there are any institutional or other controls that will prevent the discharge of possible contaminants into the system in the future. Clarify how the current operations at Site 1004 are protective of the environment.

The risk assessment report for Site 1004 states that the analytical data adequately characterize the rate of contaminant migration up to the date of sampling in September 2002. State if there are any changes in the volumes or types of discharges to this system that may affect the rate of contaminant migration. Industrial land use controls may be required for Site 1004.

Response:
In the "Summary" Section 2.1 of the DSS Site 1004 SAR, the final sentence in the first paragraph states that "Current operations at the site are conducted in accordance with applicable laws and regulations that are protective of the environment."

SNL/NM has a septic system monitoring program that was established to sample all active septic tank systems at SNL/NM. The purpose of the program was to show that no contaminated material will be sent to the City of Albuquerque publically-owned treatment works (POTW) when tanks are pumped, and that no effluent contained within the tanks will contaminate the soil column. SNL/NM maintains five active septic tank systems in remote areas on KAFB that are not connected to the sanitary sewer system. These systems are used only for domestic sanitary sewage collection. Since these systems receive only domestic sewage and no industrial discharges, they do not require sampling prior to pumping and discharge to the public sewer system. However, since 1992 as a Best Management Practice (BMP), SNL/NM periodically samples these active systems prior to pumping and discharge by a certified pumping service. Environmental monitoring samples are also periodically collected from the KAFB sanitary sewer system at monitoring stations to verify and demonstrate that contaminants in waste streams exiting the facility do not exceed applicable wastewater discharge standards.

The SNL/NM Environment, Safety, and Health (ES&H) Manual describes numerous policies and procedures that are in place to ensure that operations at the site are conducted in a manner that are protective of the environment. SNL/NM department managers are directly responsible for ensuring that department activities are conducted in an environmentally responsible manner, and that department personnel are properly trained and educated about hazardous waste management practices. Also, annual audits and inspections are conducted at SNL/NM by NMED regulators to determine if the facility is in compliance with all pertinent environmental regulations.

Mr. Dan Puetz, the Robotics Vehicle Range facility representative, was contacted on March 4, 2005, and he stated that 16 to 18 permanent staff have typically worked at the facility, but that number has recently increased to approximately 35 personnel, and it could increase again to as many as 50 people approximately one year from now. The septic system at this remote facility currently receives only effluent from restrooms, and while the volume of effluent discharged to the system will increase in the future due to staff increases at the facility, the nature of the discharges will not change.

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

APR 7 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 Quality Control (QC) Report, and copies of gamma spectroscopy analytical results for the entire Drain and Septic Systems (DSS) project, in response to the New Mexico Environment Department Request for Supplemental Information: Environmental Restoration Project SWMU Assessment Reports and Proposals for Corrective Action Complete: Drain and Septic Systems Sites 1034, 1035, 1036, 1078, 1079, 1084, 1098, 1104, and 1120, (DSS Round 6); September 2004, Environmental Restoration Project at Sandia National Laboratories, New Mexico, EPA ID No. NM589011518, dated January 14, 2005.

One hardcopy (consisting of seven volumes) will be delivered to Will Moats (NMED), and an electronic CD will be sent by certified mail to you and Laurie King (EPA).

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

Sincerely,

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

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R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
P. Puissant, SNL, MS 1087
M. Sanders, SNL, MS 1087
A. Blumberg, SNL, MS 0141

Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

April 2005

Volume 1 of 7
Master Index
and
Field Duplicate Relative Percent Difference Tables

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

Sandia National Laboratories/New Mexico
Drain and Septic Systems Project Quality Control Report
April 2005

In response to the New Mexico Environmental Department (NMED) request for supplemental information dated January 14, 2005, the Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration (ER) project is providing a complete set of laboratory analytical quality control (QC) documentation for approximately 1,200 soil and associated field blank and duplicate samples collected at the SNL/NM Drain and Septic System (DSS) sites from 1998 to 2002.

The documentation set is comprised of seven report binders. The first binder contains a master index sorted by DSS Site number, and then by analytical parameter. The master index also includes the site names, binder number in which the pertinent QC information can be found for any individual sample, Analytical Request/Chain of Custody (AR/COC) numbers, ER sample IDs, ER sample numbers, sample collection dates, sample matrix, analytical laboratory, and the laboratory analytical batch number for these DSS samples. The first binder also contains tables of calculated relative percent differences (RPDs) for primary and field duplicate sample pairs collected at the DSS sites from 1998 to 2002.

Binders 2 through 5 include the detailed QC information for General Engineering Laboratories (GEL). Binder 6 includes the same type of information for the ER Chemistry Laboratory (ERCL). Binders 2 through 6 include general narratives which address condition on receipt at the laboratory, and sample integrity issues (proper preservation, shipping, AR/COC, etc.). Technical narratives are also provided for each analytical method used. These narratives address holding time and any other specific QC method conformance issues. QC summaries are included for each QC batch. These include the result data and applicable calculations (percent recovery, RPD) for analytical blanks, spikes, and replicates. Finally, Binder 7 includes both complete gamma spectroscopy data documentation, and the associated batch QC from the SNL Radiation Protection Sample Diagnostic (RPSD) Laboratory. For each data set indicated by the AR/COC number, an individual cross reference summary sheet is provided.

DRAIN AND SEPTIC SYSTEMS PROJECT QC MASTER INDEX

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
276	F. Bldg. 829X Sump	Volume 7	605731	829/276-SP1-BH1-13-S	059908-003	24-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
276	F. Bldg. 829X Sump	Volume 7	605731	829/276-SP1-BH1-8-DU	059931-001	24-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
276	F. Bldg. 829X Sump	Volume 7	605731	829/276-SP1-BH1-8-S	059907-003	24-SEP-02	SOIL	GAMMA SPEC	RPSD	201342
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-006	25-SEP-02	AQUEOUS	Cr+6	GEL	204193
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	PCB-8082	GEL	204381
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	PCB-8082	GEL	204381
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	PCB-8082	GEL	204381
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	BNA-8270	GEL	204423
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	BNA-8270	GEL	204423
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	BNA-8270	GEL	204423
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-001	24-SEP-02	SOIL	VOA-8260	GEL	204483
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059909-001	24-SEP-02	SOIL	VOA-8260	GEL	204483
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-001	24-SEP-02	SOIL	VOA-8260	GEL	204483
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-003	25-SEP-02	AQUEOUS	PCB-8082	GEL	204654
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-002	25-SEP-02	AQUEOUS	BNA-8270	GEL	204661
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	HE-8330	GEL	204696
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	HE-8330	GEL	204696
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	HE-8330	GEL	204696
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-TB	059911-001	24-SEP-02	AQUEOUS	VOA-8260	GEL	204910
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-001	25-SEP-02	AQUEOUS	VOA-8260	GEL	204910
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-TB	059927-001	25-SEP-02	AQUEOUS	VOA-8260	GEL	204910
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-008	25-SEP-02	AQUEOUS	GROSS-A/B	GEL	204950
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	GROSS-A/B	GEL	205013
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	GROSS-A/B	GEL	205013
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	GROSS-A/B	GEL	205013
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	TOTAL-CN	GEL	205123
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	TOTAL-CN	GEL	205123
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	TOTAL-CN	GEL	205123
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-004	25-SEP-02	AQUEOUS	HE-8330	GEL	205512
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	Cr+6	GEL	205620
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	Cr+6	GEL	205620
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	Cr+6	GEL	205620
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-005	25-SEP-02	AQUEOUS	TOTAL-CN	GEL	205981
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-13-S	059908-002	24-SEP-02	SOIL	RCRA METALS	GEL	204452, 204440
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-DU	059910-001	24-SEP-02	SOIL	RCRA METALS	GEL	204452, 204440
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-BH1-8-S	059907-002	24-SEP-02	SOIL	RCRA METALS	GEL	204452, 204440
276	F. Bldg. 829X Sump	Volume 5	605728	829X/276-SP1-EB	059926-007	25-SEP-02	AQUEOUS	RCRA METALS	GEL	204455, 204420
1001	Bldg. 898 SS	Volume 2	600426	ER-1295-898-DF1-BH1-10-S	041303-002	09-JUL-98	SOIL	BNA-8270	GEL	126124
1001	Bldg. 898 SS	Volume 2	600426	ER-1295-898-DF1-BH1-5-S	041302-002	09-JUL-98	SOIL	BNA-8270	GEL	126124
1001	Bldg. 898 SS	Volume 2	600426	ER-1295-898-DF1-BH2-10-S	041305-002	09-JUL-98	SOIL	BNA-8270	GEL	126124
1001	Bldg. 898 SS	Volume 2	600426	ER-1295-898-DF1-BH2-5-S	041304-002	09-JUL-98	SOIL	BNA-8270	GEL	126124
1001	Bldg. 898 SS	Volume 2	600426	ER-1295-898-DF1-BH3-10-S	041307-002	09-JUL-98	SOIL	BNA-8270	GEL	126124

NOTE: Multiple batch numbers are listed for reanalysis and RCRA metals for the ICP run and the mercury CVAA run.

Acronym List

GEL	= General Engineering Laboratory.
ERCL	= Environmental Restoration Chemistry Laboratory.
mg/kg	= milligram per kilogram.
NC	= Not calculated for nondetected results.
ND	= Not detected.
PCB	= Polychlorinated biphenyls.
pCi/g	= picocurie(s) per gram.
RPD	= Relative percent difference and is calculated as: (|x1 - x2| / ((x1 + x2)/2)) x 100. Where: x1 = concentration detected in the primary sample x2 = concentration detected in the duplicate environmental sample.
RPSD	= Radiation Protection and Sample Diagnostics Laboratory
SVOC	= Semivolatile organic compounds.
µg/kg	= microgram per kilogram.
VOC	= Volatile Organic Compounds.

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for VOC Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	µg/kg		
Acetone	ND	ND	NC
Benzene	ND	ND	NC
Bromodichloromethane	ND	ND	NC
Bromoform	ND	ND	NC
Bromomethane	ND	ND	NC
2-Butanone	ND	4.34	NC
Carbon disulfide	ND	ND	NC
Carbon tetrachloride	ND	ND	NC
Chlorobenzene	ND	ND	NC
Chloroethane	ND	ND	NC
Chloroform	ND	ND	NC
Chloromethane	ND	ND	NC
Dibromochloromethane	ND	ND	NC
1,1-Dichloroethane	ND	ND	NC
1,2-Dichloroethane	ND	ND	NC
1,1-Dichloroethene	ND	ND	NC
cis-1,2-Dichloroethene	ND	ND	NC
trans-1,2-Dichloroethene	ND	ND	NC
1,2-Dichloropropane	ND	ND	NC
cis-1,3-Dichloropropene	ND	ND	NC
trans-1,3-Dichloropropene	ND	ND	NC
Ethyl benzene	ND	ND	NC
2-Hexanone	ND	ND	NC
Methylene chloride	ND	ND	NC
4-methyl-, 2-Pentanone	ND	ND	NC
Styrene	ND	ND	NC
1,1,2,2-Tetrachloroethane	ND	ND	NC
Tetrachloroethene	ND	ND	NC
Toluene	ND	ND	NC
1,1,1-Trichloroethane	ND	ND	NC
1,1,2-Trichloroethane	ND	ND	NC
Trichloroethene	ND	ND	NC
Vinyl acetate	ND	ND	NC
Vinyl chloride	ND	ND	NC
Xylene	ND	ND	NC

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for SVOC Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	µg/kg		
Acenaphthene	ND	ND	NC
Acenaphthylene	ND	ND	NC
Anthracene	ND	ND	NC
Benzo(a)anthracene	ND	ND	NC
Benzo(a)pyrene	ND	ND	NC
Benzo(b)fluoranthene	ND	ND	NC
Benzo(ghi)perylene	ND	ND	NC
Benzo(k)fluoranthene	ND	ND	NC
4-Bromophenyl phenyl ether	ND	ND	NC
Butylbenzyl phthalate	ND	ND	NC
Carbazole	ND	ND	NC
4-Chloro-3-methylphenol	ND	ND	NC
4-Chlorobenzenamine	ND	ND	NC
bis(2-Chloroethoxy)methane	ND	ND	NC
bis(2-Chloroethyl)ether	ND	ND	NC
bis-Chloroisopropyl ether	ND	ND	NC
2-Chloronaphthalene	ND	ND	NC
2-Chlorophenol	ND	ND	NC
4-Chlorophenyl phenyl ether	ND	ND	NC
Chrysene	ND	ND	NC
m-,p-Cresol	ND	ND	NC
o-Cresol	ND	ND	NC
Di-n-butyl phthalate	ND	ND	NC
Di-n-octyl phthalate	ND	ND	NC
Dibenz[a,h]anthracene	ND	ND	NC
Dibenzofuran	ND	ND	NC
1,2-Dichlorobenzene	ND	ND	NC
1,3-Dichlorobenzene	ND	ND	NC
1,4-Dichlorobenzene	ND	ND	NC
3,3'-Dichlorobenzidine	ND	ND	NC
2,4-Dichlorophenol	ND	ND	NC
Diethylphthalate	ND	ND	NC
2,4-Dimethylphenol	ND	ND	NC
Dimethylphthalate	ND	ND	NC
Dinitro-o-cresol	ND	ND	NC
2,4-Dinitrophenol	ND	ND	NC
2,4-Dinitrotoluene	ND	ND	NC
2,6-Dinitrotoluene	ND	ND	NC
1,2-Diphenylhydrazine	ND	ND	NC
bis(2-Ethylhexyl)phthalate	90.8	127	33.24
Fluoranthene	ND	ND	NC
Fluorene	ND	ND	NC
Hexachlorobenzene	ND	ND	NC
Hexachlorobutadiene	ND	ND	NC

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for SVOC Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	µg/kg		
Hexachlorocyclopentadiene	ND	ND	NC
Hexachloroethane	ND	ND	NC
Indeno(1,2,3-c,d)pyrene	ND	ND	NC
Isophorone	ND	ND	NC
2-Methylnaphthalene	ND	ND	NC
Naphthalene	ND	ND	NC
Nitro-benzene	ND	ND	NC
2-Nitroaniline	ND	ND	NC
3-Nitroaniline	ND	ND	NC
4-Nitroaniline	ND	ND	NC
2-Nitrophenol	ND	ND	NC
4-Nitrophenol	ND	ND	NC
n-Nitrosodiphenylamine	ND	ND	NC
Pentachlorophenol	ND	ND	NC
Phenanthrene	ND	ND	NC
Phenol	ND	ND	NC
Pyrene	ND	ND	NC
1,2,4-Trichlorobenzene	ND	ND	NC
2,4,5-Trichlorophenol	ND	ND	NC
2,4,6-Trichlorophenol	ND	ND	NC

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for PCB Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	µg/kg		
Aroclor 1016	ND	ND	NC
Aroclor 1221	ND	ND	NC
Aroclor 1232	ND	ND	NC
Aroclor 1242	ND	57.6	NC
Aroclor 1248	ND	ND	NC
Aroclor 1254	ND	16.2	NC
Aroclor 1260	ND	ND	NC

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for High Explosives Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	µg/kg		
4-Amino-2,6-dinitrotoluene	ND	ND	NC
2-Amino-4,6-dinitrotoluene	ND	ND	NC
1,3-Dinitrobenzene	ND	ND	NC
2,4-Dinitrotoluene	ND	ND	NC
2,6-Dinitrotoluene	ND	ND	NC
HMX	ND	ND	NC
Nitro-benzene	ND	ND	NC
2-Nitrotoluene	ND	ND	NC
3-Nitrotoluene	ND	ND	NC
4-Nitrotoluene	ND	ND	NC
RDX	ND	ND	NC
Tetryl	ND	ND	NC
1,3,5-Trinitrobenzene	ND	ND	NC
2,4,6-Trinitrotoluene	ND	ND	NC

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DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for Metals Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	mg/kg		
Arsenic	3.73	5.93	45.55
Barium	165	178	7.58
Cadmium	0.285	0.243	15.91
Chromium	12.3	13.6	10.04
Lead	7.51	7.31	2.70
Mercury	0.00678	0.00631	7.18
Selenium	ND	ND	NC
Silver	0.626	0.403	43.34

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for Chromium VI Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	mg/kg		
Chromium (VI)	ND	ND	NC

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for Cyanide Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	mg/kg		
Cyanide, total	ND	0.0493	NC

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DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for Gamma Spectroscopy Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (RPSD)	829X-SP1-BH1-8-DU Duplicate Sample (RPSD)	RPD
	pCi/g		
Cesium-137	ND	ND	NC
Thorium-232	0.908	1	9.64
Uranium-235	0.0946	ND	NC
Uranium-238	ND	ND	NC

DSS Site 276, Former Bldg. 829X Silver Recovery Sump
RPD's Calculated for Gross Alpha/Beta Soil Samples
Collected in September 2002

Parameter	829X-SP1-BH1-8-S Primary Sample (GEL)	829X-SP1-BH1-8-DU Duplicate Sample (GEL)	RPD
	pCi/g		
Gross Alpha	12.6	12.6	0.00
Gross Beta	16.6	18.4	10.29

Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

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Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

GEL QC CROSS REFERENCE

COC 605728

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1052	Bldg. 803 SP	059906	002	803/1052-SP1-BH1-27-S	19-SEP-02	SOIL	PCB-8082	204381
1052	Bldg. 803 SP	059906	002	803/1052-SP1-BH1-27-S	19-SEP-02	SOIL	RCRA METALS	204452, 204440
1052	Bldg. 803 SP	059906	002	803/1052-SP1-BH1-27-S	19-SEP-02	SOIL	TOTAL-CN	205123, 206136
276	F. Bldg. 829X Sump	059907	001	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	VOA-8260	204483
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	BNA-8270	204423
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	Cr+6	205618, 205620
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	GROSS-A/B	205013
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	HE-8330	204696
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	PCB-8082	204381
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	RCRA METALS	204452, 204440
276	F. Bldg. 829X Sump	059907	002	829X/276-SP1-BH1-8-S	24-SEP-02	SOIL	TOTAL-CN	205123, 206136
276	F. Bldg. 829X Sump	059908	001	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	VOA-8260	204483
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	BNA-8270	204423
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	Cr+6	205618, 205620
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	GROSS-A/B	205013
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	HE-8330	204696
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	PCB-8082	204381
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	RCRA METALS	204452, 204440
276	F. Bldg. 829X Sump	059908	002	829X/276-SP1-BH1-13-S	24-SEP-02	SOIL	TOTAL-CN	205123, 206136
276	F. Bldg. 829X Sump	059909	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	VOA-8260	204483
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	BNA-8270	204423
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	Cr+6	205618, 205620
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	GROSS-A/B	205013
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	HE-8330	204696
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	PCB-8082	204381
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	RCRA METALS	204452, 204440
276	F. Bldg. 829X Sump	059910	001	829X/276-SP1-BH1-8-DU	24-SEP-02	SOIL	TOTAL-CN	205123, 206136
276	F. Bldg. 829X Sump	059911	001	829X/276-SP1-BH1-TB	24-SEP-02	AQUEOUS	VOA-8260	204910
276	F. Bldg. 829X Sump	059926	001	829X/276-SP1-EB	25-SEP-02	AQUEOUS	VOA-8260	204910

GEL QC CROSS REFERENCE

COC 605728

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
276	F. Bldg. 829X Sump	059926	002	829X/276-SP1-EB	25-SEP-02	AQUEOUS	BNA-8270	204661
276	F. Bldg. 829X Sump	059926	003	829X/276-SP1-EB	25-SEP-02	AQUEOUS	PCB-8082	204654
276	F. Bldg. 829X Sump	059926	004	829X/276-SP1-EB	25-SEP-02	AQUEOUS	HE-8330	205512
276	F. Bldg. 829X Sump	059926	005	829X/276-SP1-EB	25-SEP-02	AQUEOUS	TOTAL-CN	205981
276	F. Bldg. 829X Sump	059926	006	829X/276-SP1-EB	25-SEP-02	AQUEOUS	Cr+6	204193
276	F. Bldg. 829X Sump	059926	007	829X/276-SP1-EB	25-SEP-02	AQUEOUS	RCRA METALS	204455, 204420
276	F. Bldg. 829X Sump	059926	008	829X/276-SP1-EB	25-SEP-02	AQUEOUS	GROSS-A/B	204950
276	F. Bldg. 829X Sump	059927	001	829X/276-SP1-TB	25-SEP-02	AQUEOUS	VOA-8260	204910

Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

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Radiation Protection & Sample Diagnostics (RPSD)
Laboratory Data

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

RPSD QC CROSS REFERENCE

COC 605731
BATCH NO. 201342

Site #	Site Name	SAMPLE#	F#	ER SAMPLE ID	SAMPLE DATE	MATRIX	LAB TEST
1034	Bldg. 6710 SS	059903	003	6710/1034-SP1-BH1-14-S	19-SEP-02	SOIL	GAMMA SPEC
1034	Bldg. 6710 SS	059904	003	6710/1034-SP1-BH1-19-S	19-SEP-02	SOIL	GAMMA SPEC
1052	Bldg. 803 SP	059905	003	803/1052-SP1-BH1-22-S	19-SEP-02	SOIL	GAMMA SPEC
1052	Bldg. 803 SP	059906	003	803/1052-SP1-BH1-27-S	19-SEP-02	SOIL	GAMMA SPEC
276	F. Bldg. 829X Sump	059907	003	829/276-SP1-BH1-8-S	24-SEP-02	SOIL	GAMMA SPEC
276	F. Bldg. 829X Sump	059908	003	829/276-SP1-BH1-13-S	24-SEP-02	SOIL	GAMMA SPEC
1003	F. Bldg. 915/922 SS	059912	003	915-922/1003-SP1-BH1-27-S	24-SEP-02	SOIL	GAMMA SPEC
1003	F. Bldg. 915/922 SS	059913	003	915-922/1003-SP1-BH1-33-S	24-SEP-02	SOIL	GAMMA SPEC
1003	F. Bldg. 915/922 SS	059914	003	915-922/1003-SP2-BH1-26-S	24-SEP-02	SOIL	GAMMA SPEC
1003	F. Bldg. 915/922 SS	059915	003	915-922/1003-SP2-BH1-31-S	24-SEP-02	SOIL	GAMMA SPEC
1004	Bldg. 6969 SS	059917	003	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	GAMMA SPEC
1004	Bldg. 6969 SS	059918	003	6969/1004-DF1-BH1-13-S	20-SEP-02	SOIL	GAMMA SPEC
1004	Bldg. 6969 SS	059919	003	6969/1004-DF1-BH1-8-S	20-SEP-02	SOIL	GAMMA SPEC
1004	Bldg. 6969 SS	059920	003	6969/1004-DF1-BH2-13-S	20-SEP-02	SOIL	GAMMA SPEC
1004	Bldg. 6969 SS	059921	003	6969/1004-DF1-BH3-8-S	20-SEP-02	SOIL	GAMMA SPEC
1004	Bldg. 6969 SS	059922	003	6969/1004-DF1-BH3-13-S	20-SEP-02	SOIL	GAMMA SPEC
1114	Bldg. 9978 DW	059923	003	9978/1114-DW1-BH1-6-S	23-SEP-02	SOIL	GAMMA SPEC
1114	Bldg. 9978 DW	059924	003	9978/1114-DW1-BH1-11-S	23-SEP-02	SOIL	GAMMA SPEC
276	F. Bldg. 829X Sump	059931	001	829/276-SP1-BH1-8-DU	24-SEP-02	SOIL	GAMMA SPEC

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CASE NARRATIVE
for
Sandia National Laboratories
ARCOC-605728
SDG#67794A
ARCOC-605729
SDG#67794B
Case No. 7223.02.03.02

October 22, 2002

Laboratory Identification:

General Engineering Laboratories, Inc.

Mailing Address:

P.O. Box 30712
Charleston, South Carolina 29417

Express Mail Delivery and Shipping Address:

2040 Savage Road
Charleston, South Carolina 29407

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

Sandia collected twenty-two soil samples and eleven aqueous samples on September 19, 24, and 25, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 26, 2002, for environmental analyses. Cooler clearance (screening, temperature check, etc.) was done upon login. The coolers arrived without any visible signs of tampering and with custody seals intact. The samples were delivered with chain of custody documentation and signatures. The temperature of the samples was 4.0 and 5.0°C, as measured from the temperature control bottles.

Soil sample ID 059906-002 from ARCOC-605728 was received broken inside the ziploc bag. Client was notified and instructed GEL to proceed with analysis. Sample ID 059926-006 from ARCOC-605728 was received out of holding for Hexavalent

Chromium analysis. This was the aqueous equipment blank for Hexavalent Chromium. Client was contacted regarding the issue, and an NCR was generated.

The samples were screened according to GEL Standard Operating Procedures (SOP) EPI SOP S-007 rev. 2 "The Receiving of Radioactive Samples." The samples were stored properly according to SW-846 procedures and GEL SOP.

The samples were received and collected as listed in the table below:

ARCOC	SDG#	#of samples	Collection Date	Date Rec'd by Lab
605728	67794A	24	09/19/02,09/24/02, 09/25/02	09/26/02
605729	67794B	9	09/24/02	09/26/02

The laboratory received the following samples:

Laboratory ID	**Description**
ARCOC-605728:	
67794001	059903-001
67794002	059904-001
67794003	059905-001
67794004	059906-001
67794005	059907-001
67794006	059908-001
67794007	059909-001
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67798001	059911-001
67798002	059926-001
67798003	059927-001
67798005	059926-002
67798006	059926-003
67798007	059926-004
67798008	059926-005
67798009	059926-006
67798010	059926-007
67798011	059926-008

ARCOC-605729:

67794008	059912-001
67794009	059913-001
67794010	059914-001
67794011	059915-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
67794022	059915-002
67798004	059916-001

Case Narrative

Sample analyses were conducted using methodology as outlined in General Engineering Laboratories (GEL) Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

Internal Chain of Custody:

Custody was maintained for the samples.

Data Package:

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Qualifier Flag and Data Package Definitions, Laboratory Certifications, Volatiles Data, Volatiles QC Summary, Semivolatiles Data, Semivolatiles QC Summary, PCB Data, PCB QC Summary, Explosives Data, Explosives QC Summary, Metals Data, Metals QC Summary, General Chemistry Data, General Chemistry QC Summary, Radiochemistry Data, Radiochemistry QC Summary, and Level C Data Package.

This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.

Edith M. Kent

Edith M. Kent

Project Manager

GC/MS VOLATILES
SAMPLE
DATA

GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG# 67794

Method/Analysis Information

Procedure:	Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method:	SW846 8260A
Prep Method:	SW846 5030A
Analytical Batch Number:	204483
Prep Batch Number:	204482

Sample Analysis

The following client and quality control samples were analyzed to complete this sample delivery group/work order using the methods referenced in the Analysis Information section:

Sample ID	Client ID
67794001	059903-001
67794002	059904-001
67794003	059905-001
67794004	059906-001
67794005	059907-001
67794006	059908-001
67794007	059909-001
67794008	059912-001
67794009	059913-001
67794010	059914-001
67794011	059915-001
1200307822	VBLK01 (Blank)

1200307828	VBLK01LCS (Laboratory Control Sample)
1200307823	VBLK02 (Blank)
1200307829	VBLK02LCS (Laboratory Control Sample)
1200308582	VBLK03 (Blank)
1200308583	VBLK03LCS (Laboratory Control Sample)
1200307825	059903-001MS (Matrix Spike)
1200307827	059903-001MSD (Matrix Spike Duplicate)

Preparation/Analytical Method Verification

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-026 REV.8.

Calibration Information
Due to software limitations, all the data files comprising the initial calibration curve may not be listed on the initial calibration summary form. All calibration files are listed in the calibration history report in the "Standard Data" section.

Initial Calibration
All the initial calibration requirements were met.

CCV Requirements
All the continuing calibration verification (CCV) requirements were met.

Quality Control (QC) Information

Surrogate Recoveries
Surrogate recoveries, in all samples and quality control samples, were within the acceptance limits.

Blank Acceptance
Target analytes were not detected above the reporting limit in the blanks.

LCS Recovery Statement
All the required analyte recoveries in the laboratory control samples were within the acceptance limits.

QC Sample Designation
The following sample was designated for matrix spike analysis:
67794001 *059903-001*

MS Recovery Statement
All the required matrix spike recoveries were within the acceptance limits.

