9-1-2005

Justification for Class III Permit Modification September 2005 DSS Site 1092 Operable Unit MO 228-230 Septic System at Technical Area III

Sandia National Laboratories/NM

This work supported by the United States Department of Energy under contract DE-AC04-94185000.

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)

Environmental Restoration Project

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	1959	1991	1990-1991, 1992, 1995, 2005	2005
1080	Bldg 6644 Septic System	TA-III	1959	1991	1990-1991, 1992, 1995	1996
1081	Bldg 6650 Septic System	TA-III	1967 (southern system) Early 1980s (northern system)	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-V	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	1959	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	1999-2002	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

For More Information Contact

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

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

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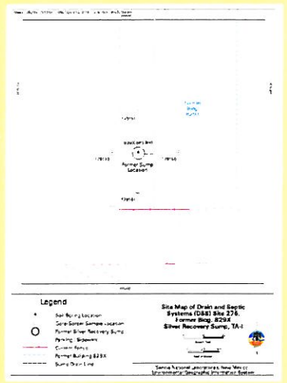
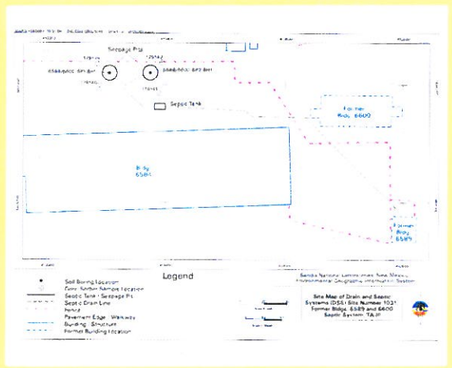
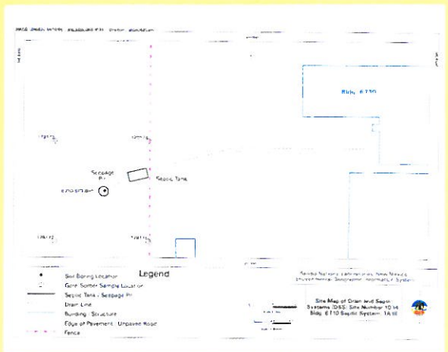
Sandia National Laboratories

Environmental Restoration Project

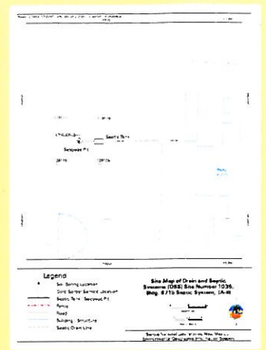


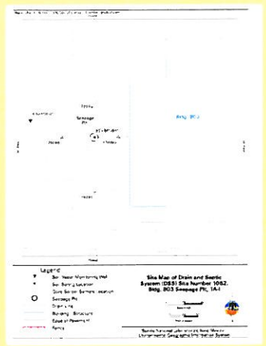


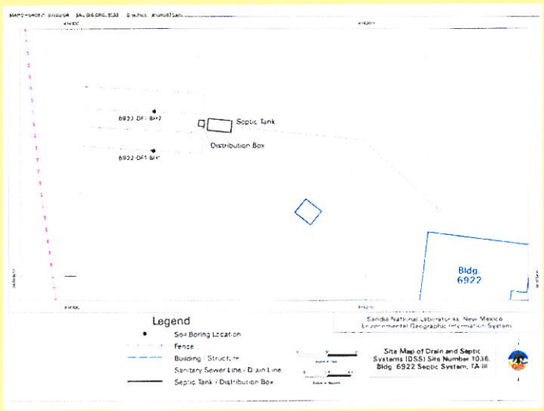


Septic system demolition and backfilling.

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







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Justification for Class III Permit Modification

September 2005

DSS Site 1092
Operable Unit 1295
MO 228-230 Septic System at Technical Area III

CAC (SWMU Assessment Report) 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.

Sandia National Laboratories

Justification for Class III Permit Modification

September 2005

DSS Site 1092
Operable Unit 1295
MO 228-230 Septic System at Technical Area III

CAC (SWMU Assessment Report) Submitted March 2005
RSI Submitted April 2005

Environmental Restoration Project

United States Department of Energy
Sandia Site Office

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P.O. Box 5400
Albuquerque, New Mexico 87185-5400

Brenda

MAR 2 3 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 Solid Waste Management Unit (SWMU) Assessment Reports and Proposals for Corrective Action Complete (CAC) for Drain and Septic Systems (DSS) Sites 1081 and 1092. DOE is also submitting responses to the Request for Supplemental Information (RSI) for SWMUs 137, 146, 148, 152, and 153 at Sandia National Laboratories, New Mexico, EPA ID No. NM5890110518. These documents are compiled as DSS Round 8 and CAC (formerly No further Action [NFA]) Batch 26.

This submittal includes descriptions of the site characterization work and risk assessments for DSS Area of Concern (AOC) Sites 1081 and 1092, and SWMUs 137, 146, 148, 152, and 153. The risk assessments conclude that for these seven sites: (1) there is no significant risk to human health under both the industrial and residential land-use scenarios; and (2) that there are no ecological risks associated with these sites.

Based on the information provided, DOE and Sandia are requesting a determination of Corrective Action Complete without controls for these DSS sites.

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

Sincerely,

Patty Wagner
Manager

Enclosure

cc w/ enclosure:
L. King, EPA, Region 6 (Via Certified Mail)
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cc w/o enclosure.:
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M. J. Davis, SNL, MS 1089
ESHSEC Records Center, MS 1087

Sandia National Laboratories/New Mexico
Environmental Restoration Project

SWMU ASSESSMENT REPORT AND PROPOSAL FOR CORRECTIVE ACTION COMPLETE DRAIN AND SEPTIC SYSTEMS SITE 1092, MO 228-230 SEPTIC SYSTEM

March 2005

United States Department of Energy
Sandia Site Office

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ACRONYMS AND ABBREVIATIONS

AOC	Area of Concern
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
HE	high explosive
HI	hazard index
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
MDA	minimum detectable activity
MDL	method detection limit
MO	Mobile Office
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
OU	Operable Unit
PCB	polychlorinated biphenyl
ppmv	parts per million by volume
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
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. 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. 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.