MSD Recovery Statement
All the required matrix spike duplicate recoveries were within the acceptance limits.

MS/MSD RPD Statement
The relative percent differences (RPD) between the matrix spike and matrix spike duplicate recoveries were within the acceptance limits.

Internal Standard (ISTD) Acceptance
The internal standard responses, in all samples and quality control samples, met the required acceptance criteria.

Technical Information

Holding Time Specifications
All the samples were prepared and/or analyzed within the required holding time period.

Sample Preservation and Integrity
All samples met the sample preservation and integrity requirements.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this sample delivery group/work order did not require dilutions.

Sample Re-prep/Re-analysis
Re-analyses were not required for samples in this sample group/work order.

Miscellaneous Information

Nonconformance (NCR) Documentation
A nonconformance report was not required for this sample delivery group/work order.

Manual Integrations
Data files associated with the initial calibration, continuing calibration check, and samples did not require manual integrations.

Additional Comments
The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are on the original raw data. These hard copies are temporary stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data package. The data validator will always sign and date the case narrative. Data that are not generated electronically, and such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration
The laboratory utilizes the following GC/MS configurations:

Chromatographic Columns
Chromatographic separation of volatile components is accomplished through analysis on one of the following columns:

Column ID	Column Description
J&W1	DB-624, 60m x 0.25mm, 1.4um
J&W2	DB-624, 75m x 0.53mm, 3.0um

Instrument Configuration
Instrument systems are reference in the raw data and individual form headers by the Instrument ID designations below:

Instrument ID	System Configuration	Chromatographic Column	P & T Trap
VOA1	HP6890/HP5973	J&W1	Trap C
VOA2	HP6890/HP5973	J&W1	Trap C
VOA4	HP5890/HP5972	J&W1	Trap K
VOA5	HP5890/HP5972	J&W1	Trap C
VOA7	HP5890/HP5972	J&W2	Trap K
VOA8	HP6890/HP5973	J&W1	Trap K
VOA9	HP6890/HP5973	J&W1	Trap C

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: Chandra Wilson Date: 10-21-02

Organics Package Creation

This package has been originally reviewed by Richard Bomar (9/30/2002 12:13)
This package has been peer reviewed by Crystal Stacey (10/11/2002 15:48)
This package has been packaged by LySandra Gathers (10/21/2002 10:00)
This roadmap has been edited by
Package Requirements

Raw Data	TICS	Standards Traceability
N	N	

Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
☐	/chem/VOA1.i/092702v1.b/1c508.d	67794001	059903-001	27-SEP-2002	11:50	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c516.d	67794009	059913-001	27-SEP-2002	15:52	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c517.d	67794010	059914-001	27-SEP-2002	16:22	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c518.d	67794011	059915-001	27-SEP-2002	16:52	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c509.d	67794002	059904-001	27-SEP-2002	12:19	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c510.d	67794003	059905-001	27-SEP-2002	12:50	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c511.d	67794004	059906-001	27-SEP-2002	13:20	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c512.d	67794005	059907-001	27-SEP-2002	13:51	67794.sub	
■	/chem/VOA1.i/092702v1.b/1c513.d	67794006	059908-001	27-SEP-2002	14:21	67794.sub	not used
☐	/chem/VOA1.i/093002v1.b/1d106.d	67794006	059908-001	30-SEP-2002	10:12	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c514.d	67794007	059909-001	27-SEP-2002	14:52	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c515.d	67794008	059912-001	27-SEP-2002	15:22	67794.sub	

QC Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
☐	/chem/VOA1.i/092702v1.b/1c542.d	1200307825	059903-001MS	28-SEP-2002	03:39	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c543.d	1200307827	059903-001MSD	28-SEP-2002	04:05	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c502lcsB.d	1200307828	VBLK01LCS	27-SEP-2002	08:11	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c525lcsB.d	1200307829	VBLK02LCS	27-SEP-2002	20:15	67794.sub	
☐	/chem/VOA1.i/093002v1.b/1d102lcsB.d	1200308583	VBLK03LCS	30-SEP-2002	08:08	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c505B.d	1200307822	VBLK01	27-SEP-2002	09:45	67794.sub	
☐	/chem/VOA1.i/092702v1.b/1c529B.d	1200307823	VBLK02	27-SEP-2002	22:00	67794.sub	
☐	/chem/VOA1.i/093002v1.b/1d105B.d	1200308582	VBLK03	30-SEP-2002	09:41	67794.sub	

REVISED

GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG# 67794-1

Method/Analysis Information

Procedure:	Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method:	SW846 8260B
Prep Method:	SW846 5030B
Analytical Batch Number:	204910

Sample Analysis

The following client and quality control samples were analyzed to complete this sample delivery group/work order using the methods referenced in the Analysis Information section:

Sample ID	Client ID
67798001	059911-001
67798002	059926-001
67798003	059927-001
67798004	059916-001
1200308688	VBLK01 (Blank)
1200308691	VBLK01LCS (Laboratory Control Sample)
1200308692	VBLK01LCSD (Laboratory Control Sample Duplicate)

Preparation/Analytical Method Verification

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-038 REV.6.

Calibration Information
Due to software limitations, all the data files comprising the initial calibration curve may not be listed on the initial calibration summary form. All calibration files are listed in the calibration history report in the "Standard Data" section.

REVISED

Initial Calibration
All the initial calibration requirements were met.

CCV Requirements
All the continuing calibration verification (CCV) requirements were met.

Quality Control (QC) Information

Surrogate Recoveries
Surrogate recoveries, in all samples and quality control samples, were within the acceptance limits.

Blank Acceptance
Target analytes were not detected above the reporting limit in the blank.

QC Sample Designation
Since the samples in this sample delivery group/work order were field QC samples (i.e.: trip blank, equipment blank, etc.), the analysis of a matrix spike (MS) and a matrix spike duplicate (MSD) was not required. Instead, a laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) were analyzed for QC purposes.

LCS Recovery Statement
All the required analyte recoveries in the laboratory control sample were within the acceptance limits.

LCSD Recovery Statement
All the required analyte recoveries in the laboratory control sample duplicate were within the acceptance limits.

LCS/LCSD RPD Statement
The relative percent differences (RPD) between the laboratory control sample and laboratory control sample duplicate recoveries were within the acceptance limits.

Internal Standard (ISTD) Acceptance
The internal standard responses, in all samples and quality control samples, met the required acceptance criteria.

Technical Information

Holding Time Specifications
All the samples were prepared and/or analyzed within the required holding time period.

Sample Preservation and Integrity
All samples met the sample preservation and integrity requirements.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The samples in this sample delivery group/work order did not require dilutions.

Sample Re-prep/Re-analysis
Re-analyses were not required for samples in this sample group/work order.

Miscellaneous Information

REVISED

Nonconformance (NCR) Documentation
A nonconformance report was not required for this sample delivery group/work order.

Manual Integrations
Data files associated with the initial calibration, continuing calibration check, and samples did not require manual integrations.

Additional Comments
The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are on the original raw data. These hard copies are temporary stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the analyst, reviewer, and report specialist names associated with the generation of the data package. The data validator will always sign and date the case narrative. Data that are not generated electronically, and such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration
The laboratory utilizes the following GC/MS configurations:

Chromatographic Columns
Chromatographic separation of volatile components is accomplished through analysis on one of the following columns:

Column ID	Column Description
J&W1	DB-624, 60m x 0.25mm, 1.4um
J&W2	DB-624, 75m x 0.53mm, 3.0um

Instrument Configuration
Instrument systems are reference in the raw data and individual form headers by the Instrument ID designations below:

Instrument ID	System Configuration	Chromatographic Column	P & T Trap
VOA1	HP6890/HP5973	J&W1	Trap C
VOA2	HP6890/HP5973	J&W1	Trap C
VOA4	HP5890/HP5972	J&W1	Trap K
VOA5	HP5890/HP5972	J&W1	Trap C
VOA7	HP5890/HP5972	J&W2	Trap K
VOA8	HP6890/HP5973	J&W1	Trap K
VOA9	HP6890/HP5973	J&W1	Trap C

REVISED

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: _____ Date: 10-21-02

Organics Package Creation

This package has been originally reviewed by Richard Bomar (10/1/2002 13:30)
This package has been peer reviewed by Debbie Smith (10/15/2002 14:40)
This package has been packaged by LySandra Gathers (10/18/2002 15:42)
This roadmap has been edited by
Package Requirements

Raw Data	TICS	Standards Traceability
N	N	

Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
☐	/chem/VOA1.i/093002v1.b/1d136.d	67798001	059911-001	01-OCT-2002	00:28	67794-1.sub	
☐	/chem/VOA1.i/093002v1.b/1d137.d	67798002	059926-001	01-OCT-2002	00:54	67794-1.sub	
☐	/chem/VOA1.i/093002v1.b/1d138.d	67798003	059927-001	01-OCT-2002	01:20	67794-1.sub	
☐	/chem/VOA1.i/093002v1.b/1d139.d	67798004	059916-001	01-OCT-2002	01:46	67794-1.sub	

QC Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
☐	/chem/VOA1.i/093002v1.b/1d124lcs-3.d	1200308691	VBLK01LCS	30-SEP-2002	19:13	67794-1.sub	
☐	/chem/VOA1.i/093002v1.b/1d125-3.d	1200308692	VBLK01LCSD	30-SEP-2002	19:39	67794-1.sub	
☐	/chem/VOA1.i/093002v1.b/1d129-3.d	1200308688	VBLK01	30-SEP-2002	21:23	67794-1.sub	all samples field QC - used LCS/LCSD

GC/MS VOLATILES QUALITY CONTROL SUMMARY

QC Summary

Report Date: October 17, 2002

Client: Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 204483										
QC1200307828 LCS										
1,1-Dichloroethylene	50.0			43.4	ug/kg		87	(75%-134%)	RMB	09/27/02 08:11
Benzene	50.0			47.5	ug/kg		95	(80%-120%)		
Chlorobenzene	50.0			46.8	ug/kg		94	(82%-118%)		
Toluene	50.0			46.3	ug/kg		93	(74%-115%)		
Trichloroethylene	50.0			47.7	ug/kg		95	(80%-119%)		
**Bromofluorobenzene	50.0			38.2	ug/kg		76	(69%-138%)		
**Dibromofluoromethane	50.0			45.8	ug/kg		92	(67%-137%)		
**Toluene-d8	50.0			40.4	ug/kg		81	(67%-139%)		
QC1200307829 LCS										
1,1-Dichloroethylene	50.0			41.9	ug/kg		84	(75%-134%)		09/27/02 20:15
Benzene	50.0			46.2	ug/kg		92	(80%-120%)		
Chlorobenzene	50.0			44.7	ug/kg		89	(82%-118%)		
Toluene	50.0			44.4	ug/kg		89	(74%-115%)		
Trichloroethylene	50.0			44.5	ug/kg		89	(80%-119%)		
**Bromofluorobenzene	50.0			47.5	ug/kg		95	(69%-138%)		
**Dibromofluoromethane	50.0			50.2	ug/kg		100	(67%-137%)		
**Toluene-d8	50.0			45.5	ug/kg		91	(67%-139%)		
QC1200308583 LCS										
1,1-Dichloroethylene	50.0			40.2	ug/kg		81	(75%-134%)		09/30/02 08:08
Benzene	50.0			44.6	ug/kg		89	(80%-120%)		
Chlorobenzene	50.0			47.1	ug/kg		94	(82%-118%)		
Toluene	50.0			47.1	ug/kg		94	(74%-115%)		
Trichloroethylene	50.0			44.6	ug/kg		89	(80%-119%)		
**Bromofluorobenzene	50.0			45.0	ug/kg		90	(69%-138%)		
**Dibromofluoromethane	50.0			46.1	ug/kg		92	(67%-137%)		
**Toluene-d8	50.0			43.3	ug/kg		87	(67%-139%)		
QC1200307822 MB										
1,1,1-Trichloroethane			U	ND	ug/kg					09/27/02 09:45
1,1,2,2-Tetrachloroethane			U	ND	ug/kg					
1,1,2-Trichloroethane			U	ND	ug/kg					
1,1-Dichloroethane			U	ND	ug/kg					
1,1-Dichloroethylene			U	ND	ug/kg					
1,2-Dichloroethane			U	ND	ug/kg					
1,2-Dichloropropane			U	ND	ug/kg					
2-Butanone			U	ND	ug/kg					
2-Hexanone			U	ND	ug/kg					
4-Methyl-2-pentanone			U	ND	ug/kg					
Acetone			U	ND	ug/kg					
Benzene			U	ND	ug/kg					
Bromodichloromethane			U	ND	ug/kg					
Bromoform			U	ND	ug/kg					
Bromomethane			U	ND	ug/kg					

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 204483										
Carbon disulfide			U	ND	ug/kg					
Carbon tetrachloride			U	ND	ug/kg					
Chlorobenzene			U	ND	ug/kg					
Chloroethane			U	ND	ug/kg					
Chloroform			U	ND	ug/kg					
Chloromethane			U	ND	ug/kg					
Dibromochloromethane			U	ND	ug/kg					
Ethylbenzene			U	ND	ug/kg					
Methylene chloride			U	ND	ug/kg					
Styrene			U	ND	ug/kg					
Tetrachloroethylene			U	ND	ug/kg					
Toluene			U	ND	ug/kg					
Trichloroethylene			U	ND	ug/kg					
Vinyl acetate			U	ND	ug/kg					
Vinyl chloride			U	ND	ug/kg					
Xylenes (total)			U	ND	ug/kg					
cis-1,2-Dichloroethylene			U	ND	ug/kg					
cis-1,3-Dichloropropylene			U	ND	ug/kg					
trans-1,2-Dichloroethylene			U	ND	ug/kg					
trans-1,3-Dichloropropylene			U	ND	ug/kg					
**Bromofluorobenzene	50.0			62.3	ug/kg		125	(69%-138%)		
**Dibromofluoromethane	50.0			48.0	ug/kg		96	(67%-137%)		
**Toluene-d8	50.0			47.1	ug/kg		94	(67%-139%)		
QC1200307823 MB										
1,1,1-Trichloroethane			U	ND	ug/kg					09/27/02 22:00
1,1,2,2-Tetrachloroethane			U	ND	ug/kg					
1,1,2-Trichloroethane			U	ND	ug/kg					
1,1-Dichloroethane			U	ND	ug/kg					
1,1-Dichloroethylene			U	ND	ug/kg					
1,2-Dichloroethane			U	ND	ug/kg					
1,2-Dichloropropane			U	ND	ug/kg					
2-Butanone			U	ND	ug/kg					
2-Hexanone			U	ND	ug/kg					
4-Methyl-2-pentanone			U	ND	ug/kg					
Acetone			U	ND	ug/kg					
Benzene			U	ND	ug/kg					
Bromodichloromethane			U	ND	ug/kg					
Bromoform			U	ND	ug/kg					
Bromomethane			U	ND	ug/kg					
Carbon disulfide			U	ND	ug/kg					
Carbon tetrachloride			U	ND	ug/kg					
Chlorobenzene			U	ND	ug/kg					
Chloroethane			U	ND	ug/kg					
Chloroform			U	ND	ug/kg					
Chloromethane			U	ND	ug/kg					
Dibromochloromethane			U	ND	ug/kg					
Ethylbenzene			U	ND	ug/kg					
Methylene chloride			U	ND	ug/kg					

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 204483											
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			60.0	ug/kg		120	(69%-138%)			
**Dibromofluoromethane	50.0			49.3	ug/kg		99	(67%-137%)			
**Toluene-d8	50.0			46.8	ug/kg		94	(67%-139%)			
QC1200308582 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					09/30/02	09:41
1,1,2,2-Tetrachloroethane			U	ND	ug/kg						
1,1,2-Trichloroethane			U	ND	ug/kg						
1,1-Dichloroethane			U	ND	ug/kg						
1,1-Dichloroethylene			U	ND	ug/kg						
1,2-Dichloroethane			U	ND	ug/kg						
1,2-Dichloropropane			U	ND	ug/kg						
2-Butanone			U	ND	ug/kg						
2-Hexanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						
Acetone			U	ND	ug/kg						
Benzene			U	ND	ug/kg						
Bromodichloromethane			U	ND	ug/kg						
Bromoform			U	ND	ug/kg						
Bromomethane			U	ND	ug/kg						
Carbon disulfide			U	ND	ug/kg						
Carbon tetrachloride			U	ND	ug/kg						
Chlorobenzene			U	ND	ug/kg						
Chloroethane			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Chloromethane			U	ND	ug/kg						
Dibromochloromethane			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						

QC Summary

Workorder: 67794

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal												
Batch 204483												
trans-1,2-Dichloroethylene				U	ND	ug/kg						
trans-1,3-Dichloropropylene				U	ND	ug/kg						
**Bromofluorobenzene	50.0				62.7	ug/kg		125	(69%-138%)			
**Dibromofluoromethane	50.0				47.7	ug/kg		96	(67%-137%)			
**Toluene-d8	50.0				47.0	ug/kg		94	(67%-139%)			
QC1200307825 67794001 PS												
1,1-Dichloroethylene	50.0	U	ND		38.9	ug/L		78	(55%-128%)		09/28/02	03:39
Benzene	50.0	U	ND		41.9	ug/L		84	(53%-118%)			
Chlorobenzene	50.0	U	ND		37.1	ug/L		74	(53%-116%)			
Toluene	50.0	U	ND		38.5	ug/L		77	(56%-113%)			
Trichloroethylene	50.0	U	ND		39.7	ug/L		79	(54%-119%)			
**Bromofluorobenzene	50.0		60.7		50.5	ug/L		101	(69%-138%)			
**Dibromofluoromethane	50.0		49.0		50.0	ug/L		100	(67%-137%)			
**Toluene-d8	50.0		46.6		46.0	ug/L		92	(67%-139%)			
QC1200307827 67794001 PSD												
1,1-Dichloroethylene	50.0	U	ND		38.7	ug/L	0	78	(0%-21%)		09/28/02	04:05
Benzene	50.0	U	ND		41.5	ug/L	1	83	(0%-17%)			
Chlorobenzene	50.0	U	ND		35.8	ug/L	4	72	(0%-21%)			
Toluene	50.0	U	ND		37.2	ug/L	3	75	(0%-25%)			
Trichloroethylene	50.0	U	ND		38.9	ug/L	2	78	(0%-25%)			
**Bromofluorobenzene	50.0		60.7		49.3	ug/L		99	(69%-138%)			
**Dibromofluoromethane	50.0		49.0		49.9	ug/L		100	(67%-137%)			
**Toluene-d8	50.0		46.6		45.6	ug/L		91	(67%-139%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where d
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. 1
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 18, 2002

Client: Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Pulssant

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 204910											
QC1200308691 LCS											
1,1-Dichloroethylene	50.0			43.0	ug/L		86	(78%-140%)	RMB	09/30/02	19:13
Benzene	50.0			47.5	ug/L		95	(78%-119%)			
Chlorobenzene	50.0			50.0	ug/L		100	(82%-120%)			
Toluene	50.0			49.4	ug/L		99	(68%-133%)			
Trichloroethylene	50.0			47.5	ug/L		95	(80%-123%)			
**Bromofluorobenzene	50.0			47.9	ug/L		96	(67%-136%)			
**Dibromofluoromethane	50.0			49.7	ug/L		99	(62%-148%)			
**Toluene-d8	50.0			46.2	ug/L		93	(58%-139%)			
QC1200308692 LCSD											
1,1-Dichloroethylene	50.0			42.4	ug/L	1	85	(0%-30%)		09/30/02	19:39
Benzene	50.0			47.7	ug/L	0	95	(0%-30%)			
Chlorobenzene	50.0			49.5	ug/L	1	99	(0%-30%)			
Toluene	50.0			49.1	ug/L	1	98	(0%-30%)			
Trichloroethylene	50.0			47.1	ug/L	1	94	(0%-30%)			
**Bromofluorobenzene	50.0			49.4	ug/L		99	(67%-136%)			
**Dibromofluoromethane	50.0			49.7	ug/L		99	(62%-148%)			
**Toluene-d8	50.0			46.3	ug/L		93	(58%-139%)			
QC1200308688 MB											
1,1,1-Trichloroethane			U	ND	ug/L					09/30/02	21:23
1,1,2,2-Tetrachloroethane			U	ND	ug/L						
1,1,2-Trichloroethane			U	ND	ug/L						
1,1-Dichloroethane			U	ND	ug/L						
1,1-Dichloroethylene			U	ND	ug/L						
1,2-Dichloroethane			U	ND	ug/L						
1,2-Dichloropropane			U	ND	ug/L						
2-Butanone			U	ND	ug/L						
2-Hexanone			U	ND	ug/L						
4-Methyl-2-pentanone			U	ND	ug/L						
Acetone			U	ND	ug/L						
Benzene			U	ND	ug/L						
Bromodichloromethane			U	ND	ug/L						
Bromoform			U	ND	ug/L						
Bromomethane			U	ND	ug/L						
Carbon disulfide			U	ND	ug/L						
Carbon tetrachloride			U	ND	ug/L						
Chlorobenzene			U	ND	ug/L						
Chloroethane			U	ND	ug/L						
Chloroform			U	ND	ug/L						
Chloromethane			U	ND	ug/L						
Dibromochloromethane			U	ND	ug/L						
Ethylbenzene			U	ND	ug/L						
Methylene chloride			U	ND	ug/L						

QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 204910											
Styrene			U	ND	ug/L						
Tetrachloroethylene			U	ND	ug/L						
Toluene			U	ND	ug/L						
Trichloroethylene			U	ND	ug/L						
Vinyl chloride			U	ND	ug/L						
Xylenes (total)			U	ND	ug/L						
cis-1,2-Dichloroethylene			U	ND	ug/L						
cis-1,3-Dichloropropylene			U	ND	ug/L						
trans-1,2-Dichloroethylene			U	ND	ug/L						
trans-1,3-Dichloropropylene			U	ND	ug/L						
**Bromofluorobenzene	50.0			66.5	ug/L		133	(67%-136%)			
**Dibromofluoromethane	50.0			48.2	ug/L		96	(62%-148%)			
**Toluene-d8	50.0			47.3	ug/L		95	(58%-139%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

*	Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where tl
**	Indicates analyte is a surrogate compound.
B	The analyte was found in the blank above the effective MDL.
H	Holding time was exceeded
J	Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
P	The response between the confirmation column and the primary column is >40%D
U	The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL.]
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
X	Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

GC/MS SEMIVOLATILE ANALYSIS

Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 67794

Method/Analysis Information

Procedure:	**Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8270C
Prep Method:	SW846 3550B
Analytical Batch Number:	204423
Prep Batch Number:	204422

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8270C:

Sample ID	Client ID
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
67794022	059915-002
1200307670	SBLK01 (Blank)
1200307671	SBLK01LCS (Laboratory Control Sample)

1200307672	059903-002MS (Matrix Spike)
1200307673	059903-002MSD (Matrix Spike Duplicate)

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Due to the limited capacity of software we do not display all of the current initial calibration files here. If necessary, a calibration history will be inserted in the package prior to the appropriate Form 6.

Diphenylamine has now superseded N-Nitroso-diphenylamine as a CCC on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Method 8270 (prior to 8270C) listed N-Nitroso-diphenylamine as a CCC. However, as stated in EPA Method 8270C, Revision 3, December, 1996, Section 1.4.5, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, show that they not only coelute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

When calibrations are performed for Appendix IX compounds some of the compounds may not be calibrated exactly according to the criteria in Method 8270C. If the %RSD is greater than 15% or the correlation coefficient is less that 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

Initial Calibration
All initial calibration requirements have been met for this SDG.

CCV Requirements
All calibration verification standard (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries
All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance
The blank contained hits of target analytes below the reporting limit; however, there were no hits in the associated samples. The data will be reported as is.
1200307670

LCS Recovery Statement
The laboratory control sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis:
67794012 059903-002

MS Recovery Statement
The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement
The matrix spike duplicate (MSD) recoveries for this SDG were within the established acceptance limits.

MS/MSD RPD Statement
The relative percent differences (RPD) between each MS and MSD were within the required acceptance limits.

Internal Standard (ISTD) Acceptance
The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:

Holding Time Specifications
All samples in this SDG met the specified holding time requirements. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
None of the samples analyzed in this SDG required dilution.

Miscellaneous Information:

Nonconformance (NCR) Documentation
No nonconformance report (NCR) was generated for this SDG.

Manual Integrations
No manual integrations were required for any data file in this SDG.

System Configuration

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with the electronic pressure control. All MS interfaces are capillary direct.

Chromatographic Columns

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

Column ID	Column Description
J&W	DB-5.625(5% Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromatograms)
J&W DB-5MS	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS designation)
Alltech	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane

	(identified by a HP-5MS designation)
HP	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex	ZB-5 5% Phenyl Polysiloxane (identified by a ZB-5 designation)
J&W DB-5MS2	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS2 designation)

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below:

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	DB-5MS2
MSD4	HP6890/HP5973	DB-5MS2
MSD5	HP6890/HP5973	DB-5MS2
MSD7	HP6890/HP5973	DB-5MS2
MSD8	HP6890/HP5973	DB-5MS2

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

Reviewer: Erin Haubert Date: 10/22/02

Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 67794-1

Method/Analysis Information

Procedure:	**Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8270C
Prep Method:	SW846 3510C
Analytical Batch Number:	204661
Prep Batch Number:	204660

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8270C:

Sample ID	Client ID
67798005	059926-002
1200308140	SBLK01 (Blank)
1200308141	SBLK01LCS (Laboratory Control Sample)
1200308146	059926-002MS (Matrix Spike)
1200308147	059926-002MSD (Matrix Spike Duplicate)

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Due to the limited capacity of software we do not display all of the current initial calibration files here. If necessary, a calibration history will be inserted in the package prior to the appropriate Form 6.

Diphenylamine has now superseded N-Nitroso-diphenylamine as a CCC on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Method 8270 (prior to 8270C) listed N-Nitroso-diphenylamine as a CCC. However, as stated in EPA Method 8270C, Revision 3, December, 1996, Section 1.4.5, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from

Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, show that they not only coelute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

When calibrations are performed for Appendix IX compounds some of the compounds may not be calibrated exactly according to the criteria in Method 8270C. If the %RSD is greater than 15% or the correlation coefficient is less that 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

Initial Calibration
All initial calibration requirements have been met for this SDG.

CCV Requirements
All calibration verification standard (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries
All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance
The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement
The laboratory control sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis:
67798005 059926-002

MS Recovery Statement
The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement
The matrix spike duplicate (MSD) recoveries for this SDG were within the established acceptance limits.

MS/MSD RPD Statement
The relative percent differences (RPD) between each MS and MSD were within the required acceptance limits.

Internal Standard (ISTD) Acceptance
The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:

Holding Time Specifications
All samples in this SDG met the specified holding time requirements. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
None of the samples analyzed in this SDG required dilution.

Miscellaneous Information:

Nonconformance (NCR) Documentation
No nonconformance report (NCR) was generated for this SDG.

Manual Integrations
No manual integrations were required for any data file in this SDG.

System Configuration

The laboratory utilizes a HP 6890 Series gas chromatograph and a HP 5973 Mass Selective Detector. The configuration is equipped with the electronic pressure control. All MS interfaces are capillary direct.

Chromatographic Columns

Chromatographic separation of semivolatile components is accomplished through analysis on one or more of the following columns (all with dimensions of 30 meters x 0.25 millimeters ID and 0.25 micron film except J&W DB-5MS2 which is 25 meters x 0.20 mm ID and 0.33 micron film):

Column ID	Column Description
J&W	DB-5.625(5% Phenyl)-methylpolysiloxane (identified by a DB-5.625 designation on quantitation reports and reconstructed ion chromatograms)
J&W DB-5MS	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS designation)
Alltech	EC-5 (SE-54) 5% Phenyl, 95% Methylpolysiloxane (identified by a HP-5MS designation)
HP	HP-5MS 5% Phenylmethylsiloxane (identified by a HP-5MS designation)
Phenomenex	ZB-5 5% Phenyl Polysiloxane (identified by a ZB-5 designation)
J&W DB-5MS2	Similar to the J&W DB-5.625 with low bleed characteristics (identified by a DB-5MS2 designation)

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below:

Instrument ID	System Configuration	Chromatographic Column
MSD2	HP6890/HP5973	DB-5MS2

MSD4	HP6890/HP5973	DB-5MS2
MSD5	HP6890/HP5973	DB-5MS2
MSD7	HP6890/HP5973	DB-5MS2
MSD8	HP6890/HP5973	DB-5MS2

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

Reviewer: Erin Hanbrat **Date:** 10/22/02

GC/MS
SEMI- VOLATILES
QUALITY CONTROL
SUMMARY

QC Summary

Report Date: October 21, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch : 204423										
QC1200307671 LCS										
1,2,4-Trichlorobenzene	1670			1190	ug/kg		72	(27%-91%)	KGB1	10/02/02 21:20
1,4-Dichlorobenzene	1670			1080	ug/kg		65	(25%-85%)		
2,4,5-Trichlorophenol	3330			2790	ug/kg		84	(42%-96%)		
2,4,6-Trichlorophenol	3330			2570	ug/kg		77	(32%-91%)		
2,4-Dinitrotoluene	1670			1370	ug/kg		82	(50%-109%)		
2-Chlorophenol	3330			2470	ug/kg		74	(31%-85%)		
4-Chloro-3-methylphenol	3330			2880	ug/kg		86	(34%-97%)		
4-Nitrophenol	3330			2190	ug/kg		66	(22%-128%)		
Acenaphthene	1670			1290	ug/kg		78	(39%-98%)		
Hexachlorobenzene	1670			1420	ug/kg		85	(41%-105%)		
Hexachlorobutadiene	1670			1190	ug/kg		72	(21%-94%)		
Hexachloroethane	1670			1190	ug/kg		72	(25%-86%)		
N-Nitrosodipropylamine	1670			1200	ug/kg		72	(34%-90%)		
Nitrobenzene	1670			1150	ug/kg		69	(30%-84%)		
Pentachlorophenol	3330			1970	ug/kg		59	(27%-109%)		
Phenol	3330			2290	ug/kg		69	(31%-83%)		
Pyrene	1670			1130	ug/kg		68	(37%-110%)		
m,p-Cresols	3330			2460	ug/kg		74	(40%-83%)		
o-Cresol	3330			2240	ug/kg		67	(34%-86%)		
**2,4,6-Tribromophenol	3330			2750	ug/kg		83	(23%-111%)		
**2-Fluorobiphenyl	1670			1100	ug/kg		66	(21%-104%)		
**2-Fluorophenol	3330			2420	ug/kg		73	(22%-93%)		
**Nitrobenzene-d5	1670			1090	ug/kg		66	(24%-97%)		
**Phenol-d5	3330			2370	ug/kg		71	(22%-99%)		
**p-Terphenyl-d14	1670			1160	ug/kg		70	(30%-133%)		
QC1200307670 MB										
1,2,4-Trichlorobenzene			U	ND	ug/kg					10/02/02 20:59
1,2-Dichlorobenzene			U	ND	ug/kg					
1,3-Dichlorobenzene			U	ND	ug/kg					
1,4-Dichlorobenzene			U	ND	ug/kg					
2,4,5-Trichlorophenol			U	ND	ug/kg					
2,4,6-Trichlorophenol			U	ND	ug/kg					
2,4-Dichlorophenol			U	ND	ug/kg					
2,4-Dimethylphenol			U	ND	ug/kg					
2,4-Dinitrophenol			U	ND	ug/kg					
2,4-Dinitrotoluene			U	ND	ug/kg					
2,6-Dinitrotoluene			U	ND	ug/kg					
2-Chloronaphthalene			U	ND	ug/kg					
2-Chlorophenol			U	ND	ug/kg					
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg					
2-Methylnaphthalene			U	ND	ug/kg					
2-Nitrophenol			U	ND	ug/kg					

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 204423											
3,3'-Dichlorobenzidine			U	ND	ug/kg						
4-Bromophenylphenylether			U	ND	ug/kg						
4-Chloro-3-methylphenol			U	ND	ug/kg						
4-Chloroaniline			U	ND	ug/kg						
4-Chlorophenylphenylether			U	ND	ug/kg						
4-Nitrophenol			U	ND	ug/kg						
Acenaphthene			U	ND	ug/kg						
Acenaphthylene			U	ND	ug/kg						
Anthracene			U	ND	ug/kg						
Benzo(a)anthracene			U	ND	ug/kg						
Benzo(a)pyrene			U	ND	ug/kg						
Benzo(b)fluoranthene			U	ND	ug/kg						
Benzo(ghi)perylene			U	ND	ug/kg						
Benzo(k)fluoranthene			U	ND	ug/kg						
Butylbenzylphthalate			U	ND	ug/kg						
Carbazole			U	ND	ug/kg						
Chrysene			U	ND	ug/kg						
Di-n-butylphthalate			U	ND	ug/kg						
Di-n-octylphthalate			U	ND	ug/kg						
Dibenzo(a,h)anthracene			U	ND	ug/kg						
Dibenzofuran			U	ND	ug/kg						
Diethylphthalate			U	ND	ug/kg						
Dimethylphthalate			U	ND	ug/kg						
Diphenylamine			U	ND	ug/kg						
Fluoranthene			U	ND	ug/kg						
Fluorene			U	ND	ug/kg						
Hexachlorobenzene			U	ND	ug/kg						
Hexachlorobutadiene			U	ND	ug/kg						
Hexachlorocyclopentadiene			U	ND	ug/kg						
Hexachloroethane			U	ND	ug/kg						
Indeno(1,2,3-cd)pyrene			U	ND	ug/kg						
Isophorone			U	ND	ug/kg						
N-Nitrosodipropylamine			U	ND	ug/kg						
Naphthalene			U	ND	ug/kg						
Nitrobenzene			U	ND	ug/kg						
Pentachlorophenol			U	ND	ug/kg						
Phenanthrene			U	ND	ug/kg						
Phenol			U	ND	ug/kg						
Pyrene			U	ND	ug/kg						
bis(2-Chloroethoxy)methane			U	ND	ug/kg						
bis(2-Chloroethyl) ether			U	ND	ug/kg						
bis(2-Chloroisopropyl)ether			U	ND	ug/kg						
bis(2-Ethylhexyl)phthalate			J	84.1	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						

QC Summary

Workorder: 67794

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal											
Batch 204423											
**2,4,6-Tribromophenol	3330				2010	ug/kg		60	(23%-111%)		
**2-Fluorobiphenyl	1670				1140	ug/kg		69	(21%-104%)		
**2-Fluorophenol	3330				2520	ug/kg		76	(22%-93%)		
**Nitrobenzene-d5	1670				1180	ug/kg		71	(24%-97%)		
**Phenol-d5	3330				2310	ug/kg		69	(22%-99%)		
**p-Terphenyl-d14	1670				1210	ug/kg		73	(30%-133%)		
QC1200307672 67794012 MS											
1,2,4-Trichlorobenzene	1670	U	ND		1220	ug/kg		73	(15%-112%)		10/02/02 22:02
1,4-Dichlorobenzene	1670	U	ND		1180	ug/kg		71	(19%-89%)		
2,4,5-Trichlorophenol	3330	U	ND		2730	ug/kg		82			
2,4,6-Trichlorophenol	3330	U	ND		2440	ug/kg		73			
2,4-Dinitrotoluene	1670	U	ND		1270	ug/kg		76	(32%-117%)		
2-Chlorophenol	3330	U	ND		2590	ug/kg		78	(13%-101%)		
4-Chloro-3-methylphenol	3330	U	ND		2790	ug/kg		84	(23%-114%)		
4-Nitrophenol	3330	U	ND		2260	ug/kg		68	(20%-126%)		
Acenaphthene	1670	U	ND		1240	ug/kg		74	(15%-114%)		
Hexachlorobenzene	1670	U	ND		1310	ug/kg		78			
Hexachlorobutadiene	1670	U	ND		1180	ug/kg		71			
Hexachloroethane	1670	U	ND		1220	ug/kg		74			
N-Nitrosodipropylamine	1670	U	ND		1250	ug/kg		75	(18%-106%)		
Nitrobenzene	1670	U	ND		1190	ug/kg		71			
Pentachlorophenol	3330	U	ND		1600	ug/kg		48	(34%-110%)		
Phenol	3330	U	ND		2340	ug/kg		70	(17%-104%)		
Pyrene	1670		132		973	ug/kg		50	(26%-130%)		
m,p-Cresols	3330	U	ND		2570	ug/kg		77			
o-Cresol	3330	U	ND		2330	ug/kg		70			
**2,4,6-Tribromophenol	3330				2720	ug/kg		82	(23%-111%)		
**2-Fluorobiphenyl	1670				1140	ug/kg		69	(21%-104%)		
**2-Fluorophenol	3330				2650	ug/kg		79	(22%-93%)		
**Nitrobenzene-d5	1670				1160	ug/kg		70	(24%-97%)		
**Phenol-d5	3330				2540	ug/kg		76	(22%-99%)		
**p-Terphenyl-d14	1670				1010	ug/kg		61	(30%-133%)		
QC1200307673 67794012 MSD											
1,2,4-Trichlorobenzene	1670	U	ND		1240	ug/kg	1	74	(0%-31%)		10/02/02 22:23
1,4-Dichlorobenzene	1670	U	ND		1170	ug/kg	1	70	(0%-36%)		
2,4,5-Trichlorophenol	3330	U	ND		2970	ug/kg	9	89			
2,4,6-Trichlorophenol	3330	U	ND		2620	ug/kg	7	79			
2,4-Dinitrotoluene	1670	U	ND		1380	ug/kg	9	83	(0%-37%)		
2-Chlorophenol	3330	U	ND		2540	ug/kg	2	76	(0%-34%)		
4-Chloro-3-methylphenol	3330	U	ND		3130	ug/kg	11	94	(0%-34%)		
4-Nitrophenol	3330	U	ND		2060	ug/kg	10	62	(0%-35%)		
Acenaphthene	1670	U	ND		1320	ug/kg	7	79	(0%-33%)		
Hexachlorobenzene	1670	U	ND		1490	ug/kg	13	89			
Hexachlorobutadiene	1670	U	ND		1230	ug/kg	4	74			
Hexachloroethane	1670	U	ND		1170	ug/kg	5	70			
N-Nitrosodipropylamine	1670	U	ND		1270	ug/kg	1	76	(0%-29%)		
Nitrobenzene	1670	U	ND		1220	ug/kg	3	73			
Pentachlorophenol	3330	U	ND		1750	ug/kg	9	52	(0%-40%)		

QC Summary

Workorder: 67794

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal												
Batch 204423												
Phenol	3330	U	ND		2400	ug/kg	3	72	(0%-37%)			
Pyrene	1670		132		1140	ug/kg	18	61	(0%-39%)			
m,p-Cresols	3330	U	ND		2580	ug/kg	1	77				
o-Cresol	3330	U	ND		2410	ug/kg	4	72				
**2,4,6-Tribromophenol	3330				2590	ug/kg		78	(23%-111%)			
**2-Fluorobiphenyl	1670				1160	ug/kg		70	(21%-104%)			
**2-Fluorophenol	3330				2460	ug/kg		74	(22%-93%)			
**Nitrobenzene-d5	1670				1150	ug/kg		69	(24%-97%)			
**Phenol-d5	3330				2440	ug/kg		73	(22%-99%)			
**p-Terphenyl-d14	1670				1150	ug/kg		69	(30%-133%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL.)
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 21, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 204661										
QC1200308141 LCS										
Pyridine	50.0			19.4	ug/L		39		KGB1	10/01/02 22:14
1,2,4-Trichlorobenzene	50.0			36.3	ug/L		73	(53%-104%)		
1,4-Dichlorobenzene	50.0			35.4	ug/L		71	(47%-102%)		
2,4,5-Trichlorophenol	100			95.3	ug/L		95	(67%-106%)		
2,4,6-Trichlorophenol	100			92.8	ug/L		93	(45%-111%)		
2,4-Dinitrotoluene	50.0			42.7	ug/L		86	(55%-121%)		
2-Chlorophenol	100			71.7	ug/L		72	(47%-87%)		
4-Chloro-3-methylphenol	100			88.6	ug/L		89	(51%-100%)		
4-Nitrophenol	100			23.4	ug/L		23	(10%-55%)		
Acenaphthene	50.0			44.2	ug/L		88	(63%-111%)		
Hexachlorobenzene	50.0			47.1	ug/L		94	(67%-114%)		
Hexachlorobutadiene	50.0			35.1	ug/L		70	(44%-106%)		
Hexachloroethane	50.0			35.6	ug/L		71	(47%-97%)		
N-Nitrosodipropylamine	50.0			41.2	ug/L		83	(52%-118%)		
Nitrobenzene	50.0			35.1	ug/L		70	(49%-110%)		
Pentachlorophenol	100			62.2	ug/L		62	(31%-110%)		
Phenol	100			25.0	ug/L		25	(16%-44%)		
Pyrene	50.0			36.4	ug/L		73	(68%-117%)		
m,p-Cresols	100			57.8	ug/L		58	(43%-100%)		
o-Cresol	100			60.9	ug/L		61	(47%-87%)		
**2,4,6-Tribromophenol	100			95.5	ug/L		96	(27%-126%)		
**2-Fluorobiphenyl	50.0			40.3	ug/L		81	(32%-109%)		
**2-Fluorophenol	100			40.3	ug/L		40	(13%-73%)		
**Nitrobenzene-d5	50.0			34.3	ug/L		69	(33%-107%)		
**Phenol-d5	100			26.5	ug/L		27	(14%-66%)		
**p-Terphenyl-d14	50.0			37.9	ug/L		76	(36%-130%)		
QC1200308140 MB										
1,2,4-Trichlorobenzene			U	ND	ug/L					10/01/02 14:57
1,2-Dichlorobenzene			U	ND	ug/L					
1,3-Dichlorobenzene			U	ND	ug/L					
1,4-Dichlorobenzene			U	ND	ug/L					
2,4,5-Trichlorophenol			U	ND	ug/L					
2,4,6-Trichlorophenol			U	ND	ug/L					
2,4-Dichlorophenol			U	ND	ug/L					
2,4-Dimethylphenol			U	ND	ug/L					
2,4-Dinitrophenol			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Chloronaphthalene			U	ND	ug/L					
2-Chlorophenol			U	ND	ug/L					
2-Methyl-4,6-dinitrophenol			U	ND	ug/L					
2-Methylnaphthalene			U	ND	ug/L					

QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 204661											
2-Nitrophenol			U	ND	ug/L						
3,3'-Dichlorobenzidine			U	ND	ug/L						
4-Bromophenylphenylether			U	ND	ug/L						
4-Chloro-3-methylphenol			U	ND	ug/L						
4-Chloroaniline			U	ND	ug/L						
4-Chlorophenylphenylether			U	ND	ug/L						
4-Nitrophenol			U	ND	ug/L						
Acenaphthene			U	ND	ug/L						
Acenaphthylene			U	ND	ug/L						
Anthracene			U	ND	ug/L						
Benzo(a)anthracene			U	ND	ug/L						
Benzo(a)pyrene			U	ND	ug/L						
Benzo(b)fluoranthene			U	ND	ug/L						
Benzo(ghi)perylene			U	ND	ug/L						
Benzo(k)fluoranthene			U	ND	ug/L						
Butylbenzylphthalate			U	ND	ug/L						
Carbazole			U	ND	ug/L						
Chrysene			U	ND	ug/L						
Di-n-butylphthalate			U	ND	ug/L						
Di-n-octylphthalate			U	ND	ug/L						
Dibenzo(a,h)anthracene			U	ND	ug/L						
Dibenzofuran			U	ND	ug/L						
Diethylphthalate			U	ND	ug/L						
Dimethylphthalate			U	ND	ug/L						
Diphenylamine			U	ND	ug/L						
Fluoranthene			U	ND	ug/L						
Fluorene			U	ND	ug/L						
Hexachlorobenzene			U	ND	ug/L						
Hexachlorobutadiene			U	ND	ug/L						
Hexachlorocyclopentadiene			U	ND	ug/L						
Hexachloroethane			U	ND	ug/L						
Indeno(1,2,3-cd)pyrene			U	ND	ug/L						
Isophorone			U	ND	ug/L						
N-Nitrosodipropylamine			U	ND	ug/L						
Naphthalene			U	ND	ug/L						
Nitrobenzene			U	ND	ug/L						
Pentachlorophenol			U	ND	ug/L						
Phenanthrene			U	ND	ug/L						
Phenol			U	ND	ug/L						
Pyrene			U	ND	ug/L						
bis(2-Chloroethoxy)methane			U	ND	ug/L						
bis(2-Chloroethyl) ether			U	ND	ug/L						
bis(2-Chloroisopropyl)ether			U	ND	ug/L						
bis(2-Ethylhexyl)phthalate			U	ND	ug/L						
m,p-Cresols			U	ND	ug/L						
m-Nitroaniline			U	ND	ug/L						
o-Cresol			U	ND	ug/L						
o-Nitroaniline			U	ND	ug/L						

QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 204661										
p-Nitroaniline			U	ND	ug/L					
**2,4,6-Tribromophenol	100			54.8	ug/L		55	(27%-126%)		
**2-Fluorobiphenyl	50.0			34.3	ug/L		69	(32%-109%)		
**2-Fluorophenol	100			36.3	ug/L		36	(13%-73%)		
**Nitrobenzene-d5	50.0			32.9	ug/L		66	(33%-107%)		
**Phenol-d5	100			21.1	ug/L		21	(14%-66%)		
**p-Terphenyl-d14	50.0			33.7	ug/L		67	(36%-130%)		
QC1200308146 67798005 MS										
Pyridine	100			0.00	ug/L					10/01/02 17:02
1,2,4-Trichlorobenzene	100	U	ND	73.9	ug/L		74	(44%-102%)		
1,4-Dichlorobenzene	100	U	ND	68.1	ug/L		68	(48%-95%)		
2,4,5-Trichlorophenol	200	U	ND	177	ug/L		88			
2,4,6-Trichlorophenol	200	U	ND	174	ug/L		87			
2,4-Dinitrotoluene	100	U	ND	77.3	ug/L		77	(48%-120%)		
2-Chlorophenol	200	U	ND	145	ug/L		72	(32%-98%)		
4-Chloro-3-methylphenol	200	U	ND	167	ug/L		84	(40%-107%)		
4-Nitrophenol	200	U	ND	63.5	ug/L		32	(16%-78%)		
Acenaphthene	100	U	ND	84.3	ug/L		84	(32%-127%)		
Hexachlorobenzene	100	U	ND	103	ug/L		103			
Hexachlorobutadiene	100	U	ND	70.3	ug/L		70			
Hexachloroethane	100	U	ND	72.4	ug/L		72			
N-Nitrosodipropylamine	100	U	ND	77.6	ug/L		78	(44%-119%)		
Nitrobenzene	100	U	ND	68.7	ug/L		69			
Pentachlorophenol	200	U	ND	124	ug/L		62	(44%-104%)		
Phenol	200	U	ND	77.6	ug/L		39	(15%-70%)		
Pyrene	100	U	ND	81.0	ug/L		81	(29%-142%)		
m,p-Cresols	200	U	ND	127	ug/L		64			
o-Cresol	200	U	ND	129	ug/L		65			
**2,4,6-Tribromophenol	200		55.6	162	ug/L		81	(27%-126%)		
**2-Fluorobiphenyl	100		29.6	76.8	ug/L		77	(32%-109%)		
**2-Fluorophenol	200		28.7	107	ug/L		53	(13%-73%)		
**Nitrobenzene-d5	100		28.6	64.5	ug/L		65	(33%-107%)		
**Phenol-d5	200		16.9	80.9	ug/L		40	(14%-66%)		
**p-Terphenyl-d14	100		36.0	80.4	ug/L		80	(36%-130%)		
QC1200308147 67798005 MSD										
Pyridine	100			0.00	ug/L					10/01/02 17:22
1,2,4-Trichlorobenzene	100	U	ND	78.8	ug/L	6	79	(0%-20%)		
1,4-Dichlorobenzene	100	U	ND	73.3	ug/L	7	73	(0%-20%)		
2,4,5-Trichlorophenol	200	U	ND	204	ug/L	15	102			
2,4,6-Trichlorophenol	200	U	ND	189	ug/L	8	94			
2,4-Dinitrotoluene	100	U	ND	84.2	ug/L	9	84	(0%-16%)		
2-Chlorophenol	200	U	ND	153	ug/L	6	76	(0%-25%)		
4-Chloro-3-methylphenol	200	U	ND	181	ug/L	8	90	(0%-25%)		
4-Nitrophenol	200	U	ND	79.1	ug/L	22	40	(0%-25%)		
Acenaphthene	100	U	ND	93.5	ug/L	10	94	(0%-24%)		
Hexachlorobenzene	100	U	ND	102	ug/L	1	102			
Hexachlorobutadiene	100	U	ND	75.9	ug/L	8	76			
Hexachloroethane	100	U	ND	76.6	ug/L	6	77			

QC Summary

Workorder: 67798

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal												
Batch 204661												
N-Nitrosodipropylamine	100	U	ND		85.5	ug/L	10	86	(0%-20%)			
Nitrobenzene	100	U	ND		75.8	ug/L	10	76				
Pentachlorophenol	200	U	ND		132	ug/L	6	66	(0%-17%)			
Phenol	200	U	ND		82.9	ug/L	7	42	(0%-29%)			
Pyrene	100	U	ND		70.9	ug/L	13	71	(0%-30%)			
m,p-Cresols	200	U	ND		145	ug/L	13	72				
o-Cresol	200	U	ND		140	ug/L	8	70				
**2,4,6-Tribromophenol	200		55.6		174	ug/L		87	(27%-126%)			
**2-Fluorobiphenyl	100		29.6		83.0	ug/L		83	(32%-109%)			
**2-Fluorophenol	200		28.7		107	ug/L		54	(13%-73%)			
**Nitrobenzene-d5	100		28.6		68.6	ug/L		69	(33%-107%)			
**Phenol-d5	200		16.9		84.5	ug/L		42	(14%-66%)			
**p-Terphenyl-d14	100		36.0		70.5	ug/L		71	(36%-130%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where d
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL.]
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

HPLC EXPLOSIVES ANALYSIS

HPLC Narrative
Sandia National Labs (SNLS)
SDG 67794

Method/Analysis Information

Procedure:	**Nitroaromatics and Nitramines by High Performance Liquid Chromatography (HPLC)**
Analytical Method:	SW846 8330
Prep Method:	SW846 8330 PREP
Analytical Batch Number:	204696
Prep Batch Number:	204695

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8330:

Sample ID	Client ID
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002

67794022	059915-002
1200308210	XBLK01 (Blank)
1200308211	XBLK01LCS (Laboratory Control Sample)
1200308212	059903-002MS (Matrix Spike)
1200308213	059903-002MSD (Matrix Spike Duplicate)

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC or HP Model 1100 HPLC with programmable gradient pumping and a 100 ul loop injector for the primary system and a 100 ul loop injector for the confirmation system. The HPLC 1050 is coupled to a HP Model G1306A Diode Array UV detector, and the HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitor absorbance at the following five wavelengths: 1) 214 nm; 2) 224 nm; 3) 235 nm; 4) 254 nm; 5) 264 nm.

The primary HPLC system is usually identified with either a designation of HPLC #2, or hplcb in the raw data printouts. The confirmation HPLC system is usually identified with a designation of HPLC #1, or hplca in the raw data printouts. The HP 1100 HPLC system is identified as HPLC #3, or hplcc in the raw data printouts. The HP 1100 HPLC has a Column Switching Valve which enables this system to be used for primary analysis or confirmation analysis.

Chromatographic Columns

Chromatographic separation of nitroaromatic and nitramine components is accomplished through analysis on the following reversed phase columns:

HP: Hypersil BDS-C18, 250 mm x 4 mm O.D. containing 5 um particle size.

Confirmation of nitroaromatic and nitramine components, initially identified on one of the above columns, is accomplished through analysis on the following column:

PH: Develosil CN-UG5-5, 250 mm x 4.6 mm I.D.

The primary column is used for quantitation while the confirmation column is for qualitative purposes only.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this SDG.

CCV Requirements
All calibration verification standard(s) (CVS, ICV or CCV)requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries
All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance
The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement
All the LCS spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation
The following sample was used for matrix spike analysis:
059903-002 (059903-002).

MS Recovery Statement
All the matrix spike recoveries were within the established acceptance limits.

MSD Recovery Statement
The matrix spike duplicate recoveries were within the established acceptance limits.

MS/MSD RPD Statement
The relative percent differences (RPD) between the MS and MSD were within the required acceptance limits.

Technical Information

Holding Time Specifications
All samples in this SDG met the specified holding time requirements. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system.

Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
None of the samples in this SDG required dilutions.

Miscellaneous Information

Nonconformance (NCR) Documentation
No nonconformance report (NCR) has been generated for this SDG.

Manual Integrations
Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations.

Additional Comments
The Form 8 uses the retention time of the surrogate as a measure of how close the retention time of the samples and QC are to a standard component. The Instrument Blank does not contain the surrogate.

Confirmation analysis was performed on some of the samples in this batch. The values reported are from the primary analysis. The confirmation analysis is used for qualitative purposes only.

The samples were concentrated prior to analysis to achieve the required detection limit.

The following analytes coelute on the cyano column: a.) 2,4,6-Trinitrotoluene, 2,4-Dinitrotoluene, and 2,6-Dinitrotoluene b.) 1,3,5-Trinitrotoluene and 1,3-Dinitrobenzene c.) m-Nitrotoluene, p-Nitrotoluene and o-Nitrotoluene. As a result some of these analytes may be flagged with a P qualifier. The coelution from the cyano column should be considered and the values as suspect to the sample.

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

Reviewer: Herbert K Meier **Date:** 10/21/02

HPLC Narrative
Sandia National Labs (SNLS)
SDG 67794-1

Method/Analysis Information

Procedure:	**Nitroaromatics and Nitramines by High Performance Liquid Chromatography (HPLC)**
Analytical Method:	SW846 8330
Prep Method:	SW846 8330 PREP
Analytical Batch Number:	205512
Prep Batch Number:	205511

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8330:

Sample ID	Client ID
67798007	059926-004
1200310005	XBLK01 (Blank) 205511
1200310006	XBLK01LCS (Laboratory Control Sample)
1200310007	059926-004MS (Matrix Spike)

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC or HP Model 1100 HPLC with programmable gradient pumping and a 100 ul loop injector for the primary system and a 100 ul loop injector for the confirmation system. The HPLC 1050 is coupled to a HP Model G1306A Diode Array UV detector, and the HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitor absorbance at the following five wavelengths: 1) 214 nm; 2) 224 nm; 3) 235 nm; 4) 254 nm; 5) 264 nm.

The primary HPLC system is usually identified with either a designation of HPLC #2, or hplcb in the raw data printouts. The confirmation HPLC system is usually identified with a designation of HPLC #1, or hplca in the raw data printouts. The HP 1100 HPLC system is identified as HPLC #3, or hplcc in the raw data printouts. The HP 1100 HPLC has a Column Switching Valve which enables this system to be used for primary analysis or confirmation analysis.

Chromatographic Columns

Chromatographic separation of nitroaromatic and nitramine components is accomplished through analysis on the following reversed phase columns:

HP: Hypersil BDS-C18, 250 mm x 4 mm O.D. containing 5 um particle size.

Confirmation of nitroaromatic and nitramine components, initially identified on one of the above columns, is accomplished through analysis on the following column:

PH: Develosil CN-UG5-5, 250 mm x 4.6 mm I.D.

The primary column is used for quantitation while the confirmation column is for qualitative purposes only.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration
All initial calibration requirements have been met for this SDG.

CCV Requirements
All calibration verification standard(s) (CVS, ICV or CCV)requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries
All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance
The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement
Not all the required spiking analytes were within the acceptance limits in the laboratory control sample (LCS). Several spiking compounds were not within the acceptance limits. Please see nonconformance report 6088.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis: *67798007* (059926-004).

MS Recovery Statement
All the matrix spike recoveries were within the established acceptance limits.

MSD Recovery Statement
There was only enough sample provided for one matrix spike.

Technical Information

Holding Time Specifications
All samples in this SDG met the specified holding time requirements. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
None of the samples in this SDG required dilutions.