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 1092: MO 228-230 SEPTIC SYSTEM

2.1 Summary

The SNL/NM ER Project conducted an assessment of DSS Site 1092, the Mobile Office (MO) 228-230 Septic System. There are no known or specific environmental concerns at this site. The assessment was conducted to determine whether environmental contamination was released to the environment via the septic system 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 MO 228-230 Septic System, and that it does not pose a threat to human health or the environment under either the industrial or residential land-use scenarios. The MO 228-230 complex was removed in April 2004.

Review and analysis of all relevant data for DSS Site 1092 indicate that concentrations of constituents of concern (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 1092 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 1092 is located in SNL/NM Technical Area (TA)-III on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy. The site is located approximately 800 feet southwest of the entrance to TA-III (Figure 2.2.1-1). The abandoned septic system is approximately 90 feet southwest of the former MO 228-230 complex, and consisted of a 3,000-gallon septic tank and distribution box that emptied to four branching drain line laterals, each approximately 70 feet long (Figure 2.2.1-2). Construction details are based upon engineering drawings (SNL/NM February 1986), site inspections, and backhoe excavations of the system.

The surface geology at DSS Site 1092 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 1092, 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). Site vegetation primarily consists of desert grasses, shrubs, and cacti.

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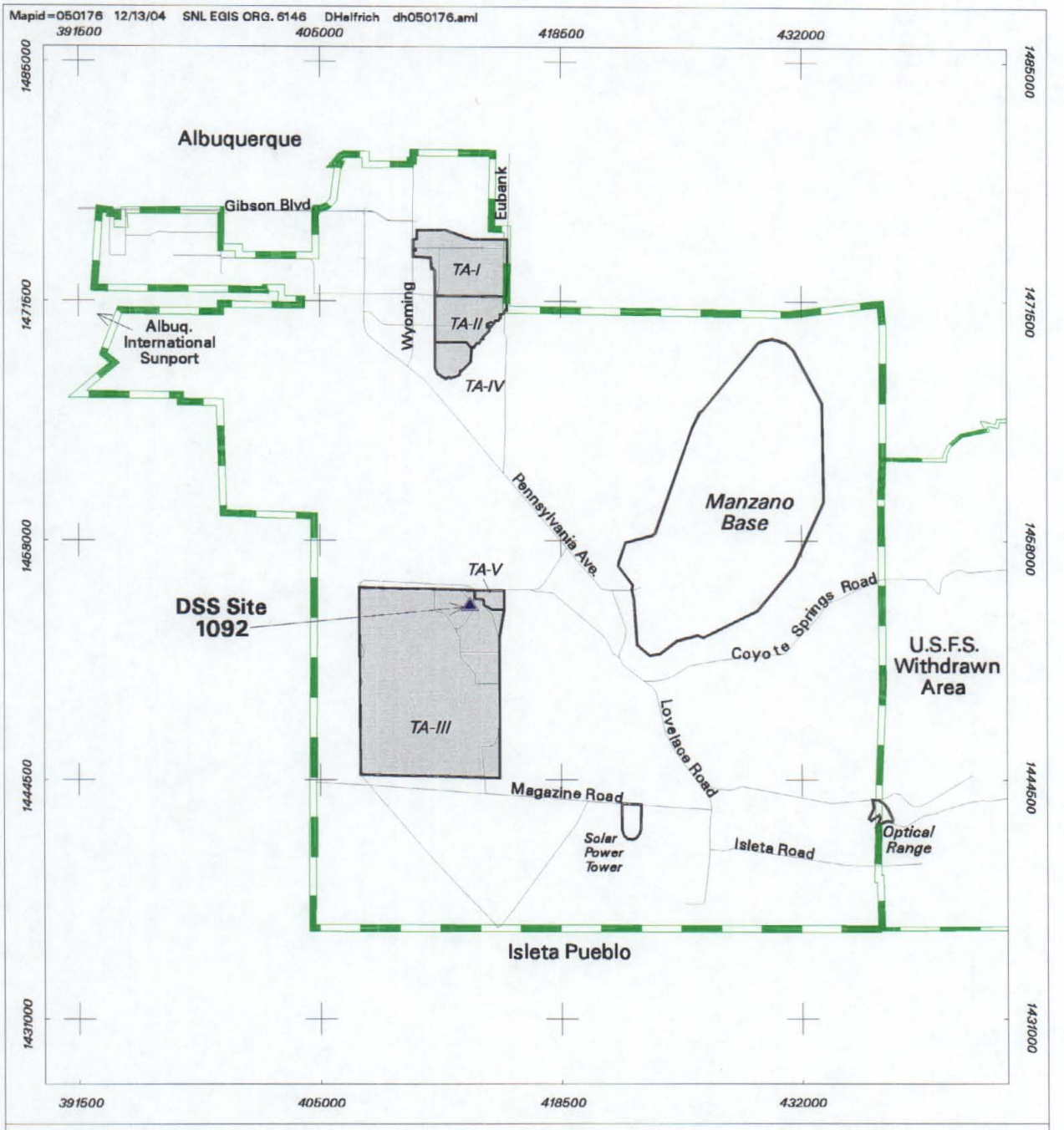


Legend

- DSS Site 1092
- Major Road
- KAFB Boundary
- USFS Withdrawn Area Boundary
- SNL Technical Area