Miscellaneous Information

Nonconformance (NCR) Documentation
Nonconformance report 6088 was generated for this SDG.

Not all the required spiking analytes were within the acceptance limits in the laboratory control sample (LCS). Several spiking compounds were not within the acceptance limits. Please see nonconformance report 6088.

Manual Integrations
Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations.

Additional Comments
The samples were concentrated prior to analysis to achieve the required detection limit.

Sample *67798007* (059926-004) had a response for some target analytes whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference). Because both columns or detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference between the two columns, it is indicated as such on the appropriate Form I with a P qualifier. Those analytes reported with a percent difference greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material. Analytes reported with a percent difference greater than 70% should be considered undetected.

The Form 8 uses the retention time of the surrogate as a measure of how close the retention time of the samples and QC are to a standard component. The Instrument Blank does not contain the surrogate.

Confirmation analysis was performed on some of the samples in this batch. The values reported are from the primary analysis. The confirmation analysis is used for qualitative purposes only.

The following analytes coelute on the cyano column: a.) 2,4,6-Trinitrotoluene, 2,4-Dinitrotoluene, and 2,6-Dinitrotoluene b.) 1,3,5-Trinitrotoluene and 1,3-Dinitrobenzene c.) m-Nitrotoluene, p-Nitrotoluene and o-Nitrotoluene. As a result some of these analytes may be flagged with a P qualifier. The coelution from the cyano column should be considered and the values as suspect to the sample.

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

Reviewer: Heather M Mauer **Date:** 10/21/02

HPLC QUALITY CONTROL SUMMARY

QC Summary

Report Date: October 21, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 204696										
QC1200308211 LCS										
1,3,5-Trinitrobenzene	800			790	ug/kg		99	(77%-124%)	JLW	10/07/02 11:14
2,4,6-Trinitrotoluene	800			818	ug/kg		102	(80%-120%)		
2,4-Dinitrotoluene	800			756	ug/kg		95	(77%-122%)		
2,6-Dinitrotoluene	800			786	ug/kg		98	(74%-121%)		
2-Amino-4,6-dinitrotoluene	800			832	ug/kg		104	(81%-125%)		
4-Amino-2,6-dinitrotoluene	800			781	ug/kg		98	(79%-123%)		
HMX	800			843	ug/kg		105	(84%-131%)		
Nitrobenzene	800			725	ug/kg		91	(75%-125%)		
RDX	800			830	ug/kg		104	(80%-123%)		
Tetryl	800			544	ug/kg		68	(65%-124%)		
m-Dinitrobenzene	800			778	ug/kg		97	(77%-124%)		
m-Nitrotoluene	800			731	ug/kg		91	(77%-117%)		
o-Nitrotoluene	800			723	ug/kg		90	(75%-119%)		
p-Nitrotoluene	800			731	ug/kg		91	(76%-121%)		
**1,2-dinitrobenzene	400			384	ug/kg		96	(71%-118%)		
QC1200308210 MB										
1,3,5-Trinitrobenzene			U	ND	ug/kg					10/07/02 10:32
2,4,6-Trinitrotoluene			U	ND	ug/kg					
2,4-Dinitrotoluene			U	ND	ug/kg					
2,6-Dinitrotoluene			U	ND	ug/kg					
2-Amino-4,6-dinitrotoluene			U	ND	ug/kg					
4-Amino-2,6-dinitrotoluene			U	ND	ug/kg					
HMX			U	ND	ug/kg					
Nitrobenzene			U	ND	ug/kg					
RDX			U	ND	ug/kg					
Tetryl			U	ND	ug/kg					
m-Dinitrobenzene			U	ND	ug/kg					
m-Nitrotoluene			U	ND	ug/kg					
o-Nitrotoluene			U	ND	ug/kg					
p-Nitrotoluene			U	ND	ug/kg					
**1,2-dinitrobenzene	400			373	ug/kg		93	(71%-118%)		
QC1200308212 67794012 MS										
1,3,5-Trinitrobenzene	800	U	ND	836	ug/kg		104	(66%-133%)		10/07/02 11:56
2,4,6-Trinitrotoluene	800	U	ND	842	ug/kg		105	(77%-132%)		
2,4-Dinitrotoluene	800	U	ND	825	ug/kg		103	(61%-134%)		
2,6-Dinitrotoluene	800	U	ND	872	ug/kg		109	(70%-121%)		
2-Amino-4,6-dinitrotoluene	800	U	ND	865	ug/kg		108	(79%-124%)		
4-Amino-2,6-dinitrotoluene	800	U	ND	818	ug/kg		102	(71%-120%)		
HMX	800	U	ND	840	ug/kg		105	(75%-138%)		
Nitrobenzene	800	U	ND	788	ug/kg		99	(72%-120%)		
RDX	800	U	ND	839	ug/kg		105	(61%-136%)		
Tetryl	800	U	ND	656	ug/kg		82	(65%-135%)		

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 204696										
m-Dinitrobenzene	800	U	ND	848	ug/kg		106	(75%-125%)		
m-Nitrotoluene	800	U	ND	796	ug/kg		99	(73%-116%)		
o-Nitrotoluene	800	U	ND	790	ug/kg		99	(68%-122%)		
p-Nitrotoluene	800	U	ND	799	ug/kg		100	(67%-125%)		
**1,2-dinitrobenzene	400		389	404	ug/kg		101	(71%-118%)		
QC1200308213 67794012 MSD										
1,3,5-Trinitrobenzene	800	U	ND	865	ug/kg	3	108	(0%-20%)		10/07/02 12:38
2,4,6-Trinitrotoluene	800	U	ND	894	ug/kg	6	112	(0%-20%)		
2,4-Dinitrotoluene	800	U	ND	866	ug/kg	5	108	(0%-24%)		
2,6-Dinitrotoluene	800	U	ND	936	ug/kg	7	117	(0%-21%)		
2-Amino-4,6-dinitrotoluene	800	U	ND	901	ug/kg	4	113	(0%-20%)		
4-Amino-2,6-dinitrotoluene	800	U	ND	838	ug/kg	2	105	(0%-20%)		
HMX	800	U	ND	868	ug/kg	3	109	(0%-38%)		
Nitrobenzene	800	U	ND	834	ug/kg	6	104	(0%-21%)		
RDX	800	U	ND	871	ug/kg	4	109	(0%-35%)		
Tetryl	800	U	ND	580	ug/kg	12	73	(0%-30%)		
m-Dinitrobenzene	800	U	ND	890	ug/kg	5	111	(0%-23%)		
m-Nitrotoluene	800	U	ND	845	ug/kg	6	106	(0%-20%)		
o-Nitrotoluene	800	U	ND	830	ug/kg	5	104	(0%-23%)		
p-Nitrotoluene	800	U	ND	840	ug/kg	5	105	(0%-22%)		
**1,2-dinitrobenzene	400		389	413	ug/kg		103	(71%-118%)		

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 21, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 205512										
QC1200310006 LCS										
1,3,5-Trinitrobenzene	1.04			0.997	ug/L		96	(84%-110%)	JLW	10/04/02 22:13
2,4,6-Trinitrotoluene	1.04			1.01	ug/L		97	(85%-110%)		
2,4-Dinitrotoluene	1.04			0.815	ug/L		79	(78%-110%)		
2,6-Dinitrotoluene	1.04			0.855	ug/L		82	(79%-110%)		
2-Amino-4,6-dinitrotoluene	1.04			1.02	ug/L		99	(77%-110%)		
4-Amino-2,6-dinitrotoluene	1.04			0.799	ug/L		77	(59%-110%)		
HMX	1.04			1.01	ug/L		97	(86%-110%)		
Nitrobenzene	1.04			0.710	ug/L		68	(68%-110%)		
RDX	1.04			0.997	ug/L		96	(76%-110%)		
Tetryl	1.04			0.910	ug/L		88	(73%-110%)		
m-Dinitrobenzene	1.04			0.789	ug/L		76	(76%-110%)		
m-Nitrotoluene	1.04			0.740	ug/L		71*	(73%-110%)		
o-Nitrotoluene	1.04			0.746	ug/L		72	(69%-110%)		
p-Nitrotoluene	1.04			0.749	ug/L		72*	(73%-110%)		
**1,2-dinitrobenzene	0.519			0.399	ug/L		77	(59%-118%)		
QC1200310005 MB										
1,3,5-Trinitrobenzene			U	ND	ug/L					10/04/02 21:31
2,4,6-Trinitrotoluene			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Amino-4,6-dinitrotoluene			U	ND	ug/L					
4-Amino-2,6-dinitrotoluene			U	ND	ug/L					
HMX			U	ND	ug/L					
Nitrobenzene			U	ND	ug/L					
RDX			U	ND	ug/L					
Tetryl			U	ND	ug/L					
m-Dinitrobenzene			U	ND	ug/L					
m-Nitrotoluene			U	ND	ug/L					
o-Nitrotoluene			U	ND	ug/L					
p-Nitrotoluene			U	ND	ug/L					
**1,2-dinitrobenzene	0.519			0.448	ug/L		86	(59%-118%)		
QC1200310007 67798007 MS										
1,3,5-Trinitrobenzene	1.04	U	ND	1.05	ug/L		101	(62%-121%)		10/04/02 22:56
2,4,6-Trinitrotoluene	1.04	U	ND	1.07	ug/L		103	(56%-137%)		
2,4-Dinitrotoluene	1.04	U	ND	1.03	ug/L		100	(69%-118%)		
2,6-Dinitrotoluene	1.04	U	ND	1.06	ug/L		102	(63%-123%)		
2-Amino-4,6-dinitrotoluene	1.04	U	ND	1.08	ug/L		104	(60%-133%)		
4-Amino-2,6-dinitrotoluene	1.04	U	ND	1.01	ug/L		97	(50%-121%)		
HMX	1.04	U	ND	1.05	ug/L		101	(66%-131%)		
Nitrobenzene	1.04	U	ND	0.945	ug/L		91	(61%-106%)		
RDX	1.04	U	ND	1.06	ug/L		102	(52%-135%)		
Tetryl	1.04	JP	0.042	0.860	ug/L		79	(52%-124%)		

QC Summary

Workorder: 67798

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal												
Batch 205512												
m-Dinitrobenzene	1.04	U	ND		1.03	ug/L		99	(64%-117%)			
m-Nitrotoluene	1.04	U	ND		0.983	ug/L		95	(56%-129%)			
o-Nitrotoluene	1.04	U	ND		0.988	ug/L		95	(58%-122%)			
p-Nitrotoluene	1.04	U	ND		0.986	ug/L		95	(65%-116%)			
**1,2-dinitrobenzene	0.519		0.485		0.505	ug/L		97	(59%-118%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where d
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. 1
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

GC
SEMIVOLATILE
PCB
ANALYSIS

PCB Case Narrative
Sandia National Labs (SNLS)
SDG# 67794

Method/Analysis Information

Procedure:	**Polychlorinated Biphenyls by Method 8082**
Analytical Method:	SW846 8082
Prep Method:	SW846 3550B
Analytical Batch Number:	204381
Prep Batch Number:	204380

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8082:

Sample ID	Client ID
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
67794022	059915-002
1200307556	PBLK01(Method Blank)
1200307557	PBLK01LCS(Laboratory Control Sample)
1200307560	059903-002MS(Matrix Spike)
1200307561	059903-002MSD(matrix Spike Duplicate)

System Configuration

Chromatographic Columns

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.5 3mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
J&W6	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
RESTEK	Rtx-CLPesticides 30m x 0.25mm x 0.25um Rtx-CLPesticides II 30m x 0.25mm x 0.20um

* Durabond and DB-XLB are trademarks of J & W.

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below.

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	RESTEK
ECD2	HP 6890 Series GC ECD/ECD	RESTEK
ECD3	HP 6890 Series GC ECD/ECD	RESTEK
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP 6890 Series GC ECD/ECD	J&W5
ECD7	HP 6890 Series GC ECD/ECD	J&W5
ECD8	HP 6890 Series GC ECD/ECD	RESTEK

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CVS Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

The Laboratory Control Sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

The following sample was selected for the PCB method QC:

Client Sample ID#	Laboratory Sample ID#
059903-002	67794012

The method QC included a Matrix Spike (MS) and Matrix Spike Duplicate (MSD).

MS Recovery Statement

The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement

The matrix spike duplicate recoveries for this SDG were within the established acceptance limits.

MS/MSD RPD Statement

The relative percent differences (RPD) between each MS and MSD were within the required acceptance limits.

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time requirements.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All samples underwent sulfur cleanup procedure.

Sample Dilutions

None of the samples in this SDG was required dilution.

Sample Re-prep/Re-analysis

None of the samples in this sample group were reprepped or reanalyzed.

Miscellaneous Information

Nonconformance (NCR) Documentation

No nonconformance reports (NCRs) have been generated for this SDG.

Manual Integrations

Certain standards and samples required manual integrations to correctly position the baseline as set in the calibration standard injections. If manual integrations are performed, copies of all manual integration peak profiles will be included in the raw data section of this package.

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. The following additional comments were required for this sample set:

Aroclors quantitated on the raw data report by the Target data system do not necessarily represent positive aroclor identification. In order for positive identification to be made, the aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the aroclor is reported as a non-detect on the data report. These situations will be noted on the raw data as DMP, representing "does not match pattern", or DNC "does not confirm". Sample 67794018 contained more than one PCB. The quantitation of PCB may be elevated due to overlapping PCB patterns.

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: Jimi Cao **Date:** 10/18/02

PCB Case Narrative
Sandia National Labs (SNLS)
SDG# 67794-1

Method/Analysis Information

Procedure:	**Polychlorinated Biphenyls by Method 8082**
Analytical Method:	SW846 8082
Prep Method:	SW846 3510C
Analytical Batch Number:	204654
Prep Batch Number:	204653

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8082:

Sample ID	Client ID
67798006	059926-003
1200308119	PBLK01 (Method Blank)
1200308120	PBLK01LCS (Laboratory Control Sample)

System Configuration

Chromatographic Columns

Column ID	Column Description
J&W1	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-608 Durabond stationary phase* 30m x 0.53mm x 0.5um
J&W2	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.32mm x 1.0um DB-1701 Durabond stationary phase* 30m x 0.32mm x 0.5um
J&W3	DB-5(5%-Phenyl)-methylsiloxane 30m x 0.53mm x 1.5um DB-1701(14% Cyanopropylphenyl)-methylsiloxane 30m x 0.53mm x 0.5um
J&W4	DB-608 Durabond stationary phase* 30m x 0.53mm x .83um DB-XLB* 30m x 0.53mm x 1.5um
J&W5	DB-XLB* 30m x 0.25mm x 0.25um DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x

0.25um

J&W6 DB-5(5%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um
DB-17MS(50%-Phenyl)-methylsiloxane 30m x 0.25mm x 0.25um

* Durabond and DB-XLB are trademarks of J & W.

Instrument Configuration

The samples reported in this SDG were analyzed on one or more of the following instrument systems. Instrument systems are referenced in the raw data and individual form headers by the Instrument ID designations listed below.

Instrument ID	System Configuration	Chromatographic Column
ECD1	HP 6890 Series GC ECD/ECD	RESTEK*
ECD2	HP 6890 Series GC ECD/ECD	RESTEK*
ECD3	HP 6890 Series GC ECD/ECD	RESTEK*
ECD4	HP 5890 Series II Plus GC ECD/ECD	J&W5
ECD5	HP 6890 Series GC ECD/ECD	J&W5
ECD7	HP 6890 Series GC ECD/ECD	J&W5
ECD8	HP 6890 Series GC ECD/ECD	RESTEK*

*The columns were changed to RTX-CLPEST1 and RTX-CLPEST2.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

The Laboratory Control Sample (LCS) spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

The MS and MSD were analyzed on a sample contained in another SNLS SDG (67821).

MS Recovery Statement

The matrix spike recoveries for this SDG were within the established acceptance limits.

MSD Recovery Statement

The matrix spike duplicate recoveries for this SDG were within the established acceptance limits.

MS/MSD RPD Statement

The relative percent differences (RPD) between each MS and MSD were within the required acceptance limits.

Technical Information

Holding Time Specifications

GEL assigns holding times based on the associated methodology which assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time requirements.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

None of the samples in this SDG required any dilutions.

Sample Re-prep/Re-analysis

None of the samples in this sample group were reprepped or reanalyzed.

Miscellaneous Information

Nonconformance (NCR) Documentation

No nonconformance reports (NCRs) have been generated for this SDG.

Manual Integrations

No manual integrations were required for any data file in this SDG. Certain standards and QC samples may have required manual integrations to correctly position the baseline as set in the calibration standard injections. If manual integrations were performed, copies of all manual integration peak profiles are included in the raw data section of this PCB fraction.

Additional Comments

The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. The following additional comments were required for this sample set:

Aroclors quantitated on the raw data report by the Target data system do not necessarily represent a positive aroclor identification. In order for positive identification to be made, the aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the aroclor is reported as a non-detect on the data report. These situations will be noted on the raw data as DMP, representing "does not match pattern", or DNC "does not confirm".

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: Jimi Cao **Date:** 10/13/05

GC/ECD
PCB
QUALITY CONTROL
SUMMARY

QC Summary

Report Date: October 18, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Pulssant

Workorder: 67794

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB Federal											
Batch 204381											
QC1200307557 LCS											
Aroclor-1260	33.3				29.7	ug/kg		89	(48%-116%)	GH1	10/01/02 10:49
**4cmx	6.67				5.06	ug/kg		76	(31%-120%)		
**Decachlorobiphenyl	6.67				5.52	ug/kg		83	(34%-115%)		
QC1200307556 MB											
Aroclor-1016				U	ND	ug/kg					10/01/02 10:37
Aroclor-1221				U	ND	ug/kg					
Aroclor-1232				U	ND	ug/kg					
Aroclor-1242				U	ND	ug/kg					
Aroclor-1248				U	ND	ug/kg					
Aroclor-1254				U	ND	ug/kg					
Aroclor-1260				U	ND	ug/kg					
**4cmx	6.67				5.16	ug/kg		77	(31%-120%)		
**Decachlorobiphenyl	6.67				5.43	ug/kg		82	(34%-115%)		
QC1200307560 67794012 MS											
Aroclor-1260	33.3	U	ND		14.8	ug/kg		44	(36%-134%)		10/01/02 14:03
**4cmx	6.67		4.81		2.39	ug/kg		36	(31%-120%)		
**Decachlorobiphenyl	6.67		5.27		2.72	ug/kg		41	(34%-115%)		
QC1200307561 67794012 MSD											
Aroclor-1260	33.3	U	ND		15.6	ug/kg	5	47	(0%-30%)		10/01/02 14:16
**4cmx	6.67		4.81		2.53	ug/kg		38	(31%-120%)		
**Decachlorobiphenyl	6.67		5.27		2.86	ug/kg		43	(34%-115%)		

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. T
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 17, 2002

Client: Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67798

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB Federal												
Batch 204654												
QC1200308120 LCS												
Aroclor-1260	1.00				0.770	ug/L		77	(47%-131%)	MM	10/01/02	13:03
**4cmx	0.200				0.148	ug/L		74	(34%-116%)			
**Decachlorobiphenyl	0.200				0.126	ug/L		63	(21%-122%)			
QC1200308119 MB												
Aroclor-1016				U	ND	ug/L					10/01/02	12:52
Aroclor-1221				U	ND	ug/L						
Aroclor-1232				U	ND	ug/L						
Aroclor-1242				U	ND	ug/L						
Aroclor-1248				U	ND	ug/L						
Aroclor-1254				U	ND	ug/L						
Aroclor-1260				U	ND	ug/L						
**4cmx	0.200				0.145	ug/L		72	(34%-116%)			
**Decachlorobiphenyl	0.200				0.140	ug/L		70	(21%-122%)			
QC1200308125 67821005 MS												
Aroclor-1260	1.00	U	ND		0.560	ug/L		56	(21%-113%)		10/01/02	12:18
**4cmx	0.200		0.132		0.130	ug/L		65	(34%-116%)			
**Decachlorobiphenyl	0.200		0.0574		0.0692	ug/L		35	(21%-122%)			
QC1200308126 67821005 MSD												
Aroclor-1260	1.00	U	ND		0.600	ug/L	7	60	(0%-30%)		10/01/02	12:29
**4cmx	0.200		0.132		0.133	ug/L		66	(34%-116%)			
**Decachlorobiphenyl	0.200		0.0574		0.0771	ug/L		39	(21%-122%)			

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma specroscopy.

QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

INORGANIC ANALYSIS

Inorganic Case Narrative for
Sandia National Laboratory
SDG# 67794

Sample Analysis:

The following samples were prepared and analyzed using the methods referenced in the "Method/Analysis Information" section of this narrative:

Sample ID	Client ID
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
67794022	059915-002
1200307723	Method Blank (MB) **ICP**
1200307727	Laboratory Control Sample (LCS)
1200307725	059903-002L (67794012) Serial Dilution (SD)
1200307724	059903-002D (67794012) Sample Duplicate (DUP)
1200307726	059903-002S (67794012) Matrix Spike (MS)
1200307714	Method Blank (MB) **CVAA**
1200307717	Laboratory Control Sample (LCS)
1200307715	059903-002D (67794012) Sample Duplicate (DUP)
1200307716	059903-002S (67794012) Matrix Spike (MS)

Method/Analysis Information:

Analytical Batch:	204440, 204452
Prep Batch :	204439, 204451
Standard Operating Procedures:	GL-MA-E-013 REV.6, GL-MA-E-010 REV.10
Analytical Method:	SW846 6010B, SW846 7471A
Prep Method :	SW846 3050B, SW846 7471A Prep

System Configuration

The ICP analysis was performed on a Thermo Jarrell Ash 61E Trace axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Meinhardt nebulizer, cyclonic spray chamber, and yttrium internal standard. Operating conditions for the Trace ICP are set at a power level of 950 watts. The instrument has a peristaltic pump flow rate of 140 RPM (2.0 mL/min sample uptake rate), argon gas flows of 15 L/min and 0.5 L/min for the torch and auxiliary gases, and a pressure setting of 26 PSI for the nebulizer.

Mercury analysis was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-400) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 254 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 5 L/min.

Sample Preparation
All samples were prepared in accordance with the referenced SW-846 procedures.
Calibration Information:

Initial Calibration
Instrument calibrations are conducted using method and instrument manufacturer's specifications. All initial calibration requirements have been met for this analysis.

CRDL Requirements
All CRDL standards met the referenced advisory control limits.

Continuing Calibration (CCV) Requirements
All CCV standards bracketing this SDG met the established recovery acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements
All continuing calibration blanks (CCB) bracketing this SDG met the established acceptance criteria.

ICSA/ICSAB Requirements
All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

Quality Control (QC) Information:

Method Blank Acceptance
The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the required detection limits (RDL).

LCS Recovery Statement
All LCS spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation
Sample 67794012 was designated as the quality control sample for the ICP and CVAA batches. Each batch included a sample duplicate (DUP) and a matrix spike (MS). The ICP batch included a serial dilution (SD).

MS Recovery Statement
The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All qualifying elements met the established acceptance limits for percent recovery.

RPD Statement
The relative percent difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria of 20% when the sample is greater than five times (5X) the contract required detection limit (RDL). In cases where either the sample or duplicate value is less than 5X the RDL, a control limit of +/- the RDL is used to evaluate the DUP results. All applicable elements met the DUP acceptance criteria, with the exceptions of arsenic, chromium, and lead, as indicated by the "*" qualifiers.

Serial Dilution % Difference Statement
The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw element concentrations that are at least 50X the MDL for ICP analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria.

Technical Information:

Holding Time Specifications
All samples were analyzed within the specified holding times.

Sample Dilutions
Dilutions are performed to minimize matrix interference resulting from elevated mineral element concentrations and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. The samples were diluted the standard 2x for soils on the ICP. No dilutions were required for the CVAA analysis.

Miscellaneous Information:

NCR Documentation
Nonconformance reports are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. No NCR's were issued for this SDG.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. Additional comments were not required for this SDG.

Review/Validation:

GEL requires all analytical data to be verified by a qualified data validator.

The following data validator verified the data presented in this SDG:

Reviewer: Allison Dell C

Date: 10/17/12

Metals Case Narrative for
Sandia National Labs (SNLS)
SDG# 67794-1

Sample Analysis:
The following samples first extracted by SW 846 method 1311, then prepared and analyzed using the methods referenced in the "Method/Analysis Information" section of this narrative:

Sample ID	Client ID
67798010	059926-007
1200307728	Methods Blank (MB) **ICP**-204455/204453
1200307729	LCS for batch 204453
1200307666	Methods Blank (MB) **CVAA**-204420/204419
1200307669	Laboratory Control Sample (LCS)

Method/Analysis Information:

Analytical Batch #:	204455, 204420
Prep Batch #:	204453, 204419
Analytical Method:	SW846 6010B, SW846 7470A
Prep Method:	SW846 3010, SW846 7470A
Standard Operating Procedure:	GL-MA-E-013 REV.6, GL-MA-E-010 REV.10

System Configuration
The ICP analysis was performed on a Thermo Jarrell Ash 61E Trace axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Meinhardt nebulizer, cyclonic spray chamber, and yttrium internal standard. Operating conditions for the Trace ICP are set at a power level of 950 watts. The instrument has a peristaltic pump flow rate of 140 RPM (2.0 mL/min sample uptake rate), argon gas flows of 15 L/min and 0.5 L/min for the torch and auxiliary gases, and a pressure setting of 26 PSI for the nebulizer.

Mercury analysis was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-400) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 254 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 5 L/min.

Sample Preparation
All samples were prepared in accordance with the referenced SW-846 procedures.

Calibration Information:

Initial Calibration
Instrument calibrations are conducted using method and instrument manufacturer's specifications. All initial calibration requirements have been met for the analyses.

CRDL Requirements
All element recoveries in the CRDL standards met the advisory control limits (70% - 130).
ICSA/ICSAB Requirements
All interference check standard (ICSA and ICSAB) elements associated with this SDG met the established acceptance criteria.

Continuing Calibration (CCV) Requirements
All CCV standards bracketing samples from this SDG met the established recovery acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements
All continuing calibration blanks (CCB) bracketing samples from this SDG met the established acceptance criteria.

Quality Control (QC) Information:

Method Blank Acceptance
The preparation blanks analyzed with this SDG did not contain analytes of interest at concentrations greater than the client required detection limits (CRDL).

LCS Recovery Statement
All LCS spike recoveries for this SDG were within the required acceptance limits.

QC Sample Statement
Sample 060043-003 (67821004) from SNLS SDG 67821 was designated as the quality control sample for the ICP batch. Sample 059582-007 (67354008) from SNLS SDG 67354 was designated as the quality control sample for the CVAA batch. A matrix spike (MS) and a sample duplicate (DUP) were analyzed in each batch. A serial dilution (SD) was analyzed in the ICP batch.

MS Recovery Statement
The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS analyses met the recommended quality control acceptance criteria for percent recovery (75%-125%) for all applicable analytes.

DUP RPD Statement
The relative percent difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria of 20% when the sample is greater than five times (5X) the contract required detection limit (RDL). In cases where either the sample or duplicate value is less than 5X the RDL, a control limit of +/- the RDL is used to evaluate the DUP results. All applicable elements met the DUP acceptance criteria.

Serial Dilution % Difference Statement
The serial dilution is used to assess interference caused by matrix suppression or enhancement. Raw element concentrations that are at least 50X the MDL for ICP analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria.

Technical Information:

Holding Time Specifications
All samples in this SDG met the specified holding time requirements.

Sample Dilutions
Dilutions are performed to minimize matrix interferences (e.g., those resulting from elevated mineral element concentrations) present in the sample and/or to bring over range target analyte concentrations into the linear calibration range of the instruments. No dilution was required.

Miscellaneous Information:

NCR Documentation
Nonconformance reports (NCR) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. No NCR was generated with this SDG.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis and to list any report documents generated as a result of sample analysis or review. Additional comments were not required for this SDG.

Review/Validation:

GEL requires all analytical data to be verified by a qualified data validator.

The following data validator verified the data presented in this SDG:

Reviewer: _____

Date: 10/31/02

INORGANICS QUALITY CONTROL SUMMARY

QC Summary

Report Date: October 17, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Federal										
Batch 204452										
QC1200307724 67794012 DUP										
Arsenic		1.87		1.35	mg/kg	32* ^		(+/-0.481)	HSC	10/15/02 02:49
Barium		44.2		50.4	mg/kg	13		(0%-20%)		
Cadmium		0.196	J	0.126	mg/kg	N/A ^		(+/-0.481)		
Chromium		6.62		4.39	mg/kg	40*		(0%-20%)		
Lead		4.44		2.81	mg/kg	45*		(0%-20%)		
Selenium	U	ND	U	ND	mg/kg	N/A		(+/-0.481)		
Silver	J	0.323	J	0.333	mg/kg	N/A ^		(+/-0.481)		
QC1200307727 LCS										
Arsenic	192			214	mg/kg		112	(79%-121%)		10/15/02 02:32
Barium	417			484	mg/kg		116	(80%-120%)		
Cadmium	125			139	mg/kg		111	(81%-119%)		
Chromium	133			152	mg/kg		114	(77%-123%)		
Lead	160			181	mg/kg		113	(78%-123%)		
Selenium	97.0			105	mg/kg		108	(72%-128%)		
Silver	115			135	mg/kg		118	(55%-145%)		
QC1200307723 MB										
Arsenic			U	ND	mg/kg					10/15/02 02:26
Barium			U	ND	mg/kg					
Cadmium			U	ND	mg/kg					
Chromium			U	ND	mg/kg					
Lead			U	ND	mg/kg					
Selenium			U	ND	mg/kg					
Silver			U	ND	mg/kg					
QC1200307726 67794012 MS										
Arsenic	24.3	1.87		25.5	mg/kg		97	(75%-125%)		10/15/02 02:55
Barium	24.3	44.2		68.2	mg/kg		99	(75%-125%)		
Cadmium	24.3	0.196	J	23.3	mg/kg		95	(75%-125%)		
Chromium	24.3	6.62		30.5	mg/kg		98	(75%-125%)		
Lead	24.3	4.44		27.7	mg/kg		96	(75%-125%)		
Selenium	24.3	ND	U	22.3	mg/kg		92	(75%-125%)		
Silver	24.3	0.323	J	26.5	mg/kg		108	(75%-125%)		
QC1200307725 67794012 SDILT										
Arsenic		19.1	U	ND	ug/L	N/A				10/15/02 02:43
Barium		451		91.4	ug/L	1.41				
Cadmium		1.99	U	ND	ug/L	N/A				
Chromium		67.5		14.0	ug/L	3.63				
Lead		45.3		9.16	ug/L	1.13				
Selenium	U	ND	U	ND	ug/L	N/A				
Silver	J	3.29	U	ND	ug/L	N/A				
Metals Analysis-Mercury Federal										
Batch 204440										
QC1200307715 67794012 DUP										

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury Federal											
Batch 204440											
Mercury		J 0.00179	J	0.00147	mg/kg	N/A		(+/-0.00979)	NOR1	10/15/02	11:15
QC1200307717 LCS											
Mercury	24.0			21.1	mg/kg		88	(66%-134%)		10/15/02	11:07
QC1200307714 MB											
Mercury			U	ND	mg/kg					10/15/02	11:05
QC1200307716 67794012 MS											
Mercury	0.093	J 0.00179		0.0954	mg/kg		101	(75%-125%)		10/15/02	11:17

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

*	Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
**	Indicates analyte is a surrogate compound.
B	The analyte was found in the blank above the effective MDL.
H	Holding time was exceeded
J	Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
P	The response between the confirmation column and the primary column is >40%D
U	The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL.
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
X	Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 3, 2002

Client: Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Federal										
Batch 204455										
QC1200307730 67821004 DUP										
Arsenic		U ND	U	ND	mg/L	N/A		(+/-0.005)	HSC	10/01/02 23:30
Barium			J	0.00381	mg/L	N/A ^		(+/-0.005)		
Cadmium		J 0.00473	J	0.00469	mg/L	N/A ^		(+/-0.005)		
Chromium		BJ 0.00101	BJ	0.000999	mg/L	N/A ^		(+/-0.005)		
Lead		J 0.00387	J	0.00421	mg/L	N/A ^		(+/-0.005)		
Selenium		U ND	U	ND	mg/L	N/A		(+/-0.005)		
Silver		U ND	U	ND	mg/L	N/A		(+/-0.005)		
QC1200307729 LCS										
Arsenic	0.500			0.504	mg/L		101	(80%-120%)		10/01/02 22:54
Barium	0.500			0.516	mg/L		103	(80%-120%)		
Cadmium	0.500			0.510	mg/L		102	(80%-120%)		
Chromium	0.500		B	0.513	mg/L		103	(80%-120%)		
Lead	0.500			0.520	mg/L		104	(80%-120%)		
Selenium	0.500			0.495	mg/L		99	(80%-120%)		
Silver	0.500			0.491	mg/L		98	(80%-120%)		
QC1200307728 MB										
Arsenic			U	ND	mg/L					10/01/02 22:48
Barium			U	ND	mg/L					
Cadmium			U	ND	mg/L					
Chromium			J	0.000567	mg/L					
Lead			U	ND	mg/L					
Selenium			U	ND	mg/L					
Silver			U	ND	mg/L					
QC1200307731 67821004 MS										
Arsenic	0.500	U ND		0.504	mg/L		101	(75%-125%)		10/01/02 23:36
Barium	0.500			0.523	mg/L		104	(75%-125%)		
Cadmium	0.500	J 0.00473		0.514	mg/L		102	(75%-125%)		
Chromium	0.500	BJ 0.00101	B	0.518	mg/L		103	(75%-125%)		
Lead	0.500	J 0.00387		0.525	mg/L		104	(75%-125%)		
Selenium	0.500	U ND		0.503	mg/L		101	(75%-125%)		
Silver	0.500	U ND		0.491	mg/L		98	(75%-125%)		
QC1200307732 67821004 SDILT										
Arsenic		U ND	J	2.65	ug/L	N/A				10/01/02 23:24
Barium			J	0.888	ug/L	N/A				
Cadmium		J 4.73	J	0.787	ug/L	16.8				
Chromium		BJ 1.01	BJ	0.917	ug/L	352				
Lead		J 3.87	J	1.91	ug/L	145				
Selenium		U ND	U	ND	ug/L	N/A				
Silver		U ND	U	ND	ug/L	N/A				
Metals Analysis-Mercury Federal										
Batch 204420										
QC1200307667 67354008 DUP										

QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury Federal										
Batch 204420										
Mercury		U	ND	U	ND	mg/L	N/A		(+/-0.0002)	NOR1 10/01/02 11:27
QC1200307669 LCS										
Mercury	0.002				0.00213	mg/L		106	(80%-120%)	10/01/02 11:17
QC1200307666 MB										
Mercury				U	ND	mg/L				10/01/02 11:15
QC1200307668 67354008 MS										
Mercury	0.002	U	ND		0.0021	mg/L		104	(75%-125%)	10/01/02 11:29

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. 1
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

GENERAL CHEMISTRY ANALYSIS

General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 67794

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	205123
Prep Batch Number:	205122

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9012A:

Sample ID	Client ID
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
1200309255	MB
1200309256	DUP of 67601015

1200309257	DUP of 67601016
1200309258	MS of 67601015
1200309259	MS of 67601016
1200309261	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Lachat QuickChem FIA+

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following SNLS samples were designated for Quality Control: 67601015 and 67601016

Sample Spike Recovery
The spike recoveries for this sample set were within the required acceptance limits.

Sample Duplicate Acceptance
The Relative Percent Differences between the samples and duplicates for this SDG were within the required acceptance limits.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200309261.

Sample Reanalysis
The method blank (1200309255) was reanalyzed because there was no sample in the autosampler cup during the original analysis.

Miscellaneous Information:

Nonconformance Reports
No Nonconformance Reports (NCR) were required for any of the samples in this sample group for this analysis.

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	206136
Prep Batch Number:	206135

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9012A:

Sample ID	Client ID
67794022	059915-002
1200311349	MB
1200311351	DUP of 67794022
1200311352	MS of 67794022
1200311367	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Lachat QuickChem FIA+

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following sample was designated for Quality Control: 67794022.

Sample Spike Recovery
The spike recovery for this sample set was within the required acceptance limits.

Sample Duplicate Acceptance
The values for the sample and duplicate for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200311367.

Miscellaneous Information:

Nonconformance Reports
No Nonconformance Reports (NCR) were required for any of the samples in this sample group for this analysis.

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Prep Method:	SW846 3060A
Analytical Batch Number:	205618
Prep Batch Number:	205617

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
67794012	059903-002
1200310247	MB
1200310248	DUP of 67601013
1200310249	DUP of 67601023
1200310250	MS of 67601013
1200310251	MS of 67601023
1200310252	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following SNLS samples were designated for Quality Control: 67601013 and 67601023.

Sample Spike Recovery
The spike recoveries for this sample set were within the GEL SPC limits, but were outside of the client's required acceptance limits of 75%-125%. See NCR# 6532.

Sample Duplicate Acceptance
The Relative Percent Differences between the samples and duplicates for this SDG were within the required acceptance limits.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports
NCR# 6532 was written for this sample batch.

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Prep Method:	SW846 3060A
Analytical Batch Number:	205620
Prep Batch Number:	205619

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
67794022	059915-002
1200310253	MB
1200310254	DUP of 67794013
1200310255	MS of 67794013
1200310256	LCS

SOP Reference

Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
The following sample was designated for Quality Control: 67794013.

Sample Spike Recovery
The spike recovery for this sample set was within the required acceptance limits.

Sample Duplicate Acceptance
The values for the sample and duplicate for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports
No Nonconformance Reports (NCR) were required for any of the samples in this sample group for this analysis.

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: _____ **Date:** 10/24/05

General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 67794-1

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Analytical Batch Number:	204193

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
67798009	059926-006
1200307123	MB for batch 204193
1200307124	DUP of 67608009
1200307125	PS of 67608009
1200307126	LCS for batch 204193

SOP Reference

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-044 REV.4.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Milton Roy Spectrophotometer 200

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

Quality Control
SNLS sample 67608009 was designated for Quality Control.

Sample Spike Recovery
The spike recovery for this sample set was within the required acceptance limits.

Sample Duplicate Acceptance
The Relative Percent Difference between the sample and duplicate for this SDG was within the required acceptance limits.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
The samples from this sample group were received by the lab outside of the method specified holding time. The samples were analyzed on the day they were received.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports
Nonconformance report (NCR) 5078 was submitted by the project manager for sample 67798009 because the sample was received out of holding for hexavalent chromium analysis.

Additional Comments
Sample 67798009 was analyzed before being logged in to LIMS. Therefore, the sample could not be scanned to custody prior to analysis.

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	205981
Prep Batch Number:	205980

Sample Analysis

The following samples were analyzed using the analytical protocol as established in EPA 335.3:

Sample ID	Client ID
67798008	059926-005
1200311080	MB for batch 205981
1200311081	LCS for batch 205981
1200311082	DUP of 67798008
1200311083	MS of 67798008
1200311474	LCSD for batch 205980

SOP Reference

Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-GC-E-095 Rev. 1.

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by General Engineering Laboratories, Inc. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

Calibration Information:

The instrument used in this analysis was the following: Lachat QuickChem FIA+

Initial Calibration
The instrument was properly calibrated.

Calibration Verification Information
All calibration verification standards were within the required limits.

Quality Control (QC) Information:

Blank Acceptance
The method and calibration blanks associated with this data were within the required acceptance limits.

Laboratory Control Sample Recovery
The recovery for the laboratory control sample was within the required acceptance limits.

LCS Duplicate Recovery
The LCS Duplicate recovery was within the required acceptance limits.

LCS Duplicate RPD
The Relative Percent Difference between the LCS and LCS Duplicate was within the required acceptance limits.

Quality Control
Samples 67798008 was designated for Quality Control.

Sample Spike Recovery
The spike recovery for this sample set was within the required acceptance limits.

Sample Duplicate Acceptance
The values for the sample and duplicate for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times
All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP.

Sample Dilutions
No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports
No Nonconformance Reports (NCR) were required for any of the samples in this sample group for this analysis.

Certification Statement

* Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: _____ **Date:** 10/10/02

GENERAL CHEMISTRY QUALITY CONTROL SUMMARY

QC Summary

Report Date: October 18, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rapid Flow Analysis Federal										
Batch 205123										
QC1200309256 67601015 DUP										
Cyanide, Total		U	ND	U	ND	mg/kg	N/A	(+/-0.250)	ADF	10/02/02 12:36
QC1200309257 67601016 DUP										
Cyanide, Total		U	ND	U	ND	mg/kg	N/A	(+/-0.250)		10/02/02 12:38
QC1200309261 LCS										
Cyanide, Total	277				252	mg/kg		91	(62%-138%)	10/02/02 12:34
QC1200309255 MB										
Cyanide, Total				U	ND	mg/kg				10/02/02 13:51
QC1200309258 67601015 MS										
Cyanide, Total	5.00	U	ND		5.26	mg/kg		105	(55%-145%)	10/02/02 12:36
QC1200309259 67601016 MS										
Cyanide, Total	4.55	U	ND		4.49	mg/kg		98	(55%-145%)	10/02/02 12:39
Batch 205136										
QC1200311351 67794022 DUP										
Cyanide, Total		BU	ND	BU	ND	mg/kg	N/A	(+/-0.227)	ADF	10/08/02 10:39
QC1200311367 LCS										
Cyanide, Total	277			B	264	mg/kg		96	(62%-138%)	10/08/02 10:35
QC1200311349 MB										
Cyanide, Total				J	0.0883	mg/kg				10/08/02 10:31
QC1200311352 67794022 MS										
Cyanide, Total	5.00	BU	ND	B	4.60	mg/kg		92	(55%-145%)	10/08/02 10:40
Spectrometric Analysis Federal										
Batch 205618										
QC1200310248 67601013 DUP										
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0995)	BEP2	10/11/02 09:00
QC1200310249 67601023 DUP										
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0985)		
QC1200310252 LCS										
Hexavalent Chromium	0.985				0.956	mg/kg		97	(72%-121%)	
QC1200310247 MB										
Hexavalent Chromium				U	ND	mg/kg				
QC1200310250 67601013 MS										
Hexavalent Chromium	0.993	U	ND		0.665	mg/kg		63	(49%-130%)	
QC1200310251 67601023 MS										
Hexavalent Chromium	0.993	U	ND		0.715	mg/kg		71	(49%-130%)	
Batch 205620										
QC1200310254 67794013 DUP										
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0993)	BEP2	10/11/02 09:30
QC1200310256 LCS										
Hexavalent Chromium	0.998				1.00	mg/kg		100	(72%-121%)	
QC1200310253 MB										
Hexavalent Chromium				U	ND	mg/kg				
QC1200310255 67794013 MS										
Hexavalent Chromium	0.985	U	ND		0.936	mg/kg		95	(49%-130%)	

QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

*	Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where t
**	Indicates analyte is a surrogate compound.
B	The analyte was found in the blank above the effective MDL.
H	Holding time was exceeded
J	Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
P	The response between the confirmation column and the primary column is >40%D
U	The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Presumptive evidence that the analyte is not present. Please see narrative for further information.
X	Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 9, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rapid Flow Analysis Federal										
Batch 205981										
QC1200311082 67798008 DUP										
Cyanide, Total		U	ND	U	ND	mg/L	N/A	(+/-0.005)	ADF	10/04/02 10:52
QC1200311081 LCS										
Cyanide, Total	0.050				0.0483	mg/L		97		10/04/02 10:48
QC1200311474 LCSD										
Cyanide, Total	0.050				0.0506	mg/L	5	101		10/04/02 10:49
QC1200311080 MB										
Cyanide, Total				U	ND	mg/L				10/04/02 10:47
QC1200311083 67798008 MS										
Cyanide, Total	0.100	U	ND		0.100	mg/L		100		10/04/02 10:56
Spectrometric Analysis Federal										
Batch 204193										
QC1200307124 67608009 DUP										
Hexavalent Chromium		HU	ND	HU	ND	mg/L	N/A	(+/-0.010)	VH1	09/26/02 14:20
QC1200307126 LCS										
Hexavalent Chromium	0.100				0.099	mg/L		99		
QC1200307123 MB										
Hexavalent Chromium				U	ND	mg/L				
QC1200307125 67608009 PS										
Hexavalent Chromium	0.100	HU	ND	H	0.093	mg/L		93		

Notes:
RER is calculated at the 95% confidence level (2-sigma).
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where d
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL.
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

RADIOLOGICAL ANALYSIS

REVISED

Radiochemistry Case Narrative
Sandia National Labs (SNLS)
Workorder 67794

Method/Analysis Information

Batch Number:	205013
Procedure:	Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method:	EPA 900.0

Sample ID	Client ID
67794012	059903-002
67794013	059904-002
67794014	059905-002
67794015	059906-002
67794016	059907-002
67794017	059908-002
67794018	059910-001
67794019	059912-002
67794020	059913-002
67794021	059914-002
67794022	059915-002
1200308987	MB for batch 205013
1200308988	059915-002(67794022DUP)
1200308989	059915-002(67794022MS)
1200308990	059915-002(67794022MSD)
1200308991	LCS for batch 205013

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met. The initial calibration was performed on June 12, 2002.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume(s) in this batch.

Designated QC
The following sample was used for QC: *67794022.*

REVISED

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

Gross Alpha/Beta Preparation Information
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

Miscellaneous Information:

NCR Documentation
No NCR were generated for the preparation or analysis of this sample set.

Qualifier Information

Manual qualifiers were not required.

Certification Statement
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:
GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.
The following data validator verified the information presented in this case narrative:

Reviewer: Valerie Drum Date: 10/18/02

REVISED

Radiochemistry Case Narrative
Sandia National Labs (SNLS)
SDG 67794-1

Method/Analysis Information

Batch Number:	204950
Procedure:	Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method:	EPA 900.0

Sample ID	Client ID
67798011	059926-008
1200308804	MB for batch 204950
1200308805	059826-008(67169011DUP)
1200308806	059826-008(67169011MS)
1200308807	059826-008(67169011MSD)
1200308808	LCS for batch 204950

SOP Reference
Procedure(s) for preparation, analysis and reporting of analytical data are controlled by General Engineering Laboratories, Inc. as Standard Operating Procedure(s) (SOP). The data discussed in this narrative has been analyzed in accordance with GL-RAD-A-001 REV.6.

Calibration Information:

Calibration Information
All initial and continuing calibration requirements have been met. The initial calibration was performed on June 12, 2002.

Standards Information
Standard solution(s) for these analyses are NIST traceable and used before the expiration date(s).

Sample Geometry
All counting sources were prepared in the same geometry as the calibration standards.

Quality Control (QC) Information:

Blank Information
The blank volume is representative of the sample volume(s) in this batch.

Designated QC
The following sample was used for QC: *67169011*. The QC sample is from SNLS work order 67169.

QC Information
All of the QC samples met the required acceptance limits.

Technical Information:

Holding Time
All sample procedures for this sample set were performed within the required holding time.

Preparation Information
All preparation criteria have been met for these analyses.

Sample Re-prep/Re-analysis
None of the samples in this sample set required reprep or reanalysis.

REVISED

Gross Alpha/Beta Preparation Information
High hygroscopic salt content in evaporated samples can cause the sample mass to fluctuate due to moisture absorption. To minimize this interference, the salts are converted to oxides by heating the sample under a flame until a dull red color is obtained. The conversion to oxides stabilizes the sample weight and ensures that proper alpha/beta efficiencies are assigned for each sample. Volatile radioisotopes of carbon, hydrogen, technetium, polonium and cesium may be lost during sample heating, especially to a dull red heat. For this sample set, the prepared planchet was counted for beta activity before being flamed. After flaming, the planchet was counted for alpha activity. This sequence causes the alpha count run data to record over the beta count run data in AlphaLims, therefore only the alpha count data will appear on the instrument runlog.

Miscellaneous Information:

NCR Documentation
No NCR's were generated for the preparation or analysis of this sample set.

Certification Statement
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:
GHL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.
The following data validator verified the information presented in this case narrative:

Reviewer: M. Morse **Date:** 12 Oct 2001

RADIOCHEMISTRY QUALITY CONTROL SUMMARY

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

QC Summary

Report Date: October 18, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico

Contact: Pamela M. Puissant

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date Time
Gravimetric Solids										
Batch 204314										
QC1200307411 67794012 DUP										
Moisture		5.17		3.50	percent	39*		(0%-24%)	AWB	09/27/02 11:42
Rad Gas Flow										
Batch 205013										
QC1200308988 67794022 DUP										
Alpha		12.3		11.1	pCi/g	0.190		(0%-20%)	JS1	10/16/02 01:36
Uncert:		+/-3.06		+/-2.71						
TPU:		3.30		2.80						
Beta		18.0		18.6	pCi/g	0.243		(0%-20%)		
Uncert:		+/-1.38		+/-1.40						
TPU:		1.40		1.45						
QC1200308991 LCS										
Alpha	9.89			11.2	pCi/g		113	(75%-125%)		10/16/02 19:13
Uncert:				+/-1.77						
TPU:				2.04						
Beta	39.7			46.2	pCi/g		117	(75%-125%)		
Uncert:				+/-2.55						
TPU:				2.69						
QC1200308987 MB										
Alpha			U	0.0348	pCi/g					10/16/02 01:36
Uncert:				+/-0.0996						
TPU:				0.0997						
Beta			U	0.126	pCi/g					
Uncert:				+/-0.0876						
TPU:				0.0876						
QC1200308989 67794022 MS										
Alpha	84.5	12.3		83.6	pCi/g		84	(75%-125%)		10/16/02 18:33
Uncert:		+/-3.06		+/-17.8						
TPU:		3.30		19.4						
Beta	339	18.0		326	pCi/g		91	(75%-125%)		
Uncert:		+/-1.38		+/-19.3						
TPU:		1.40		20.0						
QC1200308990 67794022 MSD										
Alpha	97.9	12.3		105	pCi/g		94			
Uncert:		+/-3.06		+/-22.5						
TPU:		3.30		26.1						
Beta	393	18.0		381	pCi/g		92			
Uncert:		+/-1.38		+/-22.3						
TPU:		1.40		23.2						

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QC Summary

Workorder: 67794

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time

Notes:
The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the Decision Level
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

QC Summary

Report Date: October 12, 2002

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date Time
Rad Gas Flow										
Batch 204950										
QC1200308805 67169011 DUP										
Alpha	U	-0.293	U	-0.582	pCi/L	0.389	^	(+/-1.00)	HOB1	10/08/02 05:44
	Uncert:	+/-0.333		+/-0.403						
	TPU:	0.334		0.408						
Beta	U	-0.0536	U	0.077	pCi/L	0.188	^	(+/-1.00)		
	Uncert:	+/-0.341		+/-0.354						
	TPU:	0.341		0.354						
QC1200308808 LCS										
Alpha	9.89			10.9	pCi/L		110	(75%-125%)		10/07/02 21:03
	Uncert:			+/-1.84						
	TPU:			2.18						
Beta	39.7			44.1	pCi/L		111	(75%-125%)		
	Uncert:			+/-2.45						
	TPU:			2.52						
QC1200308804 MB										
Alpha			U	0.0431	pCi/L					10/08/02 05:44
	Uncert:			+/-0.0745						
	TPU:			0.0746						
Beta			U	0.126	pCi/L					
	Uncert:			+/-0.162						
	TPU:			0.162						
QC1200308806 67169011 MS										
Alpha	49.4 U	-0.293		56.9	pCi/L		116	(75%-125%)		10/07/02 21:03
	Uncert:	+/-0.333		+/-9.21						
	TPU:	0.334		12.7						
Beta	199 U	-0.0536		227	pCi/L		114	(75%-125%)		
	Uncert:	+/-0.341		+/-12.3						
	TPU:	0.341		12.4						
QC1200308807 67169011 MSD										
Alpha	49.4 U	-0.293		55.3	pCi/L		113	(75%-125%)		
	Uncert:	+/-0.333		+/-9.67						
	TPU:	0.334		11.9						
Beta	199 U	-0.0536		214	pCi/L		108	(75%-125%)		
	Uncert:	+/-0.341		+/-12.3						
	TPU:	0.341		12.9						

Notes:
The Qualifiers in this report are defined as follows:

* Recovery or %RPD not within acceptance limits and/or spike amount not compatible with the sample or the duplicate RPD's are not applicable where the concentration falls below the effective PQL.

** Indicates analyte is a surrogate compound.

B The analyte was found in the blank above the effective MDL.

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GENERAL ENGINEERING LABORATORIES
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QC Summary

Workorder: 67798

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time

H Holding time was exceeded

J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL

P The response between the confirmation column and the primary column is >40%D

U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. For radiochemical analytes the result is less than the Decision Level

X Presumptive evidence that the analyte is not present. Please see narrative for further information.

X Presumptive evidence that the analyte is not present. Please see narrative for further infromation.