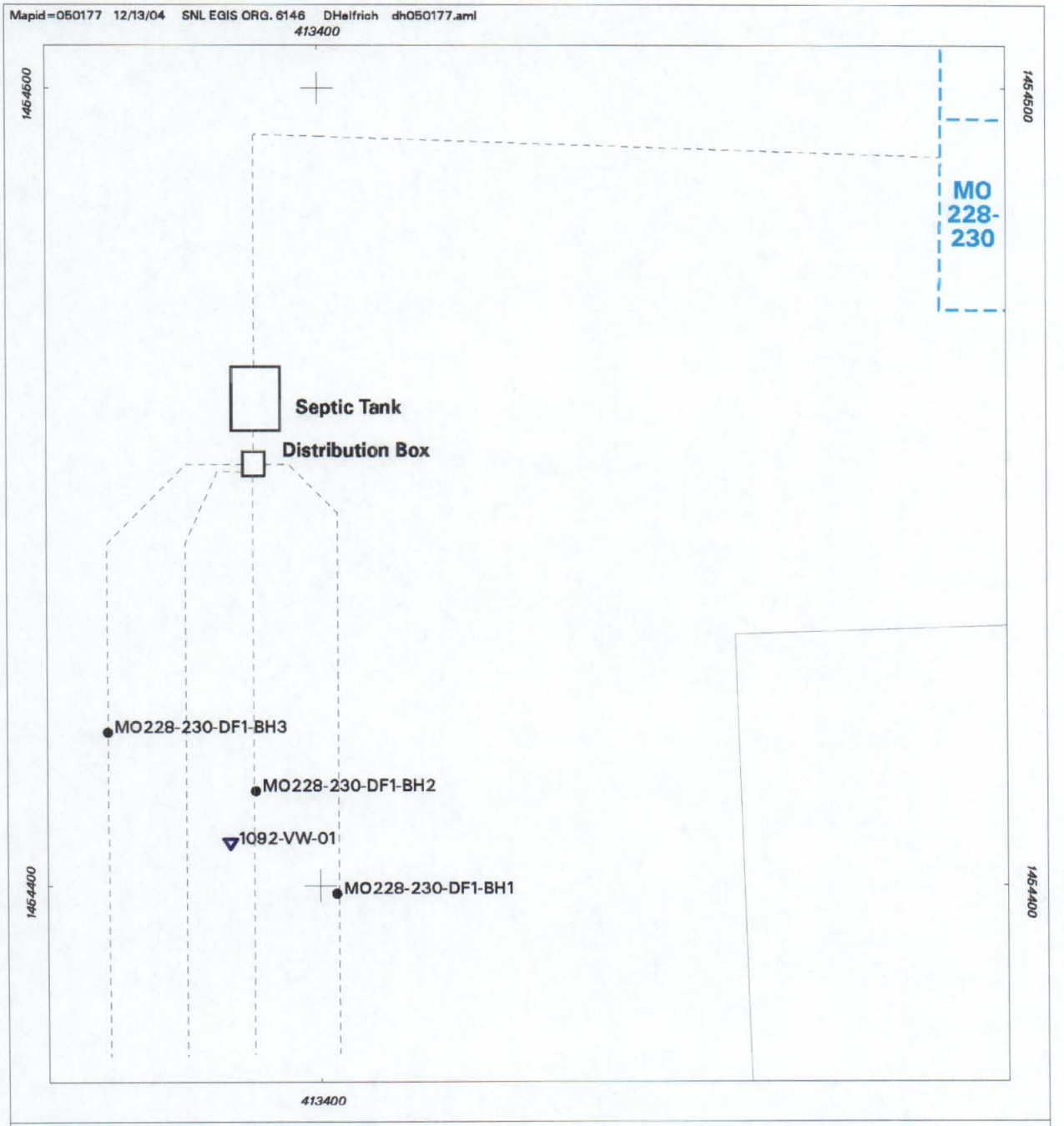
Figure 2.2.1-1
Location Map of Drain and Septic Systems (DSS) Site Number 1092, MO 228-230 Septic System, TA-III

0 4500 9000
Scale in Feet

0 1080 2160
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A332



Legend

- Soil-Vapor Monitoring Well
- Soil Boring Location
- Septic Tank / Distribution Box
- Drain Line
- Former Building / Structure
- Unpaved Parking

Figure 2.2.1-2
Site Map of Drain and Septic Systems (DSS) Site Number 1092
MO 228-230 Septic System, TA-III

0 10 20
Scale in Feet

0 2.4 4.8
Scale in Meters

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

840857.03010000 A333

The ground surface in the vicinity of the site is flat to very slightly sloping to the west. The closest major drainage is Arroyo del Coyote, located approximately 5,000 feet northeast of the site. 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). Depth to groundwater is approximately 488 feet below ground surface (bgs) at the site. Groundwater flow is thought to be generally to the west in this area (SNL/NM March 2002). The nearest production wells to DSS Site 1092 are KAFB-4, approximately 2.8 miles to the northwest, and KAFB-11, approximately 3.8 miles to the northeast. The nearest groundwater monitoring well is TAV-MW2, approximately 700 feet northeast of the site at TA-V.

2.2.2 Operational History

Available information indicates that the MO 228-230 complex was constructed in 1988 (SNL/NM March 2003), and it is assumed the septic system was constructed at the same time. The complex was being used as office space by the SNL/NM Protective Force when environmental characterization work was completed at the site. Because operational records are not available, the 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. In 1991, septic system discharges were routed to the City of Albuquerque sanitary sewer system (Jones June 1991). The old septic system line would have been disconnected, capped, and the system abandoned in place concurrent with this change (Romero September 2003).

2.3 Land Use

2.3.1 Current Land Use

The current land use for DSS Site 1092 is industrial.

2.3.2 Future/Proposed Land Use

The projected future land use for DSS Site 1092 is industrial (DOE et al. September 1995).

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3.0 INVESTIGATORY ACTIVITIES

3.1 Summary

Four assessment investigations have been conducted at this site. In late 1990 or early 1991, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002 and December 2003, a backhoe was used to physically locate the buried drainfield drain lines and buried, backfilled septic tank at the site (Investigation 2). In September 2002, subsurface soil samples were collected from three borings in the drainfield (Investigation 3). In June 2003, a 150-foot-deep, active soil-vapor monitoring well was installed at DSS Site 1092. This was one of seven DSS sites selected by the NMED/HWB for additional, deep soil-vapor monitoring (Investigation 4). Investigations 2, 3, and 4 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—Septic Tank Sampling

Investigation 1 consisted of sampling efforts to characterize the waste contents of all SNL/NM septic tanks for chemical and radiological contamination. The primary goal of the sampling was to identify types and concentrations of potential contaminants in the waste within the tanks so that the appropriate waste disposal and remedial activities could be planned.

An aqueous sample collected in December 1990 or January 1991 was analyzed at an off-site laboratory for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), oil and grease, phenolics, nitrates/nitrites, total cyanide, metals, polychlorinated biphenyls (PCBs), gross alpha/beta activity, radionuclides by gamma spectroscopy, isotopic uranium, isotopic plutonium, and tritium (SNL/NM April 1991). The analytical results for the sampling event are presented in Annex A.

3.3 Investigation 2—Backhoe Excavation

On March 28, 2002, a backhoe was used to determine the location, dimensions, and average depth of the DSS Site 1092 drainfield system. The drainfield was found to have four laterals, arranged as shown on Figure 2.2.1-2, with an average drain line trench depth of 6 feet bgs. No visible evidence of stained or discolored soil or odors indicating residual contamination was observed during the excavation. No samples were collected during the backhoe excavation at the site.

No records were found to indicate that the septic tank at DSS Site 1092 had been sampled after late 1990 or early 1991 or that it had been pumped out. It was also unknown whether the tank was still intact, so additional backhoe and hand excavations were conducted on December 2, 2003, to uncover and inspect the septic tank. The remains of the cast concrete tank were found, and it was determined that the top of the unit had been removed and the tank had been cleaned out and backfilled with soil at some point in the past.

3.4 Investigation 3—Soil Sampling

Once the system drain lines were located, soil sampling was conducted in accordance with the rationale and procedures in the SAP (SNL/NM October 1999) approved by the NMED. On September 9, 2002, soil samples were collected from three drainfield boreholes. Soil boring locations are shown on Figure 2.2.1-2. Figure 3.4-1 shows soil samples being collected in the drainfield at DSS Site 1092. A summary of the boreholes, sample depths, sample analyses, analytical methods, laboratories, and sample date is presented in Table 3.4-1.

3.4.1 Soil Sampling Methodology

An auger drill rig was used to sample all boreholes at two depth intervals. In the drainfield, the top of the shallow interval started at the bottom of the drain line trenches, as determined by the backhoe 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 1092 are presented and discussed in this section.

VOCs

VOC analytical results for the six soil samples collected from the three drainfield boreholes 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 every soil

Figure 3.4-1

Collecting soil samples with the Geoprobe™ in the DSS Site 1092 drainfield. The MO 228-230 complex is to the right in the background. View to the northeast. September 9, 2002

Table 3.4-1
Summary of Area Sampled, Analytical Methods, and Laboratories Used for
DSS Site 1092, MO 228-230 Septic System 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
Drainfield	3	6, 11	6	VOCs EPA Method 8260	GEL	09-09-02
	3	6, 11	6	SVOCs EPA Method 8270	GEL	09-09-02
	3	6, 11	6	PCBs EPA Method 8082	GEL	09-09-02
	3	6, 11	6	HE Compounds EPA Method 8330	GEL	09-09-02
	3	6, 11	6	RCRA Metals EPA Methods 6000/7000	GEL	09-09-02
	3	6, 11	6	Hexavalent Chromium EPA Method 7196A	GEL	09-09-02
	3	6, 11	6	Total Cyanide EPA Method 9012A	GEL	09-09-02
	3	6, 11	6	Gamma Spectroscopy EPA Method 901.1	RPSD	09-09-02
	3	6, 11	6	Gross Alpha/Beta Activity EPA Method 900.0	GEL	09-09-02

[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).
MO = Mobile Office.
PCB = Polychlorinated biphenyl.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

Table 3.4.2-1
Summary of DSS Site 1092, MO 228-230 Septic System
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)	Acetone	2-Butanone
605671	MO 228-230-DF1-BH1-6-S	6	ND (3.52)	**14.9**
605671	MO 228-230-DF1-BH1-11-S	11	**3.83 J (5)**	**38.6**
605671	MO 228-230-DF1-BH2-6-S	6	**4.38 J (5)**	**50.2**
605671	MO 228-230-DF1-BH2-11-S	11	ND (3.52)	**42.4**
605671	MO 228-230-DF1-BH3-6-S	6	ND (3.52)	**42.4**
605671	MO 228-230-DF1-BH3-11-S	11	**3.61 J (5)**	**42.9**
Quality Assurance/Quality Control Sample (µg/L)				
605672	6536/HP1110-TB[c]	NA	ND (4.5)	ND (2.31)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
[c]ER sample ID reflects the final site for VOC samples included in this shipment.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
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.
MO = Mobile Office.
NA = Not applicable.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
TB = Trip blank.
VOC = Volatile organic compound.

Table 3.4.2-2
Summary of DSS Site 1092, MO 228-230 Septic System
Confirmatory Soil Sampling, VOC Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 8260[a] Detection Limit (µg/kg)
Acetone	3.52
Benzene	0.45
Bromodichloromethane	0.49
Bromoform	0.49
Bromomethane	0.5
2-Butanone	3.74
Carbon disulfide	2.36
Carbon tetrachloride	0.49
Chlorobenzene	0.41
Chloroethane	0.81
Chloroform	0.52
Chloromethane	0.37
Dibromochloromethane	0.5
1,1-Dichloroethane	0.47
1,2-Dichloroethane	0.43
1,1-Dichloroethene	0.5
cis-1,2-Dichloroethene	0.47
trans-1,2-Dichloroethene	0.53
1,2-Dichloropropane	0.48
cis-1,3-Dichloropropene	0.43
trans-1,3-Dichloropropene	0.25
Ethylbenzene	0.38
2-Hexanone	3.77
Methylene chloride	1.35
4-Methyl-2-pentanone	4.03
Styrene	0.39
1,1,2,2-Tetrachloroethane	0.91
Tetrachloroethene	0.38
Toluene	0.34
1,1,1-Trichloroethane	0.53
1,1,2-Trichloroethane	0.54
Trichloroethene	0.45
Vinyl acetate	1.78
Vinyl chloride	0.56
Xylene	0.39

[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.
MO = Mobile Office.
VOC = Volatile organic compound.

sample collected, and low concentrations of acetone were also detected in three soil samples. These compounds were not detected in the associated trip blank (TB) and are common laboratory contaminants that may not indicate soil contamination at this site.

SVOCs

SVOC analytical results for the six soil samples collected from the three drainfield boreholes are summarized in Table 3.4.2-3. MDLs for the SVOC soil analyses are presented in Table 3.4.2-4. Pyrene was detected only in the 11-foot-bgs sample from borehole BH1. No other SVOCs were detected in these samples.