X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptence criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 9:57:52 AM

Analyzed by: 9/26/02 Reviewed by: 9/30/02

ustomer : SANDERS M (6135)
ustomer Sample ID : 059903-003
ab Sample ID : 20134201

ample Description : 6710/1034-SP1-BH1-14-S
ample Quantity : 884.000 gram
ample Date/Time : 9/19/02 11:25:00 AM
cquire Start Date/Time : 9/26/02 8:17:38 AM
etector Name : LAB01
lapsed Live/Real Time : 6000 / 6002 seconds

omments:
-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.26E-001
RA-226	1.17E+000	4.46E-001	6.32E-001
PB-214	5.20E-001	8.08E-002	4.61E-002
[redacted]14	4.78E-001	8.29E-002	4.95E-002
P[redacted]210	Not Detected	---	7.12E+000
TH-232	3.22E-001	1.85E-001	1.82E-001
RA-228	3.44E-001	1.36E-001	1.82E-001
AC-228	4.99E-001	1.16E-001	1.05E-001
TH-228	5.89E-001	1.91E-001	3.60E-001
RA-224	5.17E-001	1.38E-001	6.63E-002
PB-212	4.98E-001	7.60E-002	3.33E-002
BI-212	1.87E-001	2.17E-001	3.48E-001
TL-208	4.36E-001	8.56E-002	7.12E-002
U-235	Not Detected	---	1.74E-001
TH-231	Not Detected	---	5.72E+000
PA-231	Not Detected	---	1.22E+000
TH-227	Not Detected	---	2.67E-001
RA-223	Not Detected	---	1.42E-001
RN-219	Not Detected	---	3.20E-001
PB-211	Not Detected	---	7.30E-001
TL-207	Not Detected	---	1.32E+001
AM-241	Not Detected	---	1.47E-001
PU-239	Not Detected	---	3.00E+002
NP-237	Not Detected	---	1.63E+000
[redacted]233	Not Detected	---	4.79E-002
[redacted]229	Not Detected	---	1.70E-001

Summary Report] - Sample ID: : 20134201

[redacted]lide e	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.67E-002
AG-110m	Not Detected	---------	2.91E-002
BA-133	Not Detected	---------	3.64E-002
BE-7	Not Detected	---------	2.33E-001
CD-115	Not Detected	---------	4.73E-001
CE-139	Not Detected	---------	2.19E-002
CE-141	Not Detected	---------	4.41E-002
CE-144	Not Detected	---------	1.67E-001
CM-243	Not Detected	---------	1.49E-001
CO-56	Not Detected	---------	3.08E-002
CO-57	Not Detected	---------	2.12E-002
CO-58	Not Detected	---------	3.21E-002
CO-60	Not Detected	---------	3.86E-002
CR-51	Not Detected	---------	2.38E-001
CS-134	Not Detected	---------	3.84E-002
CS-137	1.16E-002	1.16E-002	1.83E-002
EU-152	Not Detected	---------	6.28E-002
EU-154	Not Detected	---------	1.70E-001
EU-155	Not Detected	---------	9.47E-002
FE-59	Not Detected	---------	7.98E-002
GD-153	Not Detected	---------	5.63E-002
HG-203	Not Detected	---------	2.99E-002
I-131	Not Detected	---------	4.39E-002
[redacted]192	Not Detected	---------	2.44E-002
K-40	1.83E+001	2.49E+000	2.82E-001
MN-52	Not Detected	---------	7.84E-002
MN-54	Not Detected	---------	3.29E-002
MO-99	Not Detected	---------	1.27E+000
NA-22	Not Detected	---------	4.58E-002
NA-24	Not Detected	---------	6.53E+001
ND-147	Not Detected	---------	2.97E-001
NI-57	Not Detected	---------	1.24E+000
RU-103	Not Detected	---------	2.66E-002
RU-106	Not Detected	---------	2.51E-001
SB-122	Not Detected	---------	1.98E-001
SB-124	Not Detected	---------	2.66E-002
SB-125	Not Detected	---------	7.32E-002
SN-113	Not Detected	---------	3.37E-002
SR-85	Not Detected	---------	3.34E-002
TA-182	Not Detected	---------	1.52E-001
TA-183	Not Detected	---------	3.21E-001
TL-201	Not Detected	---------	3.28E-001
Y-88	Not Detected	---------	2.45E-002
ZN-65	Not Detected	---------	1.03E-001
ZR-95	Not Detected	---------	5.72E-002

[redacted]

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 1:19:59 PM

* Analyzed by: 9/26/02 Reviewed by: 9/30/02

Customer : SANDERS M (6135)
Customer Sample ID : 059904-003
Lab Sample ID : 20134202

Sample Description : 6710/1034-SP1-BH1-19-S
Sample Quantity : 871.000 gram
Sample Date/Time : 9/19/02 12:00:00 PM
Acquire Start Date/Time : 9/26/02 9:59:58 AM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.28E-001
RA-226	1.24E+000	4.20E-001	5.72E-001
PB-214	6.17E-001	9.42E-002	5.35E-002
BI-214	5.60E-001	9.33E-002	4.77E-002
PB-210	Not Detected	---	7.57E+000
TH-232	4.43E-001	2.33E-001	1.93E-001
RA-228	5.17E-001	1.21E-001	1.44E-001
AC-228	Not Detected	---	1.77E-001
TH-228	3.90E-001	1.71E-001	3.87E-001
RA-224	7.30E-001	1.81E-001	8.77E-002
PB-212	5.24E-001	7.95E-002	3.43E-002
BI-212	6.08E-001	2.44E-001	3.21E-001
TL-208	4.48E-001	9.21E-002	8.53E-002
U-235	Not Detected	---	1.74E-001
TH-231	Not Detected	---	5.84E+000
PA-231	Not Detected	---	1.24E+000
TH-227	Not Detected	---	2.70E-001
RA-223	Not Detected	---	1.48E-001
RN-219	Not Detected	---	3.11E-001
PB-211	Not Detected	---	7.08E-001
TL-207	Not Detected	---	1.35E+001
AM-241	Not Detected	---	1.49E-001
PU-239	Not Detected	---	3.12E+002
NP-237	Not Detected	---	1.64E+000
PA-233	Not Detected	---	5.17E-002
TH-229	Not Detected	---	1.69E-001

[Summary Report] - Sample ID: : 20134202

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.62E-002
AG-110m	Not Detected	---------	2.63E-002
BA-133	Not Detected	---------	3.72E-002
BE-7	Not Detected	---------	2.48E-001
CD-115	Not Detected	---------	4.86E-001
CE-139	Not Detected	---------	2.28E-002
CE-141	Not Detected	---------	4.36E-002
CE-144	Not Detected	---------	1.73E-001
CM-243	Not Detected	---------	1.48E-001
CO-56	Not Detected	---------	3.26E-002
CO-57	Not Detected	---------	2.20E-002
CO-58	Not Detected	---------	3.13E-002
CO-60	Not Detected	---------	3.80E-002
CR-51	Not Detected	---------	2.38E-001
CS-134	Not Detected	---------	3.96E-002
CS-137	Not Detected	---------	2.85E-002
EU-152	Not Detected	---------	6.52E-002
EU-154	Not Detected	---------	1.69E-001
EU-155	Not Detected	---------	9.76E-002
FE-59	Not Detected	---------	8.06E-002
GD-153	Not Detected	---------	5.76E-002
HG-203	Not Detected	---------	2.93E-002
I-131	Not Detected	---------	4.41E-002
IR-192	Not Detected	---------	2.53E-002
K-40	1.46E+001	2.01E+000	2.85E-001
MN-52	Not Detected	---------	6.89E-002
MN-54	Not Detected	---------	3.21E-002
MO-99	Not Detected	---------	1.28E+000
NA-22	Not Detected	---------	4.46E-002
NA-24	Not Detected	---------	7.20E+001
ND-147	Not Detected	---------	2.87E-001
NI-57	Not Detected	---------	1.33E+000
RU-103	Not Detected	---------	2.77E-002
RU-106	Not Detected	---------	2.52E-001
SB-122	Not Detected	---------	2.17E-001
SB-124	Not Detected	---------	2.71E-002
SB-125	Not Detected	---------	7.52E-002
SN-113	Not Detected	---------	3.45E-002
SR-85	Not Detected	---------	3.23E-002
TA-182	Not Detected	---------	1.59E-001
TA-183	Not Detected	---------	3.24E-001
TL-201	Not Detected	---------	3.40E-001
Y-88	Not Detected	---------	2.70E-002
ZN-65	Not Detected	---------	1.04E-001
ZR-95	Not Detected	---------	5.58E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 1:22:31 PM

Analyzed by: Beverly Key 9/27/02 Reviewed by: 9/30/02

Customer : SANDERS M (6135)
Customer Sample ID : 059905-003
Lab Sample ID : 20134203

Sample Description : 803/1052-SP1-BH1-22-S
Sample Quantity : 932.000 gram
Sample Date/Time : 9/19/02 3:05:00 PM
Acquire Start Date/Time : 9/26/02 11:42:16 AM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.60E-001
RA-226	1.00E+000	4.36E-001	6.37E-001
PB-214	6.18E-001	9.56E-002	6.08E-002
BI-214	5.58E-001	9.38E-002	5.44E-002
PB-210	Not Detected	---	7.96E+000
TH-232	7.42E-001	3.66E-001	2.49E-001
RA-228	7.16E-001	1.46E-001	1.51E-001
AC-228	6.74E-001	1.37E-001	1.02E-001
TH-228	6.35E-001	1.96E-001	4.01E-001
RA-224	7.86E-001	1.86E-001	6.64E-002
PB-212	7.57E-001	1.11E-001	3.30E-002
BI-212	7.95E-001	2.92E-001	3.83E-001
TL-208	6.43E-001	1.15E-001	8.87E-002
U-235	2.38E-001	1.60E-001	1.87E-001
TH-231	Not Detected	---	6.29E+000
PA-231	Not Detected	---	1.28E+000
TH-227	Not Detected	---	3.03E-001
RA-223	Not Detected	---	1.55E-001
RN-219	Not Detected	---	3.42E-001
PB-211	Not Detected	---	7.76E-001
TL-207	Not Detected	---	1.46E+001
AM-241	Not Detected	---	1.55E-001
PU-239	Not Detected	---	3.32E+002
NP-237	Not Detected	---	1.80E+000
PA-233	Not Detected	---	5.09E-002
TH-229	Not Detected	---	1.79E-001

[Summary Report] - Sample ID: : 20134203

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.87E-002
AG-110m	Not Detected	---------	2.90E-002
BA-133	Not Detected	---------	3.84E-002
BE-7	Not Detected	---------	2.51E-001
CD-115	Not Detected	---------	5.13E-001
CE-139	Not Detected	---------	2.35E-002
CE-141	Not Detected	---------	4.71E-002
CE-144	Not Detected	---------	1.85E-001
CM-243	Not Detected	---------	1.56E-001
CO-56	Not Detected	---------	3.33E-002
CO-57	Not Detected	---------	2.31E-002
CO-58	Not Detected	---------	3.38E-002
CO-60	Not Detected	---------	3.84E-002
CR-51	Not Detected	---------	2.47E-001
CS-134	Not Detected	---------	4.10E-002
CS-137	Not Detected	---------	3.03E-002
EU-152	Not Detected	---------	6.86E-002
EU-154	Not Detected	---------	1.81E-001
EU-155	Not Detected	---------	1.05E-001
FE-59	Not Detected	---------	8.90E-002
GD-153	Not Detected	---------	6.13E-002
HG-203	Not Detected	---------	3.09E-002
I-131	Not Detected	---------	4.39E-002
IR-192	Not Detected	---------	2.61E-002
K-40	2.16E+001	2.91E+000	3.30E-001
MN-52	Not Detected	---------	6.91E-002
MN-54	Not Detected	---------	3.44E-002
MO-99	Not Detected	---------	1.32E+000
NA-22	Not Detected	---------	4.59E-002
NA-24	Not Detected	---------	7.22E+001
ND-147	Not Detected	---------	2.97E-001
NI-57	Not Detected	---------	1.23E+000
RU-103	Not Detected	---------	2.88E-002
RU-106	Not Detected	---------	2.66E-001
SB-122	Not Detected	---------	2.29E-001
SB-124	Not Detected	---------	2.95E-002
SB-125	Not Detected	---------	7.98E-002
SN-113	Not Detected	---------	3.63E-002
SR-85	Not Detected	---------	3.55E-002
TA-182	Not Detected	---------	1.72E-001
TA-183	Not Detected	---------	3.37E-001
TL-201	Not Detected	---------	3.58E-001
Y-88	Not Detected	---------	3.18E-002
ZN-65	Not Detected	---------	1.17E-001
ZR-95	Not Detected	---------	6.50E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 3:41:01 PM

Analyzed by: Beverly Key 9/27/02 Reviewed by: 9/30/02

Customer : SANDERS M (6135)
Customer Sample ID : 059906-003
Lab Sample ID : 20134204

Sample Description : 803/1052-SP1-BH1-27-S
Sample Quantity : 812.000 gram
Sample Date/Time : 9/19/02 3:45:00 PM
Acquire Start Date/Time : 9/26/02 1:24:37 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	4.93E-001
RA-226	1.34E+000	5.34E-001	7.68E-001
PB-214	6.78E-001	1.04E-001	6.09E-002
BI-214	5.68E-001	9.71E-002	5.67E-002
PB-210	Not Detected	---	8.55E+000
TH-232	7.37E-001	3.58E-001	2.23E-001
RA-228	7.66E-001	1.57E-001	1.56E-001
AC-228	7.32E-001	1.51E-001	1.14E-001
TH-228	7.71E-001	2.30E-001	4.35E-001
RA-224	8.85E-001	2.10E-001	7.56E-002
PB-212	7.88E-001	1.16E-001	3.70E-002
BI-212	8.03E-001	3.03E-001	3.98E-001
TL-208	6.01E-001	1.10E-001	8.36E-002
U-235	1.25E-001	1.72E-001	2.01E-001
TH-231	Not Detected	---	6.33E+000
PA-231	Not Detected	---	1.36E+000
TH-227	Not Detected	---	3.26E-001
RA-223	Not Detected	---	1.60E-001
RN-219	Not Detected	---	3.60E-001
PB-211	Not Detected	---	8.28E-001
TL-207	Not Detected	---	1.41E+001
AM-241	Not Detected	---	1.68E-001
PU-239	Not Detected	---	3.57E+002
NP-237	Not Detected	---	1.84E+000
PA-233	Not Detected	---	5.48E-002
TH-229	Not Detected	---	1.84E-001

[Summary Report] - Sample ID: : 20134204

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.35E-002
AG-110m	Not Detected	---------	3.19E-002
BA-133	Not Detected	---------	4.33E-002
BE-7	Not Detected	---------	2.60E-001
CD-115	Not Detected	---------	5.58E-001
CE-139	Not Detected	---------	2.51E-002
CE-141	Not Detected	---------	5.12E-002
CE-144	Not Detected	---------	1.94E-001
CM-243	Not Detected	---------	1.71E-001
CO-56	Not Detected	---------	3.56E-002
CO-57	Not Detected	---------	2.43E-002
CO-58	Not Detected	---------	3.55E-002
CO-60	Not Detected	---------	4.02E-002
CR-51	Not Detected	---------	2.61E-001
CS-134	Not Detected	---------	4.26E-002
CS-137	Not Detected	---------	3.36E-002
EU-152	Not Detected	---------	7.21E-002
EU-154	Not Detected	---------	2.02E-001
EU-155	Not Detected	---------	1.11E-001
FE-59	Not Detected	---------	9.05E-002
GD-153	Not Detected	---------	6.39E-002
HG-203	Not Detected	---------	3.40E-002
I-131	Not Detected	---------	4.96E-002
IR-192	Not Detected	---------	2.74E-002
K-40	1.74E+001	2.39E+000	3.53E-001
MN-52	Not Detected	---------	8.11E-002
MN-54	Not Detected	---------	3.57E-002
MO-99	Not Detected	---------	1.40E+000
NA-22	Not Detected	---------	4.91E-002
NA-24	Not Detected	---------	7.67E+001
ND-147	Not Detected	---------	3.24E-001
NI-57	Not Detected	---------	1.38E+000
RU-103	Not Detected	---------	3.10E-002
RU-106	Not Detected	---------	2.81E-001
SB-122	Not Detected	---------	2.49E-001
SB-124	Not Detected	---------	3.09E-002
SB-125	Not Detected	---------	8.71E-002
SN-113	Not Detected	---------	3.80E-002
SR-85	Not Detected	---------	3.78E-002
TA-182	Not Detected	---------	1.79E-001
TA-183	Not Detected	---------	3.65E-001
TL-201	Not Detected	---------	3.81E-001
Y-88	Not Detected	---------	2.81E-002
ZN-65	Not Detected	---------	1.16E-001
ZR-95	Not Detected	---------	6.60E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 5:22:25 PM

* Analyzed by: Beverly Key 9/27/02 Reviewed by: 9/30/02

Customer : SANDERS (6135)
Customer Sample ID : 059907-003
Lab Sample ID : 20134205

Sample Description : 829/276-SP1-BH1-8-S
Sample Quantity : 730.000 gram
Sample Date/Time : 9/24/02 2:05:00 PM
Acquire Start Date/Time : 9/26/02 3:42:11 PM
Detector Name : LAB01
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	5.54E-001
RA-226	1.79E+000	6.26E-001	8.72E-001
PB-214	9.41E-001	1.38E-001	6.98E-002
BI-214	7.43E-001	1.23E-001	6.53E-002
PB-210	Not Detected	---	9.33E+000
TH-232	9.08E-001	4.31E-001	2.32E-001
RA-228	8.82E-001	1.77E-001	1.65E-001
AC-228	8.67E-001	1.72E-001	1.16E-001
TH-228	9.76E-001	2.76E-001	5.02E-001
RA-224	1.11E+000	2.58E-001	9.44E-002
PB-212	9.41E-001	1.38E-001	4.13E-002
BI-212	8.97E-001	3.62E-001	4.91E-001
TL-208	8.04E-001	1.38E-001	9.03E-002
U-235	9.46E-002	1.86E-001	2.17E-001
TH-231	Not Detected	---	7.20E+000
PA-231	Not Detected	---	1.57E+000
TH-227	Not Detected	---	3.67E-001
RA-223	Not Detected	---	1.38E-001
RN-219	Not Detected	---	4.18E-001
PB-211	Not Detected	---	9.28E-001
TL-207	Not Detected	---	1.56E+001
AM-241	Not Detected	---	1.93E-001
PU-239	Not Detected	---	3.89E+002
NP-237	Not Detected	---	2.07E+000
PA-233	Not Detected	---	6.18E-002
TH-229	Not Detected	---	2.11E-001

[Summary Report] - Sample ID: : 20134205

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.74E-002
AG-110m	Not Detected	---------	3.45E-002
BA-133	Not Detected	---------	4.92E-002
BE-7	Not Detected	---------	2.72E-001
CD-115	Not Detected	---------	1.48E-001
CE-139	Not Detected	---------	2.72E-002
CE-141	Not Detected	---------	4.89E-002
CE-144	Not Detected	---------	2.16E-001
CM-243	Not Detected	---------	1.94E-001
CO-56	Not Detected	---------	3.69E-002
CO-57	Not Detected	---------	2.71E-002
CO-58	Not Detected	---------	3.70E-002
CO-60	Not Detected	---------	4.39E-002
CR-51	Not Detected	---------	2.53E-001
CS-134	Not Detected	---------	5.09E-002
CS-137	Not Detected	---------	3.86E-002
EU-152	Not Detected	---------	8.11E-002
EU-154	Not Detected	---------	2.21E-001
EU-155	~~1.71E-001~~	~~8.59E-002~~ Not Detected	1.27E-001
FE-59	Not Detected	---------	9.06E-002
GD-153	Not Detected	---------	7.04E-002
HG-203	Not Detected	---------	3.53E-002
I-131	Not Detected	---------	3.61E-002
IR-192	Not Detected	---------	2.93E-002
K-40	1.66E+001	2.30E+000	3.12E-001
MN-52	Not Detected	---------	5.10E-002
MN-54	Not Detected	---------	4.01E-002
MO-99	Not Detected	---------	4.78E-001
NA-22	Not Detected	---------	5.21E-002
NA-24	Not Detected	---------	3.83E-001
ND-147	Not Detected	---------	2.45E-001
NI-57	Not Detected	---------	1.55E-001
RU-103	Not Detected	---------	3.31E-002
RU-106	Not Detected	---------	3.24E-001
SB-122	Not Detected	---------	7.48E-002
SB-124	Not Detected	---------	3.26E-002
SB-125	Not Detected	---------	9.58E-002
SN-113	Not Detected	---------	4.30E-002
SR-85	Not Detected	---------	4.03E-002
TA-182	Not Detected	---------	1.92E-001
TA-183	Not Detected	---------	2.16E-001
TL-201	Not Detected	---------	1.42E-001
Y-88	Not Detected	---------	3.45E-002
ZN-65	Not Detected	---------	1.32E-001
ZR-95	Not Detected	---------	6.46E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 9:34:00 AM

* Analyzed by: [redacted] 9/26/02 Reviewed by: [redacted]

Customer : SANDERS M (6135)
Customer Sample ID : 059908-003
Lab Sample ID : 20134206

Sample Description : 829/276-SP1-BH1-13-S
Sample Quantity : 743.000 gram
Sample Date/Time : 9/24/02 2:20:00 PM
Acquire Start Date/Time : 9/26/02 7:53:41 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.14E-001
RA-226	1.59E+000	5.45E-001	7.58E-001
PB-214	8.54E-001	1.23E-001	6.15E-002
BI-214	7.11E-001	1.13E-001	5.58E-002
PB-210	Not Detected	---	2.81E+001
TH-232	7.55E-001	3.62E-001	2.12E-001
RA-228	9.43E-001	1.65E-001	1.21E-001
AC-228	8.11E-001	1.56E-001	1.11E-001
TH-228	1.30E+000	4.65E-001	6.35E-001
RA-224	1.05E+000	2.24E-001	6.88E-002
PB-212	8.87E-001	1.28E-001	3.87E-002
BI-212	7.76E-001	2.69E-001	3.48E-001
TL-208	7.25E-001	1.38E-001	1.33E-001
U-235	9.72E-002	1.82E-001	2.30E-001
TH-231	Not Detected	---	1.13E+001
PA-231	Not Detected	---	1.42E+000
TH-227	Not Detected	---	3.56E-001
RA-223	Not Detected	---	1.95E-001
RN-219	Not Detected	---	3.69E-001
PB-211	Not Detected	---	8.28E-001
TL-207	Not Detected	---	1.31E+001
AM-241	Not Detected	---	4.25E-001
PU-239	Not Detected	---	4.19E+002
NP-237	Not Detected	---	2.28E+000
PA-233	Not Detected	---	5.57E-002
TH-229	Not Detected	---	2.42E-001

[Summary Report] - Sample ID: : 20134206

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.41E-002
AG-110m	Not Detected	---------	2.75E-002
BA-133	Not Detected	---------	4.85E-002
BE-7	Not Detected	---------	2.38E-001
CD-115	Not Detected	---------	1.11E-001
CE-139	Not Detected	---------	2.88E-002
CE-141	Not Detected	---------	5.18E-002
CE-144	Not Detected	---------	2.32E-001
CM-243	Not Detected	---------	1.72E-001
CO-56	Not Detected	---------	3.19E-002
CO-57	Not Detected	---------	3.04E-002
CO-58	Not Detected	---------	3.07E-002
CO-60	Not Detected	---------	3.47E-002
CR-51	Not Detected	---------	2.31E-001
CS-134	Not Detected	---------	3.97E-002
CS-137	Not Detected	---------	2.90E-002
EU-152	Not Detected	---------	9.13E-002
EU-154	Not Detected	---------	1.57E-001
EU-155	Not Detected	---------	1.32E-001
FE-59	Not Detected	---------	7.06E-002
GD-153	Not Detected	---------	9.62E-002
HG-203	Not Detected	---------	3.16E-002
I-131	Not Detected	---------	3.14E-002
IR-192	Not Detected	---------	2.68E-002
K-40	2.41E+001	3.20E+000	3.14E-001
MN-52	Not Detected	---------	3.58E-002
MN-54	Not Detected	---------	3.32E-002
MO-99	Not Detected	---------	3.28E-001
NA-22	Not Detected	---------	3.99E-002
NA-24	Not Detected	---------	2.17E-001
ND-147	Not Detected	---------	1.98E-001
NI-57	~~1.54E-001~~	~~5.11E-002~~	~~5.75E-002~~
RU-103	Not Detected	---------	2.68E-002
RU-106	Not Detected	---------	2.41E-001
SB-122	Not Detected	---------	5.73E-002
SB-124	Not Detected	---------	2.65E-002
SB-125	Not Detected	---------	7.95E-002
SN-113	Not Detected	---------	3.51E-002
SR-85	Not Detected	---------	3.40E-002
TA-182	Not Detected	---------	1.55E-001
TA-183	Not Detected	---------	4.62E-001
TL-201	Not Detected	---------	2.31E-001
Y-88	Not Detected	---------	2.42E-002
ZN-65	Not Detected	---------	9.91E-002
ZR-95	Not Detected	---------	5.15E-002

Not detected 1CRS 9/26/02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 12:58:06 PM

Analyzed by: 9/26/02 Reviewed by: 9/26/02

Customer : SANDERS M (6135)
Customer Sample ID : 059912-003
Lab Sample ID : 20134208

Sample Description : 915-922/1003-SP1-BH1-27-S
Sample Quantity : 881.000 gram
Sample Date/Time : 9/24/02 8:45:00 AM
Acquire Start Date/Time : 9/26/02 11:17:42 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6004 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.58E-001
RA-226	1.39E+000	4.83E-001	6.76E-001
PB-214	7.10E-001	1.04E-001	5.86E-002
BI-214	6.43E-001	1.02E-001	5.06E-002
PB-210	Not Detected	---	2.56E+001
TH-232	9.28E-001	4.27E-001	1.84E-001
RA-228	8.53E-001	1.49E-001	1.16E-001
AC-228	8.86E-001	1.55E-001	7.75E-002
TH-228	8.57E-001	4.08E-001	5.99E-001
RA-224	9.75E-001	2.05E-001	5.81E-002
PB-212	8.55E-001	1.23E-001	3.60E-002
BI-212	1.08E+000	2.81E-001	3.18E-001
TL-208	7.57E-001	1.19E-001	6.79E-002
U-235	Not Detected	---	2.04E-001
TH-231	Not Detected	---	1.03E+001
PA-231	Not Detected	---	1.24E+000
TH-227	Not Detected	---	3.21E-001
RA-223	Not Detected	---	1.82E-001
RN-219	~~1.64E-001~~	~~2.75E-001~~	~~3.16E-001~~
PB-211	Not Detected	---	6.87E-001
TL-207	Not Detected	---	1.15E+001
AM-241	Not Detected	---	3.74E-001
PU-239	Not Detected	---	3.78E+002
NP-237	Not Detected	---	2.03E+000
PA-233	Not Detected	---	4.85E-002
TH-229	Not Detected	---	2.19E-001

NOT Detected ICRS 9-26-02

[Summary Report] - Sample ID: : 20134208

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.98E-002
AG-110m	Not Detected	---------	2.45E-002
BA-133	Not Detected	---------	4.21E-002
BE-7	Not Detected	---------	2.05E-001
CD-115	Not Detected	---------	1.12E-001
CE-139	Not Detected	---------	2.48E-002
CE-141	Not Detected	---------	4.59E-002
CE-144	Not Detected	---------	2.03E-001
CM-243	Not Detected	---------	1.53E-001
CO-56	Not Detected	---------	2.74E-002
CO-57	Not Detected	---------	2.66E-002
CO-58	Not Detected	---------	2.67E-002
CO-60	Not Detected	---------	3.14E-002
CR-51	Not Detected	---------	2.04E-001
CS-134	Not Detected	---------	3.50E-002
CS-137	Not Detected	---------	2.56E-002
EU-152	Not Detected	---------	7.96E-002
EU-154	Not Detected	---------	1.37E-001
EU-155	Not Detected	---------	1.21E-001
FE-59	Not Detected	---------	6.26E-002
GD-153	Not Detected	---------	8.93E-002
HG-203	Not Detected	---------	2.87E-002
I-131	Not Detected	---------	2.86E-002
IR-192	Not Detected	---------	2.32E-002
K-40	2.35E+001	3.11E+000	2.25E-001
MN-52	Not Detected	---------	3.25E-002
MN-54	Not Detected	---------	2.88E-002
MO-99	Not Detected	---------	3.28E-001
NA-22	Not Detected	---------	3.56E-002
NA-24	Not Detected	---------	2.77E-001
ND-147	Not Detected	---------	1.85E-001
NI-57	Not Detected	---------	6.93E-002
RU-103	Not Detected	---------	2.41E-002
RU-106	Not Detected	---------	2.32E-001
SB-122	Not Detected	---------	5.73E-002
SB-124	Not Detected	---------	2.48E-002
SB-125	Not Detected	---------	7.09E-002
SN-113	Not Detected	---------	3.07E-002
SR-85	Not Detected	---------	3.06E-002
TA-182	Not Detected	---------	1.27E-001
TA-183	Not Detected	---------	4.28E-001
TL-201	Not Detected	---------	2.30E-001
Y-88	Not Detected	---------	2.14E-002
ZN-65	Not Detected	---------	8.24E-002
ZR-95	Not Detected	---------	4.74E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 4:58:56 PM

Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : 059913-003
Lab Sample ID : 20134209

Sample Description : 915-922/1003-SP1-BH1-33-S
Sample Quantity : 846.000 gram
Sample Date/Time : 9/24/02 9:35:00 AM
Acquire Start Date/Time : 9/26/02 12:59:51 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.43E-001
RA-226	1.70E+000	4.88E-001	6.40E-001
PB-214	6.63E-001	9.88E-002	5.92E-002
BI-214	6.56E-001	1.04E-001	4.99E-002
PB-210	Not Detected	---	2.48E+001
TH-232	8.00E-001	3.74E-001	1.84E-001
RA-228	7.84E-001	1.41E-001	1.19E-001
AC-228	7.79E-001	1.46E-001	9.82E-002
TH-228	9.10E-001	3.36E-001	4.57E-001
RA-224	9.45E-001	2.00E-001	5.01E-002
PB-212	7.83E-001	1.14E-001	3.47E-002
BI-212	8.00E-001	2.56E-001	3.22E-001
TL-208	7.09E-001	1.14E-001	6.78E-002
U-235	8.15E-002	1.61E-001	2.04E-001
TH-231	Not Detected	---	1.03E+001
PA-231	Not Detected	---	1.23E+000
TH-227	Not Detected	---	3.18E-001
RA-223	Not Detected	---	1.80E-001
RN-219	Not Detected	---	3.11E-001
PB-211	Not Detected	---	7.12E-001
TL-207	Not Detected	---	1.12E+001
AM-241	Not Detected	---	3.83E-001
PU-239	Not Detected	---	3.81E+002
NP-237	Not Detected	---	2.02E+000
PA-233	Not Detected	---	4.90E-002
TH-229	Not Detected	---	2.17E-001