PCBs

PCB analytical results for the six soil samples collected from the three drainfield boreholes are summarized in Table 3.4.2-5. MDLs for the PCB soil analyses are presented in Table 3.4.2-6. Low concentrations of Aroclor-1260 were detected in every sample except the 11-foot-bgs sample from borehole BH1.

HE Compounds

High explosive (HE) compound analytical results for the six soil samples collected from the three drainfield boreholes 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 sample collected.

RCRA Metals and Hexavalent Chromium

Resource Conservation and Recovery Act (RCRA) metals and hexavalent chromium analytical results for the six soil samples collected from the three drainfield boreholes are summarized in Table 3.4.2-9. MDLs for the metals in soil analyses are presented in Table 3.4.2-10. Chromium was detected at a concentration above the NMED-approved background value in the 6-foot-bgs sample from borehole BH1. Silver was detected at concentrations above the NMED-approved background in the 6-foot-bgs samples from each of the three boreholes. All other metal concentrations were below background.

Total Cyanide

Total cyanide analytical results for the six soil samples collected from the three drainfield boreholes are summarized in Table 3.4.2-11. MDLs for the cyanide soil analyses are presented in Table 3.4.2-12. Low concentrations of cyanide were detected in every sample except the 11-foot-bgs sample from borehole BH1.

Table 3.4.2-3
Summary of DSS Site 1092, MO 228-230 Septic System
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)	Pyrene
605671	MO 228-230-DF1-BH1-6-S	6	ND (16.7)
605671	MO 228-230-DF1-BH1-11-S	11	**134 J**
605671	MO 228-230-DF1-BH2-6-S	6	ND (16.7)
605671	MO 228-230-DF1-BH2-11-S	11	ND (16.7)
605671	MO 228-230-DF1-BH3-6-S	6	ND (16.7)
605671	MO 228-230-DF1-BH3-11-S	11	ND (16.7)

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
J = Analytical result was qualified as an estimated value.
MDL = Method detection limit.
µg/kg = Microgram(s) per kilogram.
MO = Mobile Office.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.
SVOC = Semivolatile organic compound.

Table 3.4.2-4
Summary of DSS Site 1092, MO 228-230 Septic System
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 1092, MO 228-230 Septic System
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.
MO = Mobile Office.
SVOC = Semivolatile organic compound.

Table 3.4.2-5
Summary of DSS Site 1092, MO 228-230 Septic System
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-1260
605671	MO 228-230-DF1-BH1-6-S	6	**10.9**
605671	MO 228-230-DF1-BH1-11-S	11	ND (1)
605671	MO 228-230-DF1-BH2-6-S	6	**26**
605671	MO 228-230-DF1-BH2-11-S	11	**1.7 J (3.33)**
605671	MO 228-230-DF1-BH3-6-S	6	**10.4**
605671	MO 228-230-DF1-BH3-11-S	11	**1.7 J (3.33)**

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
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.
MO = Mobile Office.
ND ( ) = Not detected above the MDL, shown in parentheses.
PCB = Polychlorinated biphenyl.
S = Soil sample.

Table 3.4.2-6
Summary of DSS Site 1092, MO 228-230 Septic System
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.
MO = Mobile Office.
PCB = Polychlorinated biphenyl.

Table 3.4.2-7
Summary of DSS Site 1092, MO 228-230 Septic System
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)	
605671	MO 228-230-DF1-BH1-6-S	6	ND
605671	MO 228-230-DF1-BH1-11-S	11	ND
605671	MO 228-230-DF1-BH2-6-S	6	ND
605671	MO 228-230-DF1-BH2-11-S	11	ND
605671	MO 228-230-DF1-BH3-6-S	6	ND
605671	MO 228-230-DF1-BH3-11-S	11	ND

[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
HE = High explosive(s).
ID = Identification.
µg/kg = Microgram(s) per kilogram.
MO = Mobile Office.
ND = Not detected.
S = Soil sample.

Table 3.4.2-8
Summary of DSS Site 1092, MO 228-230 Septic System
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.
MO = Mobile Office.
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 1092, MO 228-230 Septic System
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
605671	MO 228-230-DF1-BH1-6-S	6	2.85 J	70.4	0.516	**30.4**	ND (0.0537)	4.26	0.0448	0.247 J (0.49)	**17.3**
605671	MO 228-230-DF1-BH1-11-S	11	3.58 J	120	0.194 J (0.467)	11.7	ND (0.0535)	6.49	0.00655 J (0.00926)	ND (0.151 J)	0.245 J (0.467)
605671	MO 228-230-DF1-BH2-6-S	6	3.16 J	93.6	0.486	9.78	ND (0.0528)	6.32	0.049	ND (0.154 J)	**21.5**
605671	MO 228-230-DF1-BH2-11-S	11	3.6 J	93.1	0.204 J (0.481)	10.8	ND (0.0529)	6.36	0.00405 J (0.00974)	0.179 J (0.481)	0.303 J (0.481)
605671	MO 228-230-DF1-BH3-6-S	6	2.69 J	58.1	0.263 J (0.5)	11	ND (0.0544)	4.86	0.0148	0.197 J (0.5)	**7.97**
605671	MO 228-230-DF1-BH3-11-S	11	2.88 J	137	0.162 J (0.495)	10.3	ND (0.0526)	5.51	0.00315 J (0.0092)	0.402 J (0.495)	ND (0.0893)
Background Concentration—Southwest Area Supergroup[c]			4.4	214	0.9	15.9	1	11.8	<0.1	<1	<1

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

[a]EPA November 1986.

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

[c]Dinwiddie September 1997.

BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
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.
J = Analytical result was qualified as an estimated value.
MDL = Method detection limit.
mg/kg = Milligram(s) per kilogram.
MO = Mobile Office.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.

Table 3.4.2-10
Summary of DSS Site 1092, MO 228-230 Septic System
Confirmatory Soil Sampling, Metals Analytical MDLs
September 2002
(Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A[a] Detection Limit (mg/kg)
Arsenic	0.193–0.206
Barium	0.0623–0.0667
Cadmium	0.0447–0.0478
Chromium	0.151–0.161
Chromium (VI)	0.0526–0.0544
Lead	0.265–0.284
Mercury	0.000905–0.000981
Selenium	0.151–0.162
Silver	0.0843–0.0902

[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.
MO = Mobile Office.