[Summary Report] - Sample ID: : 20134209

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.02E-002
AG-110m	Not Detected	---------	2.51E-002
BA-133	Not Detected	---------	4.23E-002
BE-7	Not Detected	---------	2.10E-001
CD-115	Not Detected	---------	1.10E-001
CE-139	Not Detected	---------	2.60E-002
CE-141	Not Detected	---------	4.57E-002
CE-144	Not Detected	---------	2.08E-001
CM-243	Not Detected	---------	1.49E-001
CO-56	Not Detected	---------	2.89E-002
CO-57	Not Detected	---------	2.75E-002
CO-58	Not Detected	---------	2.66E-002
CO-60	Not Detected	---------	3.03E-002
CR-51	Not Detected	---------	2.10E-001
CS-134	Not Detected	---------	3.53E-002
CS-137	Not Detected	---------	2.66E-002
EU-152	Not Detected	---------	8.23E-002
EU-154	Not Detected	---------	1.39E-001
EU-155	Not Detected	---------	1.20E-001
FE-59	Not Detected	---------	6.01E-002
GD-153	Not Detected	---------	8.88E-002
HG-203	Not Detected	---------	2.78E-002
I-131	Not Detected	---------	2.80E-002
IR-192	Not Detected	---------	2.40E-002
K-40	2.12E+001	2.83E+000	2.43E-001
MN-52	Not Detected	---------	3.31E-002
MN-54	Not Detected	---------	1.83E-002
MO-99	Not Detected	---------	3.15E-001
NA-22	Not Detected	---------	3.53E-002
NA-24	Not Detected	---------	2.82E-001
ND-147	Not Detected	---------	1.88E-001
NI-57	Not Detected	---------	6.72E-002
RU-103	Not Detected	---------	2.43E-002
RU-106	Not Detected	---------	2.31E-001
SB-122	Not Detected	---------	5.62E-002
SB-124	Not Detected	---------	2.44E-002
SB-125	Not Detected	---------	6.79E-002
SN-113	Not Detected	---------	3.17E-002
SR-85	Not Detected	---------	2.89E-002
TA-182	Not Detected	---------	1.35E-001
TA-183	Not Detected	---------	4.40E-001
TL-201	Not Detected	---------	2.30E-001
Y-88	Not Detected	---------	2.02E-002
ZN-65	Not Detected	---------	8.60E-002
ZR-95	Not Detected	---------	4.63E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 4:22:12 PM

Analyzed by: Beverly Key 9/27/02 Reviewed by:

Customer : SANDERS M (6135)
Customer Sample ID : 059914-003
Lab Sample ID : 20134210

Sample Description : 915-922/1003-SP1-BH1-26-S
Sample Quantity : 767.000 gram BJK 9/27/02
Sample Date/Time : 9/24/02 11:10:00 AM
Acquire Start Date/Time : 9/26/02 2:41:52 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.24E-001
RA-226	1.80E+000	5.48E-001	7.36E-001
PB-214	8.05E-001	1.18E-001	6.45E-002
BI-214	6.89E-001	1.10E-001	5.74E-002
PB-210	Not Detected	---	2.78E+001
TH-232	9.31E-001	4.32E-001	2.01E-001
RA-228	7.92E-001	1.47E-001	1.38E-001
AC-228	9.11E-001	1.68E-001	1.10E-001
TH-228	8.37E-001	3.96E-001	5.77E-001
RA-224	1.03E+000	2.21E-001	8.12E-002
PB-212	9.87E-001	1.42E-001	3.85E-002
BI-212	1.08E+000	2.89E-001	3.24E-001
TL-208	8.14E-001	1.31E-001	8.09E-002
U-235	Not Detected	---	2.28E-001
TH-231	Not Detected	---	1.12E+001
PA-231	Not Detected	---	1.38E+000
TH-227	Not Detected	---	3.64E-001
RA-223	Not Detected	---	2.04E-001
RN-219	Not Detected	---	3.51E-001
PB-211	Not Detected	---	8.11E-001
TL-207	Not Detected	---	1.25E+001
AM-241	Not Detected	---	4.10E-001
PU-239	Not Detected	---	4.16E+002
NP-237	Not Detected	---	2.21E+000
PA-233	Not Detected	---	5.39E-002
TH-229	Not Detected	---	2.35E-001

[Summary Report] - Sample ID: : 20134210

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.53E-002
AG-110m	Not Detected	---------	2.69E-002
BA-133	Not Detected	---------	4.68E-002
BE-7	Not Detected	---------	2.27E-001
CD-115	Not Detected	---------	1.22E-001
CE-139	Not Detected	---------	2.85E-002
CE-141	Not Detected	---------	5.12E-002
CE-144	Not Detected	---------	2.25E-001
CM-243	Not Detected	---------	1.68E-001
CO-56	Not Detected	---------	3.00E-002
CO-57	Not Detected	---------	2.95E-002
CO-58	Not Detected	---------	2.93E-002
CO-60	Not Detected	---------	3.35E-002
CR-51	Not Detected	---------	2.23E-001
CS-134	Not Detected	---------	3.92E-002
CS-137	Not Detected	---------	2.94E-002
EU-152	Not Detected	---------	8.79E-002
EU-154	Not Detected	---------	1.62E-001
EU-155	Not Detected	---------	1.32E-001
FE-59	Not Detected	---------	6.83E-002
GD-153	Not Detected	---------	9.66E-002
HG-203	Not Detected	---------	3.10E-002
I-131	Not Detected	---------	3.17E-002
IR-192	Not Detected	---------	2.58E-002
K-40	2.26E+001	3.01E+000	3.04E-001
MN-52	Not Detected	---------	3.31E-002
MN-54	Not Detected	---------	3.16E-002
MO-99	Not Detected	---------	3.86E-001
NA-22	Not Detected	---------	3.89E-002
NA-24	Not Detected	---------	3.26E-001
ND-147	Not Detected	---------	2.06E-001
NI-57	Not Detected	---------	7.68E-002
RU-103	Not Detected	---------	2.53E-002
RU-106	Not Detected	---------	2.65E-001
SB-122	Not Detected	---------	6.10E-002
SB-124	Not Detected	---------	2.67E-002
SB-125	Not Detected	---------	7.73E-002
SN-113	Not Detected	---------	3.40E-002
SR-85	Not Detected	---------	3.37E-002
TA-182	Not Detected	---------	1.46E-001
TA-183	Not Detected	---------	4.72E-001
TL-201	Not Detected	---------	2.52E-001
Y-88	Not Detected	---------	2.40E-002
ZN-65	Not Detected	---------	9.94E-002
ZR-95	Not Detected	---------	4.95E-002

****
* Sandia National Laboratories
* Radiation Protection Sample Diagnostics Program
* 9/26/02 8:26:56 AM
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*
* Analyzed by: 9/26/02 Reviewed by: 10/1/02
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Customer : SANDERS, M (6135)
Customer Sample ID : 059915-003
Lab Sample ID : 20134211

Sample Description : 915-922/1003-SP2-BH1-31-S
Sample Quantity : 859.000 gram
Sample Date/Time : 9/24/02 11:40:00 AM
Acquire Start Date/Time : 9/25/02 10:50:23 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.
****

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.23E-001
RA-226	1.63E+000	4.77E-001	6.30E-001
PB-214	6.47E-001	1.04E-001	8.34E-002
BI-214	6.05E-001	9.61E-002	4.62E-002
PB-210	Not Detected	---	2.44E+001
TH-232	7.09E-001	3.37E-001	1.90E-001
RA-228	7.26E-001	1.32E-001	1.12E-001
AC-228	7.58E-001	1.39E-001	8.39E-002
TH-228	8.12E-001	3.48E-001	4.96E-001
RA-224	9.13E-001	1.96E-001	7.09E-002
PB-212	7.58E-001	1.09E-001	3.12E-002
BI-212	7.85E-001	2.84E-001	3.82E-001
TL-208	6.10E-001	1.00E-001	6.35E-002
U-235	Not Detected	---	2.01E-001
TH-231	Not Detected	---	9.60E+000
PA-231	Not Detected	---	1.18E+000
TH-227	Not Detected	---	3.02E-001
RA-223	Not Detected	---	1.62E-001
RN-219	Not Detected	---	3.00E-001
PB-211	Not Detected	---	6.78E-001
TL-207	Not Detected	---	1.15E+001
AM-241	Not Detected	---	3.73E-001
PU-239	Not Detected	---	3.73E+002
NP-237	Not Detected	---	1.92E+000
PA-233	Not Detected	---	4.86E-002
TH-229	Not Detected	---	2.09E-001

[Summary Report] - Sample ID: : 20134211

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.02E-002
AG-110m	Not Detected	---------	2.38E-002
BA-133	Not Detected	---------	4.17E-002
BE-7	Not Detected	---------	2.01E-001
CD-115	Not Detected	---------	7.50E-002
CE-139	Not Detected	---------	2.47E-002
CE-141	Not Detected	---------	4.42E-002
CE-144	Not Detected	---------	1.99E-001
CM-243	Not Detected	---------	1.43E-001
CO-56	Not Detected	---------	2.68E-002
CO-57	Not Detected	---------	2.62E-002
CO-58	Not Detected	---------	2.55E-002
CO-60	Not Detected	---------	2.96E-002
CR-51	Not Detected	---------	1.94E-001
CS-134	Not Detected	---------	3.30E-002
CS-137	Not Detected	---------	2.63E-002
EU-152	Not Detected	---------	7.90E-002
EU-154	Not Detected	---------	1.39E-001
EU-155	Not Detected	---------	1.18E-001
FE-59	Not Detected	---------	6.10E-002
GD-153	Not Detected	---------	8.66E-002
HG-203	Not Detected	---------	2.64E-002
I-131	Not Detected	---------	2.61E-002
IR-192	Not Detected	---------	2.28E-002
K-40	2.31E+001	3.06E+000	2.25E-001
MN-52	Not Detected	---------	2.92E-002
MN-54	Not Detected	---------	2.79E-002
MO-99	Not Detected	---------	2.34E-001
NA-22	Not Detected	---------	3.55E-002
NA-24	Not Detected	---------	7.81E-002
ND-147	Not Detected	---------	1.67E-001
NI-57	Not Detected	---------	3.37E-002
RU-103	Not Detected	---------	2.23E-002
RU-106	Not Detected	---------	2.20E-001
SB-122	Not Detected	---------	4.04E-002
SB-124	Not Detected	---------	2.32E-002
SB-125	Not Detected	---------	6.82E-002
SN-113	Not Detected	---------	3.08E-002
SR-85	Not Detected	---------	2.92E-002
TA-182	Not Detected	---------	1.28E-001
TA-183	Not Detected	---------	3.66E-001
TL-201	Not Detected	---------	1.75E-001
Y-88	Not Detected	---------	2.20E-002
ZN-65	Not Detected	---------	8.44E-002
ZR-95	Not Detected	---------	4.62E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 2:12:55 PM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059917-003
Lab Sample ID : 20134212

Sample Description : 6969/1004-DF1-BH1-8-S
Sample Quantity : 675.000 gram
Sample Date/Time : 9/20/02 9:20:00 AM
Acquire Start Date/Time : 9/25/02 12:32:34 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---------	7.98E-001
RA-226	1.93E+000	5.82E-001	7.74E-001
PB-214	7.89E-001	1.17E-001	6.80E-002
BI-214	6.99E-001	1.13E-001	5.82E-002
PB-210	Not Detected	---------	2.99E+001
TH-232	9.56E-001	4.45E-001	2.11E-001
RA-228	1.17E+000	1.97E-001	1.20E-001
AC-228	9.86E-001	1.84E-001	1.24E-001
TH-228	1.10E+000	4.57E-001	6.48E-001
RA-224	1.21E+000	2.56E-001	7.02E-002
PB-212	1.04E+000	1.50E-001	3.92E-002
BI-212	1.14E+000	3.32E-001	3.99E-001
TL-208	9.46E-001	1.48E-001	7.89E-002
U-235	Not Detected	---------	2.35E-001
TH-231	Not Detected	---------	1.19E+001
PA-231	Not Detected	---------	1.38E+000
TH-227	Not Detected	---------	3.89E-001
RA-223	Not Detected	---------	2.61E-001
RN-219	Not Detected	---------	3.74E-001
PB-211	Not Detected	---------	8.40E-001
TL-207	Not Detected	---------	1.17E+001
AM-241	Not Detected	---------	4.56E-001
PU-239	Not Detected	---------	4.39E+002
NP-237	Not Detected	---------	2.34E+000
PA-233	Not Detected	---------	5.73E-002
TH-229	Not Detected	---------	2.47E-001

[Summary Report] - Sample ID: : 20134212

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.66E-002
AG-110m	Not Detected	---	2.87E-002
BA-133	Not Detected	---	5.04E-002
BE-7	Not Detected	---	2.45E-001
CD-115	Not Detected	---	3.44E-001
CE-139	Not Detected	---	2.98E-002
CE-141	Not Detected	---	5.83E-002
CE-144	Not Detected	---	2.42E-001
CM-243	Not Detected	---	1.77E-001
CO-56	Not Detected	---	3.31E-002
CO-57	Not Detected	---	3.10E-002
CO-58	Not Detected	---	3.14E-002
CO-60	Not Detected	---	3.48E-002
CR-51	Not Detected	---	2.61E-001
CS-134	Not Detected	---	4.11E-002
CS-137	Not Detected	---	3.02E-002
EU-152	Not Detected	---	9.18E-002
EU-154	Not Detected	---	1.68E-001
EU-155	Not Detected	---	1.40E-001
FE-59	Not Detected	---	6.84E-002
GD-153	Not Detected	---	1.01E-001
HG-203	Not Detected	---	3.38E-002
I-131	Not Detected	---	4.26E-002
IR-192	Not Detected	---	2.83E-002
K-40	1.84E+001	2.48E+000	3.02E-001
MN-52	Not Detected	---	5.45E-002
MN-54	Not Detected	---	3.42E-002
MO-99	Not Detected	---	8.01E-001
NA-22	Not Detected	---	4.03E-002
NA-24	Not Detected	---	9.80E+000
ND-147	Not Detected	---	2.58E-001
NI-57	Not Detected	---	5.29E-001
RU-103	Not Detected	---	3.01E-002
RU-106	Not Detected	---	2.73E-001
SB-122	Not Detected	---	1.48E-001
SB-124	Not Detected	---	2.88E-002
SB-125	Not Detected	---	7.97E-002
SN-113	Not Detected	---	3.78E-002
SR-85	Not Detected	---	3.71E-002
TA-182	Not Detected	---	1.52E-001
TA-183	Not Detected	---	7.87E-001
TL-201	Not Detected	---	5.33E-001
Y-88	Not Detected	---	2.59E-002
ZN-65	Not Detected	---	9.97E-002
ZR-95	Not Detected	---	5.35E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 3:55:00 PM

* Analyzed by: [signature] 9/26/02 Reviewed by: [signature] 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059918-003
Lab Sample ID : 20134213

Sample Description : 6969/1004-DF1-BH1-13-S
Sample Quantity : 770.000 gram
Sample Date/Time : 9/20/02 9:35:00 AM
Acquire Start Date/Time : 9/25/02 2:14:41 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)	
U-238	Not Detected	---	7.02E-001	
RA-226	2.17E+000	5.71E-001	7.20E-001	
PB-214	7.90E-001	1.15E-001	6.04E-002	
BI-214	7.36E-001	1.15E-001	5.15E-002	
PB-210	Not Detected	---	2.78E+001	
TH-232	1.00E+000	4.74E-001	2.63E-001	
RA-228	9.73E-001	1.70E-001	1.32E-001	
AC-228	9.77E-001	1.75E-001	9.94E-002	
TH-228	9.36E-001	4.35E-001	6.35E-001	
RA-224	1.26E+000	2.62E-001	7.86E-002	
PB-212	1.06E+000	1.51E-001	3.58E-002	
BI-212	1.08E+000	3.14E-001	3.81E-001	
TL-208	9.21E-001	1.44E-001	7.91E-002	
U-235	Not Detected	---	2.31E-001	
TH-231	Not Detected	---	1.13E+001	
PA-231	Not Detected	---	1.33E+000	
TH-227	Not Detected	---	3.67E-001	
RA-223	Not Detected	---	2.41E-001	
RN-219	~~2.31E-001~~	~~3.11E-001~~	~~3.60E-001~~	NOT Detected KRS 9-26-02
PB-211	Not Detected	---	7.91E-001	
TL-207	Not Detected	---	1.19E+001	
AM-241	Not Detected	---	4.13E-001	
PU-239	Not Detected	---	4.17E+002	
NP-237	Not Detected	---	2.19E+000	
PA-233	Not Detected	---	5.40E-002	
TH-229	Not Detected	---	2.37E-001	

[Summary Report] - Sample ID: : 20134213

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.45E-002
AG-110m	Not Detected	---------	2.59E-002
BA-133	Not Detected	---------	4.69E-002
BE-7	Not Detected	---------	2.23E-001
CD-115	Not Detected	---------	3.30E-001
CE-139	Not Detected	---------	2.79E-002
CE-141	Not Detected	---------	5.55E-002
CE-144	Not Detected	---------	2.29E-001
CM-243	Not Detected	---------	1.68E-001
CO-56	Not Detected	---------	3.03E-002
CO-57	Not Detected	---------	2.97E-002
CO-58	Not Detected	---------	2.81E-002
CO-60	Not Detected	---------	3.24E-002
CR-51	Not Detected	---------	2.43E-001
CS-134	Not Detected	---------	3.76E-002
CS-137	Not Detected	---------	2.85E-002
EU-152	Not Detected	---------	8.82E-002
EU-154	Not Detected	---------	1.59E-001
EU-155	Not Detected	---------	1.33E-001
FE-59	Not Detected	---------	6.51E-002
GD-153	Not Detected	---------	9.82E-002
HG-203	Not Detected	---------	3.30E-002
I-131	Not Detected	---------	4.01E-002
IR-192	Not Detected	---------	2.66E-002
K-40	1.82E+001	2.44E+000	2.60E-001
MN-52	Not Detected	---------	4.79E-002
MN-54	Not Detected	---------	2.92E-002
MO-99	Not Detected	---------	7.54E-001
NA-22	Not Detected	---------	3.65E-002
NA-24	Not Detected	---------	8.75E+000
ND-147	Not Detected	---------	2.43E-001
NI-57	Not Detected	---------	3.31E-001
RU-103	Not Detected	---------	2.75E-002
RU-106	Not Detected	---------	2.50E-001
SB-122	Not Detected	---------	1.33E-001
SB-124	Not Detected	---------	2.59E-002
SB-125	Not Detected	---------	7.72E-002
SN-113	Not Detected	---------	3.53E-002
SR-85	Not Detected	---------	3.40E-002
TA-182	Not Detected	---------	1.38E-001
TA-183	Not Detected	---------	7.19E-001
TL-201	Not Detected	---------	5.11E-001
Y-88	Not Detected	---------	2.43E-002
ZN-65	Not Detected	---------	9.09E-002
ZR-95	Not Detected	---------	4.94E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 5:37:06 PM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059919-003
Lab Sample ID : 20134214

Sample Description : 6969/1004-DF1-BH2-8-S
Sample Quantity : 762.000 gram
Sample Date/Time : 9/20/02 10:35:00 AM
Acquire Start Date/Time : 9/25/02 3:56:45 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.44E-001
RA-226	2.37E+000	5.86E-001	7.16E-001
PB-214	8.97E-001	1.28E-001	6.35E-002
BI-214	8.14E-001	1.35E-001	9.40E-002
PB-210	Not Detected	---	2.81E+001
TH-232	8.82E-001	4.11E-001	1.95E-001
RA-228	9.36E-001	1.63E-001	1.18E-001
AC-228	1.02E+000	1.81E-001	9.97E-002
TH-228	9.84E-001	3.80E-001	5.24E-001
RA-224	1.05E+000	2.25E-001	7.81E-002
PB-212	9.73E-001	1.40E-001	3.73E-002
BI-212	1.16E+000	2.99E-001	3.28E-001
TL-208	8.87E-001	1.39E-001	7.47E-002
U-235	1.66E-001	1.81E-001	2.30E-001
TH-231	Not Detected	---	1.11E+001
PA-231	Not Detected	---	1.31E+000
TH-227	Not Detected	---	3.55E-001
RA-223	Not Detected	---	2.40E-001
RN-219	Not Detected	---	3.33E-001
PB-211	Not Detected	---	7.46E-001
TL-207	Not Detected	---	1.18E+001
AM-241	Not Detected	---	4.16E-001
PU-239	Not Detected	---	4.09E+002
NP-237	Not Detected	---	2.25E+000
PA-233	Not Detected	---	5.17E-002
TH-229	Not Detected	---	2.31E-001

[Summary Report] - Sample ID: : 20134214

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.38E-002
AG-110m	Not Detected	---	2.67E-002
BA-133	Not Detected	---	5.00E-002
BE-7	Not Detected	---	2.28E-001
CD-115	Not Detected	---	3.22E-001
CE-139	Not Detected	---	2.87E-002
CE-141	Not Detected	---	5.50E-002
CE-144	Not Detected	---	2.27E-001
CM-243	Not Detected	---	1.68E-001
CO-56	Not Detected	---	2.91E-002
CO-57	Not Detected	---	2.93E-002
CO-58	Not Detected	---	2.92E-002
CO-60	Not Detected	---	3.10E-002
CR-51	Not Detected	---	2.46E-001
CS-134	Not Detected	---	4.01E-002
CS-137	Not Detected	---	2.85E-002
EU-152	Not Detected	---	8.71E-002
EU-154	Not Detected	---	1.56E-001
EU-155	Not Detected	---	1.37E-001
FE-59	Not Detected	---	6.35E-002
GD-153	Not Detected	---	9.58E-002
HG-203	Not Detected	---	3.28E-002
I-131	Not Detected	---	4.07E-002
IR-192	Not Detected	---	2.63E-002
K-40	1.67E+001	2.25E+000	2.74E-001
MN-52	Not Detected	---	5.11E-002
MN-54	Not Detected	---	2.99E-002
MO-99	Not Detected	---	7.38E-001
NA-22	Not Detected	---	3.56E-002
NA-24	Not Detected	---	9.45E+000
ND-147	Not Detected	---	2.49E-001
NI-57	Not Detected	---	2.66E-001
RU-103	Not Detected	---	2.55E-002
RU-106	Not Detected	---	2.55E-001
SB-122	Not Detected	---	1.37E-001
SB-124	Not Detected	---	2.79E-002
SB-125	Not Detected	---	7.63E-002
SN-113	Not Detected	---	3.57E-002
SR-85	Not Detected	---	3.46E-002
TA-182	Not Detected	---	1.47E-001
TA-183	Not Detected	---	7.28E-001
TL-201	Not Detected	---	5.00E-001
Y-88	Not Detected	---	2.37E-002
ZN-65	Not Detected	---	9.62E-002
ZR-95	Not Detected	---	4.97E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 7:19:08 PM

* Analyzed by: 9/26/02 Reviewed by: 10/4/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059920-003
Lab Sample ID : 20134215

Sample Description : 6969/1004-DF1-BH2-13-S
Sample Quantity : 765.000 gram
Sample Date/Time : 9/20/02 10:55:00 AM
Acquire Start Date/Time : 9/25/02 5:38:51 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.98E-001
RA-226	2.10E+000	5.51E-001	6.92E-001
PB-214	7.90E-001	1.14E-001	5.88E-002
BI-214	6.62E-001	1.06E-001	5.45E-002
PB-210	Not Detected	---	2.65E+001
TH-232	9.66E-001	4.45E-001	1.93E-001
RA-228	9.35E-001	1.64E-001	1.27E-001
AC-228	8.67E-001	1.58E-001	9.12E-002
TH-228	8.49E-001	3.71E-001	5.29E-001
RA-224	1.10E+000	2.32E-001	6.64E-002
PB-212	9.54E-001	1.37E-001	3.59E-002
BI-212	1.40E+000	3.28E-001	3.35E-001
TL-208	8.63E-001	1.35E-001	7.31E-002
U-235	2.03E-001	1.75E-001	2.23E-001
TH-231	Not Detected	---	1.06E+001
PA-231	Not Detected	---	1.31E+000
TH-227	Not Detected	---	3.49E-001
RA-223	Not Detected	---	2.26E-001
RN-219	Not Detected	---	3.42E-001
PB-211	Not Detected	---	7.56E-001
TL-207	Not Detected	---	1.15E+001
AM-241	Not Detected	---	4.33E-001
PU-239	Not Detected	---	4.09E+002
NP-237	Not Detected	---	2.16E+000
PA-233	Not Detected	---	5.15E-002
TH-229	Not Detected	---	2.31E-001

[Summary Report] - Sample ID: : 20134215

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.46E-002
AG-110m	Not Detected	---------	2.61E-002
BA-133	Not Detected	---------	4.65E-002
BE-7	Not Detected	---------	2.23E-001
CD-115	Not Detected	---------	3.23E-001
CE-139	Not Detected	---------	2.78E-002
CE-141	Not Detected	---------	5.33E-002
CE-144	Not Detected	---------	2.26E-001
CM-243	Not Detected	---------	1.62E-001
CO-56	Not Detected	---------	2.91E-002
CO-57	Not Detected	---------	2.92E-002
CO-58	Not Detected	---------	2.88E-002
CO-60	Not Detected	---------	3.02E-002
CR-51	Not Detected	---------	2.40E-001
CS-134	Not Detected	---------	3.77E-002
CS-137	Not Detected	---------	2.81E-002
EU-152	Not Detected	---------	8.70E-002
EU-154	Not Detected	---------	1.59E-001
EU-155	Not Detected	---------	1.32E-001
FE-59	Not Detected	---------	6.81E-002
GD-153	Not Detected	---------	9.79E-002
HG-203	Not Detected	---------	3.14E-002
I-131	Not Detected	---------	3.96E-002
IR-192	Not Detected	---------	2.60E-002
K-40	1.72E+001	2.32E+000	2.58E-001
MN-52	Not Detected	---------	5.08E-002
MN-54	Not Detected	---------	3.23E-002
MO-99	Not Detected	---------	7.14E-001
NA-22	Not Detected	---------	3.56E-002
NA-24	Not Detected	---------	9.53E+000
ND-147	Not Detected	---------	2.30E-001
NI-57	Not Detected	---------	3.31E-001
RU-103	Not Detected	---------	2.69E-002
RU-106	Not Detected	---------	2.47E-001
SB-122	Not Detected	---------	1.34E-001
SB-124	Not Detected	---------	2.64E-002
SB-125	Not Detected	---------	7.72E-002
SN-113	Not Detected	---------	3.31E-002
SR-85	Not Detected	---------	3.31E-002
TA-182	Not Detected	---------	1.34E-001
TA-183	Not Detected	---------	7.63E-001
TL-201	Not Detected	---------	5.09E-001
Y-88	Not Detected	---------	2.47E-002
ZN-65	Not Detected	---------	8.64E-002
ZR-95	Not Detected	---------	4.99E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 9:01:10 PM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059921-003
Lab Sample ID : 20134216

Sample Description : 6969/1004-DF1-BH3-8-S
Sample Quantity : 873.000 gram
Sample Date/Time : 9/20/02 11:30:00 AM
Acquire Start Date/Time : 9/25/02 7:20:52 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.21E-001
RA-226	1.35E+000	4.62E-001	6.43E-001
PB-214	6.43E-001	9.51E-002	5.43E-002
BI-214	5.98E-001	9.55E-002	4.86E-002
PB-210	Not Detected	---	2.45E+001
TH-232	6.67E-001	3.21E-001	1.94E-001
RA-228	7.40E-001	1.35E-001	1.17E-001
AC-228	6.86E-001	1.34E-001	1.02E-001
TH-228	7.95E-001	3.99E-001	5.91E-001
RA-224	8.03E-001	1.75E-001	5.90E-002
PB-212	7.78E-001	1.12E-001	3.35E-002
BI-212	1.05E+000	2.67E-001	2.93E-001
TL-208	7.10E-001	1.13E-001	6.58E-002
U-235	Not Detected	---	2.02E-001
TH-231	Not Detected	---	1.01E+001
PA-231	Not Detected	---	1.21E+000
TH-227	Not Detected	---	3.08E-001
RA-223	Not Detected	---	2.15E-001
RN-219	Not Detected	---	3.06E-001
PB-211	Not Detected	---	6.84E-001
TL-207	Not Detected	---	1.17E+001
AM-241	Not Detected	---	3.78E-001
PU-239	Not Detected	---	3.66E+002
NP-237	Not Detected	---	2.00E+000
PA-233	Not Detected	---	4.75E-002
TH-229	Not Detected	---	2.12E-001

[Summary Report] - Sample ID: : 20134216

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.99E-002
AG-110m	Not Detected	---------	2.40E-002
BA-133	Not Detected	---------	4.19E-002
BE-7	Not Detected	---------	2.19E-001
CD-115	Not Detected	---------	2.90E-001
CE-139	Not Detected	---------	2.55E-002
CE-141	Not Detected	---------	4.82E-002
CE-144	Not Detected	---------	2.07E-001
CM-243	Not Detected	---------	1.51E-001
CO-56	Not Detected	---------	2.88E-002
CO-57	Not Detected	---------	2.70E-002
CO-58	Not Detected	---------	2.72E-002
CO-60	Not Detected	---------	3.25E-002
CR-51	Not Detected	---------	2.19E-001
CS-134	Not Detected	---------	3.47E-002
CS-137	Not Detected	---------	2.58E-002
EU-152	Not Detected	---------	8.00E-002
EU-154	Not Detected	---------	1.38E-001
EU-155	Not Detected	---------	1.17E-001
FE-59	Not Detected	---------	6.83E-002
GD-153	Not Detected	---------	8.85E-002
HG-203	Not Detected	---------	2.97E-002
I-131	Not Detected	---------	3.67E-002
IR-192	Not Detected	---------	2.33E-002
K-40	2.53E+001	3.35E+000	2.35E-001
MN-52	Not Detected	---------	4.40E-002
MN-54	Not Detected	---------	2.92E-002
MO-99	Not Detected	---------	7.23E-001
NA-22	Not Detected	---------	3.70E-002
NA-24	Not Detected	---------	1.03E+001
ND-147	Not Detected	---------	2.24E-001
NI-57	Not Detected	---------	2.52E-001
RU-103	Not Detected	---------	2.53E-002
RU-106	Not Detected	---------	2.24E-001
SB-122	Not Detected	---------	1.30E-001
SB-124	Not Detected	---------	2.49E-002
SB-125	Not Detected	---------	7.15E-002
SN-113	Not Detected	---------	3.23E-002
SR-85	Not Detected	---------	3.05E-002
TA-182	Not Detected	---------	1.29E-001
TA-183	Not Detected	---------	6.71E-001
TL-201	Not Detected	---------	4.57E-001
Y-88	Not Detected	---------	1.98E-002
ZN-65	Not Detected	---------	8.64E-002
ZR-95	Not Detected	---------	4.68E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/25/02 10:43:10 PM

* Analyzed by: 7/26/02 Reviewed by: 10/1/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059922-003
Lab Sample ID : 20134217

Sample Description : 6969/1004-DF1-BH3-13-S
Sample Quantity : 779.000 gram
Sample Date/Time : 9/20/02 11:50:00 AM
Acquire Start Date/Time : 9/25/02 9:02:55 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.01E-001
RA-226	1.94E+000	5.38E-001	6.94E-001
PB-214	7.27E-001	1.06E-001	5.71E-002
BI-214	6.68E-001	1.06E-001	5.06E-002
PB-210	Not Detected	---	2.67E+001
TH-232	9.21E-001	4.26E-001	1.89E-001
RA-228	8.98E-001	1.57E-001	1.08E-001
AC-228	8.46E-001	1.56E-001	9.69E-002
TH-228	9.37E-001	4.16E-001	5.99E-001
RA-224	9.66E-001	2.08E-001	6.58E-002
PB-212	9.26E-001	1.33E-001	3.65E-002
BI-212	8.84E-001	3.01E-001	3.94E-001
TL-208	7.70E-001	1.24E-001	7.71E-002
U-235	Not Detected	---	2.19E-001
TH-231	Not Detected	---	1.06E+001
PA-231	Not Detected	---	1.26E+000
TH-227	Not Detected	---	3.43E-001
RA-223	Not Detected	---	2.36E-001
RN-219	Not Detected	---	3.27E-001
PB-211	Not Detected	---	7.46E-001
TL-207	Not Detected	---	1.17E+001
AM-241	Not Detected	---	4.13E-001
PU-239	Not Detected	---	4.05E+002
NP-237	Not Detected	---	2.09E+000
PA-233	Not Detected	---	5.13E-002
TH-229	Not Detected	---	2.30E-001

[Summary Report] - Sample ID: : 20134217

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.09E-002
AG-110m	Not Detected	---	2.59E-002
BA-133	Not Detected	---	4.34E-002
BE-7	Not Detected	---	2.22E-001
CD-115	Not Detected	---	3.31E-001
CE-139	Not Detected	---	2.69E-002
CE-141	Not Detected	---	5.40E-002
CE-144	Not Detected	---	2.20E-001
CM-243	Not Detected	---	1.55E-001
CO-56	Not Detected	---	2.94E-002
CO-57	Not Detected	---	2.84E-002
CO-58	Not Detected	---	2.93E-002
CO-60	Not Detected	---	3.12E-002
CR-51	Not Detected	---	2.38E-001
CS-134	Not Detected	---	3.65E-002
CS-137	Not Detected	---	2.78E-002
EU-152	Not Detected	---	8.43E-002
EU-154	Not Detected	---	1.42E-001
EU-155	Not Detected	---	1.27E-001
FE-59	Not Detected	---	6.75E-002
GD-153	Not Detected	---	9.43E-002
HG-203	Not Detected	---	3.07E-002
I-131	Not Detected	---	3.90E-002
IR-192	Not Detected	---	2.58E-002
K-40	1.81E+001	2.43E+000	2.74E-001
MN-52	Not Detected	---	5.08E-002
MN-54	Not Detected	---	3.02E-002
MO-99	Not Detected	---	7.68E-001
NA-22	Not Detected	---	3.50E-002
NA-24	Not Detected	---	1.08E+001
ND-147	Not Detected	---	2.35E-001
NI-57	Not Detected	---	5.19E-001
RU-103	Not Detected	---	2.54E-002
RU-106	~~7.35E-002~~	~~7.05E-002~~	~~1.10E-001~~
SB-122	Not Detected	---	1.36E-001
SB-124	Not Detected	---	2.50E-002
SB-125	Not Detected	---	7.27E-002
SN-113	Not Detected	---	3.36E-002
SR-85	Not Detected	---	3.34E-002
TA-182	Not Detected	---	1.39E-001
TA-183	Not Detected	---	7.39E-001
TL-201	Not Detected	---	5.11E-001
Y-88	Not Detected	---	2.06E-002
ZN-65	Not Detected	---	8.56E-002
ZR-95	Not Detected	---	5.11E-002

NOT Detected KDS 9-26-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 12:25:14 AM

Analyzed by: 9/26/02 Reviewed by:

Customer : SANDERS, M (6135)
Customer Sample ID : 059923-003
Lab Sample ID : 20134218

Sample Description : 9978/1114-DW1-BH1-6-S
Sample Quantity : 711.000 gram
Sample Date/Time : 9/23/02 8:45:00 AM
Acquire Start Date/Time : 9/25/02 10:44:54 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	6.46E-001
RA-226	1.83E+000	4.84E-001	5.99E-001
PB-214	6.57E-001	1.00E-001	6.21E-002
BI-214	5.48E-001	9.14E-002	5.25E-002
PB-210	Not Detected	---	2.64E+001
TH-232	6.04E-001	2.95E-001	1.89E-001
RA-228	7.15E-001	1.36E-001	1.12E-001
AC-228	5.75E-001	1.21E-001	9.73E-002
TH-228	6.60E-001	4.00E-001	6.07E-001
RA-224	6.85E-001	1.65E-001	9.51E-002
PB-212	6.50E-001	9.59E-002	3.36E-002
BI-212	8.65E-001	2.76E-001	3.41E-001
TL-208	5.67E-001	9.98E-002	7.22E-002
U-235	Not Detected	---	2.10E-001
TH-231	Not Detected	---	1.03E+001
PA-231	Not Detected	---	1.22E+000
TH-227	Not Detected	---	3.16E-001
RA-223	Not Detected	---	1.85E-001
RN-219	Not Detected	---	3.30E-001
PB-211	Not Detected	---	7.39E-001
TL-207	Not Detected	---	1.12E+001
AM-241	Not Detected	---	3.92E-001
PU-239	Not Detected	---	3.69E+002
NP-237	Not Detected	---	2.00E+000
PA-233	Not Detected	---	5.12E-002
TH-229	Not Detected	---	2.06E-001

[Summary Report] - Sample ID: : 20134218

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.04E-002
AG-110m	Not Detected	---------	2.53E-002
BA-133	Not Detected	---------	4.51E-002
BE-7	Not Detected	---------	2.07E-001
CD-115	Not Detected	---------	1.28E-001
CE-139	Not Detected	---------	2.60E-002
CE-141	Not Detected	---------	4.76E-002
CE-144	Not Detected	---------	2.02E-001
CM-243	Not Detected	---------	1.49E-001
CO-56	Not Detected	---------	2.70E-002
CO-57	Not Detected	---------	2.59E-002
CO-58	Not Detected	---------	2.53E-002
CO-60	Not Detected	---------	2.98E-002
CR-51	Not Detected	---------	2.05E-001
CS-134	Not Detected	---------	3.64E-002
CS-137	Not Detected	---------	2.75E-002
EU-152	Not Detected	---------	7.79E-002
EU-154	Not Detected	---------	1.40E-001
EU-155	Not Detected	---------	1.18E-001
FE-59	Not Detected	---------	5.86E-002
GD-153	Not Detected	---------	8.38E-002
HG-203	Not Detected	---------	2.78E-002
I-131	Not Detected	---------	3.01E-002
IR-192	Not Detected	---------	2.38E-002
K-40	1.48E+001	2.02E+000	2.50E-001
MN-52	Not Detected	---------	3.64E-002
MN-54	Not Detected	---------	2.92E-002
MO-99	Not Detected	---------	3.54E-001
NA-22	Not Detected	---------	3.34E-002
NA-24	Not Detected	---------	4.89E-001
ND-147	Not Detected	---------	1.94E-001
NI-57	~~2.17E-001~~	~~8.31E-002~~	~~1.04E-001~~
RU-103	Not Detected	---------	2.37E-002
RU-106	Not Detected	---------	2.33E-001
SB-122	Not Detected	---------	6.11E-002
SB-124	Not Detected	---------	2.50E-002
SB-125	Not Detected	---------	6.80E-002
SN-113	Not Detected	---------	3.13E-002
SR-85	Not Detected	---------	3.10E-002
TA-182	Not Detected	---------	1.29E-001
TA-183	Not Detected	---------	4.79E-001
TL-201	Not Detected	---------	2.52E-001
Y-88	Not Detected	---------	2.36E-002
ZN-65	Not Detected	---------	8.63E-002
ZR-95	Not Detected	---------	4.67E-002

NOT DETECTED ICRS 9-16-02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 2:07:15 AM

Analyzed by: 9/26/02 Reviewed by: 9/26/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059924-003
Lab Sample ID : 20134219

Sample Description : 9978/1114-DW1-BH1-11-S
Sample Quantity : 906.000 gram
Sample Date/Time : 9/23/02 9:10:00 AM
Acquire Start Date/Time : 9/26/02 12:26:59 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	5.82E-001
RA-226	1.33E+000	4.34E-001	5.95E-001
PB-214	4.86E-001	7.74E-002	5.65E-002
BI-214	5.03E-001	8.23E-002	4.65E-002
PB-210	Not Detected	---	2.30E+001
TH-232	6.51E-001	3.10E-001	1.75E-001
RA-228	6.45E-001	1.22E-001	1.17E-001
AC-228	5.80E-001	1.45E-001	1.64E-001
TH-228	9.08E-001	3.71E-001	5.25E-001
RA-224	7.33E-001	1.62E-001	5.94E-002
PB-212	6.32E-001	9.21E-002	3.15E-002
BI-212	8.13E-001	2.61E-001	3.34E-001
TL-208	5.67E-001	9.57E-002	6.68E-002
U-235	Not Detected	---	1.92E-001
TH-231	Not Detected	---	9.16E+000
PA-231	Not Detected	---	1.12E+000
TH-227	Not Detected	---	2.76E-001
RA-223	Not Detected	---	1.70E-001
RN-219	Not Detected	---	2.92E-001
PB-211	Not Detected	---	6.57E-001
TL-207	Not Detected	---	1.05E+001
AM-241	Not Detected	---	3.40E-001
PU-239	Not Detected	---	3.44E+002
NP-237	Not Detected	---	1.85E+000
PA-233	Not Detected	---	4.66E-002
TH-229	Not Detected	---	1.97E-001

[Summary Report] - Sample ID: : 20134219

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.84E-002
AG-110m	Not Detected	---------	2.26E-002
BA-133	Not Detected	---------	3.77E-002
BE-7	Not Detected	---------	1.94E-001
CD-115	Not Detected	---------	1.17E-001
CE-139	Not Detected	---------	2.39E-002
CE-141	Not Detected	---------	4.45E-002
CE-144	Not Detected	---------	1.89E-001
CM-243	Not Detected	---------	1.35E-001
CO-56	Not Detected	---------	2.83E-002
CO-57	Not Detected	---------	2.54E-002
CO-58	Not Detected	---------	2.45E-002
CO-60	Not Detected	---------	3.00E-002
CR-51	Not Detected	---------	1.90E-001
CS-134	Not Detected	---------	3.15E-002
CS-137	Not Detected	---------	2.42E-002
EU-152	Not Detected	---------	7.63E-002
EU-154	Not Detected	---------	1.31E-001
EU-155	Not Detected	---------	1.10E-001
FE-59	Not Detected	---------	5.72E-002
GD-153	Not Detected	---------	8.03E-002
HG-203	Not Detected	---------	2.55E-002
I-131	Not Detected	---------	2.78E-002
IR-192	Not Detected	---------	2.23E-002
K-40	2.31E+001	3.06E+000	2.44E-001
MN-52	Not Detected	---------	2.92E-002
MN-54	Not Detected	---------	2.59E-002
MO-99	Not Detected	---------	3.35E-001
NA-22	Not Detected	---------	3.57E-002
NA-24	Not Detected	---------	4.82E-001
ND-147	Not Detected	---------	1.74E-001
NI-57	Not Detected	---------	6.76E-002
RU-103	Not Detected	---------	2.25E-002
RU-106	Not Detected	---------	2.17E-001
SB-122	Not Detected	---------	5.99E-002
SB-124	Not Detected	---------	2.34E-002
SB-125	Not Detected	---------	6.49E-002
SN-113	Not Detected	---------	2.95E-002
SR-85	Not Detected	---------	2.77E-002
TA-182	Not Detected	---------	1.23E-001
TA-183	Not Detected	---------	4.18E-001
TL-201	Not Detected	---------	2.37E-001
Y-88	Not Detected	---------	1.65E-002
ZN-65	Not Detected	---------	8.13E-002
ZR-95	Not Detected	---------	4.11E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 11:15:58 AM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : 059931-001
Lab Sample ID : 20134207

Sample Description : 829/276-SP1-BH1-8-DU
Sample Quantity : 735.000 gram
Sample Date/Time : 9/24/02 2:00:00 PM
Acquire Start Date/Time : 9/26/02 9:35:43 AM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	---	7.37E-001
RA-226	2.02E+000	5.63E-001	7.28E-001
PB-214	9.18E-001	1.30E-001	6.03E-002
BI-214	7.84E-001	1.21E-001	4.84E-002
PB-210	Not Detected	---	2.80E+001
TH-232	1.00E+000	4.61E-001	1.90E-001
RA-228	9.91E-001	1.72E-001	1.23E-001
AC-228	9.13E-001	1.66E-001	9.81E-002
TH-228	1.21E+000	4.61E-001	6.42E-001
RA-224	1.05E+000	2.27E-001	8.66E-002
PB-212	1.04E+000	1.49E-001	3.75E-002
BI-212	1.15E+000	3.15E-001	3.65E-001
TL-208	8.85E-001	1.40E-001	8.07E-002
U-235	Not Detected	---	2.31E-001
TH-231	Not Detected	---	1.16E+001
PA-231	Not Detected	---	1.34E+000
TH-227	Not Detected	---	3.75E-001
RA-223	Not Detected	---	2.03E-001
RN-219	Not Detected	---	3.68E-001
PB-211	Not Detected	---	8.25E-001
TL-207	Not Detected	---	1.16E+001
AM-241	Not Detected	---	4.27E-001
PU-239	Not Detected	---	4.13E+002
NP-237	Not Detected	---	2.22E+000
PA-233	Not Detected	---	5.35E-002
TH-229	Not Detected	---	2.35E-001

[Summary Report] - Sample ID: : 20134207

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.57E-002
AG-110m	Not Detected	---------	2.75E-002
BA-133	Not Detected	---------	4.90E-002
BE-7	Not Detected	---------	2.29E-001
CD-115	Not Detected	---------	1.14E-001
CE-139	Not Detected	---------	2.89E-002
CE-141	Not Detected	---------	5.23E-002
CE-144	Not Detected	---------	2.25E-001
CM-243	Not Detected	---------	1.62E-001
CO-56	Not Detected	---------	3.01E-002
CO-57	Not Detected	---------	2.98E-002
CO-58	Not Detected	---------	2.85E-002
CO-60	Not Detected	---------	3.38E-002
CR-51	Not Detected	---------	2.22E-001
CS-134	Not Detected	---------	3.96E-002
CS-137	Not Detected	---------	2.96E-002
EU-152	Not Detected	---------	8.96E-002
EU-154	Not Detected	---------	1.64E-001
EU-155	Not Detected	---------	1.34E-001
FE-59	Not Detected	---------	6.20E-002
GD-153	Not Detected	---------	9.58E-002
HG-203	Not Detected	---------	2.95E-002
I-131	Not Detected	---------	3.19E-002
IR-192	Not Detected	---------	2.62E-002
K-40	1.71E+001	2.30E+000	2.65E-001
MN-52	Not Detected	---------	3.49E-002
MN-54	Not Detected	---------	3.09E-002
MO-99	Not Detected	---------	3.32E-001
NA-22	Not Detected	---------	3.61E-002
NA-24	Not Detected	---------	2.28E-001
ND-147	Not Detected	---------	1.95E-001
NI-57	Not Detected	---------	7.28E-002
RU-103	Not Detected	---------	2.55E-002
RU-106	Not Detected	---------	2.39E-001
SB-122	Not Detected	---------	5.81E-002
SB-124	Not Detected	---------	2.49E-002
SB-125	Not Detected	---------	7.27E-002
SN-113	Not Detected	---------	3.49E-002
SR-85	Not Detected	---------	3.38E-002
TA-182	Not Detected	---------	1.43E-001
TA-183	Not Detected	---------	4.70E-001
TL-201	Not Detected	---------	2.38E-001
Y-88	Not Detected	---------	2.49E-002
ZN-65	Not Detected	---------	9.51E-002
ZR-95	Not Detected	---------	4.93E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 7:40:07 AM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
Lab Sample ID : 20134220

Sample Description : MIXED_GAMMA_STANDARD_CG-134
Sample Quantity : 1.000 Each
Sample Date/Time : 11/1/90 12:00:00 PM
Acquire Start Date/Time : 9/26/02 7:29:51 AM
Detector Name : LAB01
Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
BE-7	Not Detected	---	1.00E+026
NA-22	Not Detected	---	4.50E+003
NA-24	Not Detected	---	1.00E+026
K-40	Not Detected	---	1.34E+003
CR-51	Not Detected	---	1.00E+026
MN-52	Not Detected	---	1.00E+026
MN-54	Not Detected	---	5.15E+006
CO-56	Not Detected	---	2.96E+019
CO-57	Not Detected	---	1.11E+007
NI-57	Not Detected	---	1.00E+026
CO-58	Not Detected	---	8.61E+020
FE-59	Not Detected	---	1.00E+026
CO-60	7.93E+004	1.05E+004	9.20E+002
ZN-65	Not Detected	---	1.90E+008
SR-85	Not Detected	---	1.00E+026
Y-88	Not Detected	---	2.94E+014
ZR-95	Not Detected	---	1.00E+026
MO-99	Not Detected	---	1.00E+026
RU-103	Not Detected	---	1.00E+026
RU-106	Not Detected	---	9.72E+006
AG-108m	Not Detected	---	3.24E+002
AG-110m	Not Detected	---	2.87E+008
SN-113	Not Detected	---	1.01E+014
CD-115	Not Detected	---	1.00E+026
SB-122	Not Detected	---	1.00E+026
SB-124	Not Detected	---	1.00E+026
SB-125	Not Detected	---	2.38E+004
I-131	Not Detected	---	1.00E+026
BA-133	Not Detected	---	9.09E+002

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
CS-134	Not Detected	---------	1.51E+004
CS-137	6.80E+004	8.63E+003	3.65E+002
CE-139	Not Detected	---------	5.72E+011
CE-141	Not Detected	---------	1.00E+026
CE-144	Not Detected	---------	5.17E+007
ND-147	Not Detected	---------	1.00E+026
EU-152	Not Detected	---------	9.43E+002
GD-153	Not Detected	---------	1.11E+008
EU-154	Not Detected	---------	3.66E+003
EU-155	Not Detected	---------	4.26E+003
TA-182	Not Detected	---------	2.50E+014
TA-183	Not Detected	---------	1.00E+026
IR-192	Not Detected	---------	1.48E+020
TL-201	Not Detected	---------	1.00E+026
HG-203	Not Detected	---------	1.00E+026
TL-207	Not Detected	---------	2.34E+005
TL-208	Not Detected	---------	6.32E+004
PB-210	Not Detected	---------	9.80E+004
PB-211	Not Detected	---------	1.51E+004
BI-212	Not Detected	---------	2.99E+005
PB-212	Not Detected	---------	3.36E+004
BI-214	Not Detected	---------	5.79E+002
PB-214	Not Detected	---------	6.74E+002
RN-219	Not Detected	---------	6.71E+003
RA-223	Not Detected	---------	1.00E+026
RA-224	Not Detected	---------	1.86E+004
RA-226	Not Detected	---------	5.65E+003
TH-227	Not Detected	---------	2.57E+003
AC-228	Not Detected	---------	1.45E+003
RA-228	Not Detected	---------	2.46E+003
TH-228	Not Detected	---------	4.75E+005
TH-229	Not Detected	---------	1.26E+003
PA-231	Not Detected	---------	1.39E+004
TH-231	Not Detected	---------	4.04E+004
TH-232	Not Detected	---------	2.05E+003
PA-233	Not Detected	---------	5.84E+002
U-235	Not Detected	---------	1.38E+003
NP-237	Not Detected	---------	1.23E+004
U-238	Not Detected	---------	2.59E+003
PU-239	Not Detected	---------	2.32E+006
AM-241	8.91E+004	1.29E+004	1.91E+003
CM-243	Not Detected	---------	2.16E+003

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report

Report Date : 9/26/02 7:40:12 AM
QA File : C:\GENIE2K\CAMFILES\LCS1.QAF
Analyst : KICHAVE
Sample ID : 20134220
Sample Quantity : 1.00 Each
Sample Date : 11/1/90 12:00:00 PM
Measurement Date : 9/26/02 7:29:51 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	SD	UD	BS >
AM-241 ACTIVITY	8.574E-002	3.464E-003	8.909E-002	<	:	:	>
CS-137 Activity	6.836E-002	1.361E-003	6.799E-002	<	:	:	>
CO-60 Activity	7.658E-002	3.463E-003	7.716E-002	<	:	:	>

Flags Key: LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: _____ 10/1/02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/26/02 7:36:45 AM

* Analyzed by: 9/26/02 Reviewed by: 10/1/02

Customer : SANDERS M (6135)
Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
Lab Sample ID : 20134221

Sample Description : MIXED_GAMMA_STANDARD_CG-134
Sample Quantity : 1.000 Each
Sample Date/Time : 11/01/90 12:00:00 PM
Acquire Start Date/Time : 9/26/02 7:26:30 AM
Detector Name : LAB02
Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	---------	3.94E+003
RA-226	Not Detected	---------	5.61E+003
PB-214	Not Detected	---------	5.75E+002
BI-214	Not Detected	---------	4.66E+002
PB-210	Not Detected	---------	2.67E+005
TH-232	Not Detected	---------	1.77E+003
RA-228	Not Detected	---------	1.77E+003
AC-228	Not Detected	---------	1.05E+003
TH-228	Not Detected	---------	4.27E+005
RA-224	Not Detected	---------	1.90E+004
PB-212	Not Detected	---------	3.36E+004
BI-212	Not Detected	---------	2.08E+005
TL-208	Not Detected	---------	5.50E+004
U-235	Not Detected	---------	1.55E+003
TH-231	Not Detected	---------	6.77E+004
PA-231	Not Detected	---------	1.22E+004
TH-227	Not Detected	---------	2.58E+003
RA-223	Not Detected	---------	1.00E+026
RN-219	Not Detected	---------	5.66E+003
PB-211	Not Detected	---------	1.26E+004
TL-207	Not Detected	---------	1.74E+005
AM-241	8.21E+004	1.22E+004	3.94E+003
PU-239	Not Detected	---------	2.60E+006
NP-237	Not Detected	---------	1.41E+004
PA-233	Not Detected	---------	5.09E+002
TH-229	Not Detected	---------	1.49E+003

[Summary Report] - Sample ID: : 20134221

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	---	2.21E+002
AG-110m	Not Detected	---	2.27E+008
BA-133	Not Detected	---	7.80E+002
BE-7	Not Detected	---	1.00E+026
CD-115	Not Detected	---	1.00E+026
CE-139	Not Detected	---	6.26E+011
CE-141	Not Detected	---	1.00E+026
CE-144	Not Detected	---	5.81E+007
CM-243	Not Detected	---	1.88E+003
CO-56	Not Detected	---	2.28E+019
CO-57	Not Detected	---	1.28E+007
CO-58	Not Detected	---	6.47E+020
CO-60	8.15E+004	1.06E+004	7.25E+002
CR-51	Not Detected	---	1.00E+026
CS-134	Not Detected	---	1.22E+004
CS-137	7.02E+004	8.88E+003	3.35E+002
EU-152	Not Detected	---	1.09E+003
EU-154	Not Detected	---	2.49E+003
EU-155	Not Detected	---	4.92E+003
FE-59	Not Detected	---	1.00E+026
GD-153	Not Detected	---	1.61E+008
HG-203	Not Detected	---	1.00E+026
[redacted]-131	Not Detected	---	1.00E+026
[redacted]R-192	Not Detected	---	1.28E+020
K-40	Not Detected	---	1.06E+003
MN-52	Not Detected	---	1.00E+026
MN-54	Not Detected	---	3.76E+006
MO-99	Not Detected	---	1.00E+026
NA-22	Not Detected	---	3.47E+003
NA-24	Not Detected	---	1.00E+026
ND-147	Not Detected	---	1.00E+026
NI-57	Not Detected	---	1.00E+026
RU-103	Not Detected	---	1.00E+026
RU-106	Not Detected	---	8.00E+006
SB-122	Not Detected	---	1.00E+026
SB-124	Not Detected	---	1.00E+026
SB-125	Not Detected	---	1.98E+004
SN-113	Not Detected	---	8.64E+013
SR-85	Not Detected	---	1.00E+026
TA-182	Not Detected	---	1.84E+014
TA-183	Not Detected	---	1.00E+026
TL-201	Not Detected	---	1.00E+026
Y-88	Not Detected	---	2.73E+014
ZN-65	Not Detected	---	1.38E+008
ZR-95	Not Detected	---	1.00E+026

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report

Report Date : 9/26/02 7:36:51 AM
QA File : C:\GENIE2K\CAMFILES\LCS2.QAF
Analyst : KICHAVE
Sample ID : 20134221
Sample Quantity : 1.00 Each
Sample Date : 11/01/90 12:00:00 PM
Measurement Date : 9/26/02 7:26:30 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	SD	UD	BS >
AM-241 Activity	8.240E-002	3.922E-003	8.212E-002	<			>
CS-137 Activity	7.182E-002	3.734E-003	7.023E-002	<			>
CO-60 Activity	8.001E-002	5.095E-003	8.027E-002	<			>

Flags Key:
LU = Boundary Test (Ab = Above , Be = Below)
SD = Sample Driven N-Sigma Test (In = Investigate, Ac = Action)
UD = User Driven N-Sigma Test (In = Investigate, Ac = Action)
BS = Measurement Bias Test (In = Investigate, Ac = Action)

Reviewed by: 10/1/02