Table 3.4.2-11
Summary of DSS Site 1092, MO 228-230 Septic System
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)	
605671	MO 228-230-DF1-BH1-6-S	6	**0.11 J (0.25)**
605671	MO 228-230-DF1-BH1-11-S	11	ND (0.0419)
605671	MO 228-230-DF1-BH2-6-S	6	**0.143 J (0.25)**
605671	MO 228-230-DF1-BH2-11-S	11	**0.044 J (0.25)**
605671	MO 228-230-DF1-BH3-6-S	6	**0.0478 J (0.25)**
605671	MO 228-230-DF1-BH3-11-S	11	**0.0448 J (0.227)**

Note: Values in **bold** represent detected analytes.
[a]EPA November 1986.
[b]Analysis request/chain-of-custody record.
BH = Borehole.
DF = Drainfield.
DSS = Drain and Septic Systems.
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.
MO = Mobile Office.
ND ( ) = Not detected above the MDL, shown in parentheses.
S = Soil sample.

Table 3.4.2-12
Summary of DSS Site 1092, MO 228-230 Septic System
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.
MO = Mobile Office.

Radionuclides

Analytical results for the gamma spectroscopy analysis of the six soil samples collected from the three drainfield boreholes are summarized in Table 3.4.2-13. Uranium-235 was detected at activity levels above the NMED-approved background value in the 11-foot-bgs samples from boreholes BH1 and BH2. However, although not detected, the minimum detectable activity (MDA) values for the remaining uranium-235 analyses exceeded the respective 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 MDAs may be slightly elevated, they are still very low, and the risk assessment outcome for the site is not significantly impacted by their use.

Gross Alpha/Beta Activity

Gross alpha/beta activity analytical results for the six soil samples collected from the three drainfield boreholes are summarized in Table 3.4.2-14. No gross alpha or beta activity was detected above the 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.

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, equipment blank (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 and the results were used in the data validation process for all the samples in that batch. No VOCs were detected in the TB for DSS Site 1092 (Table 3.4.2-1).

No duplicate or EB samples were collected at this site.

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," in Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). 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. Annex B contains the data validation reports for the samples collected at this site.

Table 3.4.2-13
Summary of DSS Site 1092, MO 228-230 Septic System
Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results
September 2002
(On-Site Laboratory)

Sample Attributes			Activity (EPA Method 901.1[a]) (pCi/g)							
			Cesium-137		Thorium-232		Uranium-235		Uranium-238	
Record Number[b]	ER Sample ID	Sample Depth (ft)	Result	Error[c]	Result	Error[c]	Result	Error[c]	Result	Error[c]
605733	MO 228-230-DF1-BH1-6-S	6	ND (0.0223)	--	0.531	0.258	**ND (0.176)**	--	ND (0.538)	--
605733	MO 228-230-DF1-BH1-11-S	11	ND (0.029)	--	0.766	0.365	**0.199**	0.17	ND (0.722)	--
605733	MO 228-230-DF1-BH2-6-S	6	ND (0.0309)	--	0.68	0.328	**ND (0.222)**	--	ND (0.673)	--
605733	MO 228-230-DF1-BH2-11-S	11	ND (0.0288)	--	0.842	0.399	**0.22**	0.183	ND (0.747)	--
605733	MO 228-230-DF1-BH3-6-S	6	ND (0.0239)	--	0.592	0.285	**ND (0.179)**	--	ND (0.549)	--
605733	MO 228-230-DF1-BH3-11-S	11	ND (0.0283)	--	0.73	0.355	**ND (0.228)**	--	ND (0.713)	--
Background Activity—Southwest Area Supergroup[d]			0.079	NA	1.01	NA	0.16	NA	1.4	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.
DF = Drainfield.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
MDA = Minimum detectable activity.
MO = Mobile Office.
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.
-- = Error not calculated for nondetect results.

Table 3.4.2-14
Summary of DSS Site 1092, MO 228-230 Septic System
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]
605671	MO 228-230-DF1-BH1-6-S	6	7.8	2.75	20.2	1.91
605671	MO 228-230-DF1-BH1-11-S	11	11.7	2.73	17.1	1.79
605671	MO 228-230-DF1-BH2-6-S	6	10.6	2.68	22	1.92
605671	MO 228-230-DF1-BH2-11-S	11	14.3	3.16	20.1	1.82
605671	MO 228-230-DF1-BH3-6-S	6	6.2	2.59	24.7	1.96
605671	MO 228-230-DF1-BH3-11-S	11	16.4	3.15	19.7	1.79
Background Activity[d]			17.4	NA	35.4	NA

[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.
DF = Drainfield.
DSS = Drain and Septic Systems.
EPA = U.S. Environmental Protection Agency.
ER = Environmental Restoration.
ft = Foot (feet).
ID = Identification.
MO = Mobile Office.
NA = Not applicable.
pCi/g = Picocurie(s) per gram.
S = Soil sample.

3.5 Investigation 4—Active Soil-Vapor Sampling

3.5.1 Active Soil-Vapor Sampling Methodology

Active soil-vapor sampling typically involves directly pumping soil-vapor from the subsurface for analysis. Vapor collection can be accomplished either by using simple open-pipe systems analogous to groundwater monitoring wells screened in the interval of interest or through sophisticated "down hole" systems with individual inlet port and collection tube sets placed at multiple sampling depths. The extracted soil-vapor can be analyzed immediately, collected on adsorbent media, or collected into special canisters for later laboratory analysis.

3.5.2 Active Soil-Vapor Sampling Results

In June 2003, as part of the DSS investigation, a Flexible Liner Underground Technologies (FLUTe™) soil-vapor monitoring well was installed at a location specified by the NMED at DSS Site 1092 (Figure 2.2.1-2). Figure 3.5.2-1 shows the soil-vapor monitoring well borehole being drilled in the DSS Site 1092 drainfield. Figure 3.5.2-2 shows a typical FLUTe™ soil-vapor monitoring well completion. This vapor well was constructed in accordance with deep soil-vapor well design specifications in the SAP (SNL/NM October 1999). Soil-vapor well 1092-VW-01 was 150 feet deep and had vapor sampling ports at depths of 5, 20, 70, 100, and 150 feet bgs. After installation, subsurface conditions were allowed to equilibrate for more than three months before the well was sampled on September 9, 2003. Soil-vapor samples from each of the five sampling depths were collected into special canisters and sent to an off-site laboratory for analysis. Total VOC soil-vapor concentrations ranged from a low of 0.394 parts per million by volume (ppmv) in the 150-foot-bgs interval to a maximum of 2.418 ppmv in the 5-foot-bgs interval. The analytical results and data validation report for these samples are presented in Annex C.

In accordance with previous agreements with the NMED (SNL/NM October 1999), because the total VOC concentration in the 150-foot-bgs sample from this well was less than 10 ppmv, no additional soil-vapor sampling was required from this well and no additional soil-vapor or groundwater monitoring wells were required at this site by the NMED (Keiling December 2003).

3.6 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 1092.

Figure 3.5.2-1
Borehole drilling for FLUTe™ soil-vapor monitoring well 1092-VW-01 in the MO 228-230 drainfield. The MO 228-230 complex is in the left-center of the photograph. View to the east. June 9, 2003

Figure 3.5.2-2
A typical FLUTe™ soil-vapor monitoring well completion showing five individual vapor sampling tubes exiting the wellhead. Each tube is connected to an individual, downhole soil-vapor sampling port on the side of the well. The sample ports are at depths of 5, 20, 70, 100, and 150 feet bgs.

4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 1092, the MO 228-230 Septic System, is based upon the COCs identified in the soil samples collected from beneath the drainfield 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 1092 are VOCs, SVOCs, PCBs, HE compounds, cyanide, RCRA metals, hexavalent chromium, and radionuclides. Two VOCs, one SVOC, and one PCB were detected in these samples. No HE compounds or hexavalent chromium were detected in any of the soil samples collected at this site. Chromium and silver were detected above the NMED-approved maximum background concentrations for SNL/NM Southwest Area Supergroup soils. When a metal concentration exceeded its maximum background screening value, it was considered further in the risk assessment process. Cyanide was detected in five samples, but because it does not have a quantified background screening concentration, it is unknown whether this COC exceeds background. One of the four representative gamma spectroscopy radionuclides, uranium-235, was detected at activities exceeding the corresponding background level, and the MDAs for four of the six uranium-235 analyses exceeded the corresponding background activity. Finally, no gross alpha/beta activity was detected above background levels.

4.2 Environmental Fate

Potential COCs may have been released into the vadose zone via aqueous effluent discharged from the septic system. Possible secondary release mechanisms include the uptake of COCs that may have been released into the soil beneath the drainfield (Figure 4.2-1). The depth to groundwater at the site (approximately 488 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 1092.

Table 4.2-1 summarizes the potential COCs for DSS Site 1092. All potential COCs were retained in the conceptual site model and were evaluated in both the human health and ecological risk assessments. The current and future land use for DSS Site 1092 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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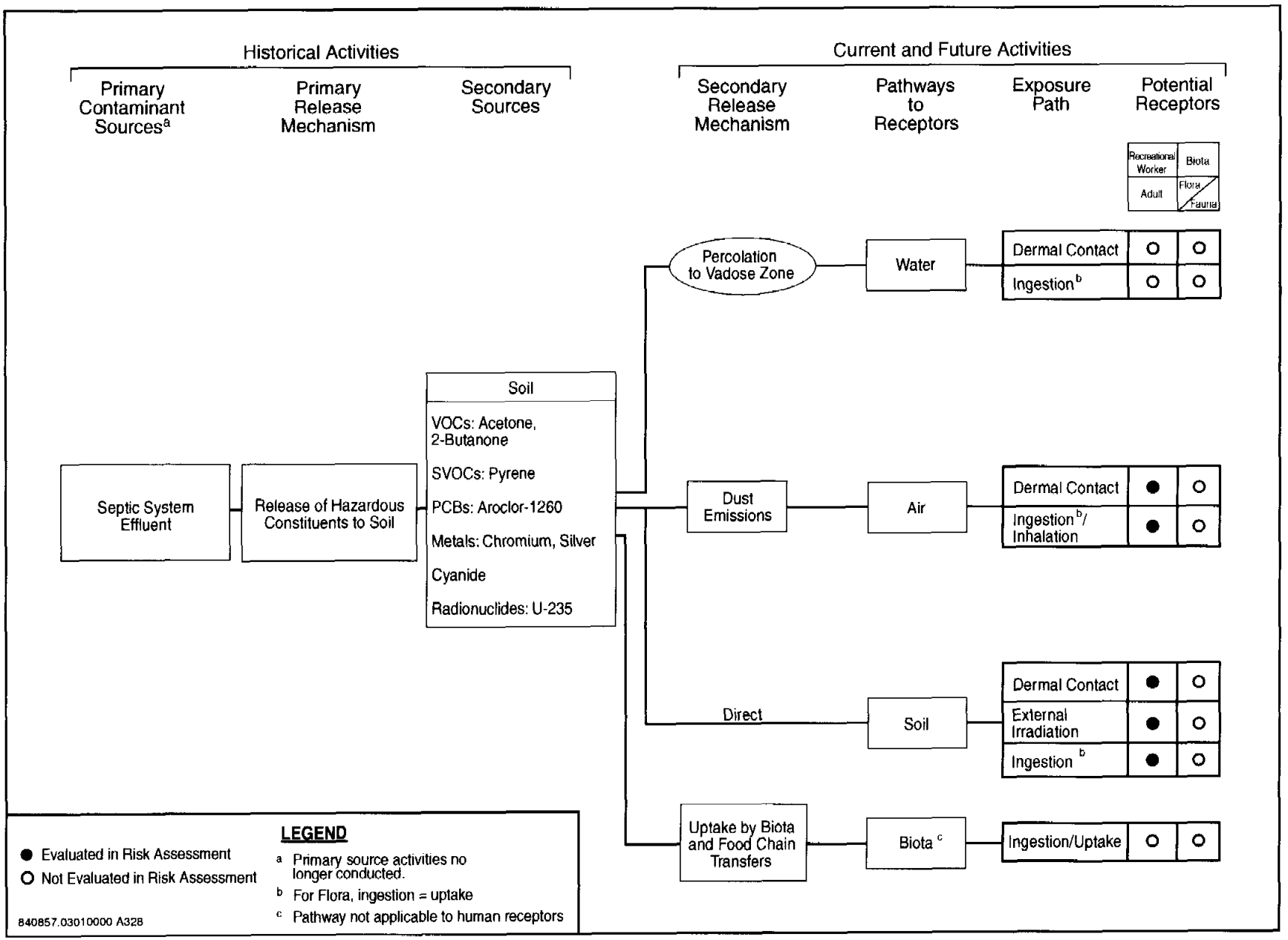

Figure 4.2-1

Conceptual Site Model Flow Diagram for DSS Site 1092, MO 228-230 Septic System

Table 4.2-1
Summary of Potential COCs for DSS Site 1092, MO 228-230 Septic System

COC Type		Number of Samples[a]	COCs Detected or with Concentrations Greater than Background or Nonquantified Background	Maximum Background Limit/Southwest Area 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		6	Acetone	NA	0.0044 J	0.0028	3
		6	2-Butanone	NA	0.0502	0.0386	6
SVOCs		6	Pyrene	NA	0.134 J	0.0293	1
PCBs		6	Aroclor-1260	NA	0.026	0.0085	5
HE Compounds		6	None	NA	NA	NA	None
RCRA Metals		6	Chromium	15.9	30.4	14.0	1
		6	Silver	<1	21.5	7.89	3
Hexavalent Chromium		6	None	1	NA	NA	None
Cyanide		6	Cyanide	NC	0.143 J	0.0684	5
Radionuclides (pCi/g)	Gamma Spectroscopy	6	Uranium-235	0.16	ND (0.228)	NC[f]	6
	Gross Alpha	6	None	NA	NA	NA	None
	Gross Beta	6	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.
MO = Mobile Office.
NA = Not applicable.
NC = Not calculated.
ND ( ) = Not detected above the 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 1092.

4.3 Site Assessment

Site assessment at DSS Site 1092 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 1092 in more detail.

4.3.1 Summary

The site assessment concluded that DSS Site 1092 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 1092. This section summarizes the results.

4.3.2.1 Human Health

DSS Site 1092 has been recommended for an industrial land-use scenario (DOE et al. September 1995). Because VOCs, SVOCs, PCBs, chromium, silver, cyanide, and uranium-235 were detected, are present above background, 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 1092 is 0.00 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. There is no quantifiable excess cancer risk for DSS Site 1092 COCs 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. There is no quantified estimated incremental excess cancer risk for the industrial land-use scenario. Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 1092 is 0.06 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 0.06. There is no quantifiable excess cancer risk for DSS Site 1092 COCs 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 below the suggested acceptable risk value. There is no quantified estimated incremental excess cancer risk for the residential land-use scenario. Both the incremental HI and estimated incremental excess cancer risk are below NMED guidelines.

For the radiological COCs, one of the constituents (uranium-235) was detected and had MDA values greater than the corresponding background values. The incremental total effective dose equivalent (TEDE) and corresponding estimated cancer risk from radiological COCs are much lower than the U.S. Environmental Protection Agency (EPA) guidance values; the estimated TEDE is 9.8E-3 millirem (mrem)/year (yr) for the industrial land-use scenario, which is much less than the EPA's numerical guidance of 15 mrem/yr (EPA 1997a). The corresponding estimated incremental cancer risk value is 8.2E-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 2.5E-2 mrem/yr with an associated risk of 2.4E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1092 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 1092, MO 228-230 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	0.00E+0	8.2E-8	8.2E-8
Residential	0.00E+0	2.4E-7	2.4E-7

DSS = Drain and Septic Systems.
MO = Mobile Office.

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 1092 are located at depths greater than 5 feet bgs. 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 1092 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 1092, 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 1092 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 1092. 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
DSS Site 1092
Septic Tank Sampling Results

4-17-91

Results of septic tank sampling conducted between 12/18/90 and 1/8/91 for buildings noted.

DB Dionne

4-17-91

Nick Durand,

For your information.

David Dionne

NOTE: These samples were all analyzed for: VOCs, SVOCs, PCBs, Metals, Total Cyanide, Oil & Grease, Phenolics, Nitrate/Nitrite, Gross Alpha/Beta, Gamma-Emitting Radionuclides, Isotopic Uranium, Isotopic Plutonium, and Tritium.

The following tables only report detections.

TABLE 24

SUMMARY OF ANALYTICAL RESULTS FOR DETECTED PARAMETERS TECHNICAL AREA III AND COYOTE CANYON TEST FIELD SEPTIC TANK SAMPLING

BUILDING MO 228 - 230

DUPLICATE SAMPLES

Parameter	Results		Units
	SNLA004892 SNLA004893	SNLA004894 SNLA004895	
VOLATILE ORGANICS			
Acetone*	ND	40	µg/l
SEMIVOLATILE ORGANICS			
4-Methylphenol*	82	99	µg/l
INORGANICS			
Oil and Grease	0.42	1.4	mg/l
Nitrates as N	ND	0.050	mg/l
Phenolics	0.057	0.049	mg/l
METALS			
Barium	0.058	0.058	mg/l
Copper	0.12	0.11	mg/l
Manganese	0.019	0.020	mg/l
Zinc	0.029	0.026	mg/l
RADIOLOGICAL			
Gross Alpha	ND	5.1	pCi/l
Gross Beta	23	30	pCi/l
Uranium 238	2.2	ND	pCi/l

ND=Not Detected
*Not on total toxic organics list

ANNEX B
DSS Site 1092
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/CF032-02
SMO PROJECT LEAD: Herrera
SAMPLE SHIP DATE: 9/16/2002

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	BY
605671	GEL	67158A		10/16/2002	X	X	JAC
605672	GEL	67158B		10/16/2002	X	X	JAC
605673	GEL	67158C		10/16/2002	X	X	JAC

	NAME	DATE
CORRECTIONS ~~REQUESTED~~/RECEIVED:		11.06.02
PROBLEM #:	5166	10.31.02
REVIEW COMPLETED BY/DATE:	L Herrera	10.31.02
FINAL TRANSMITTED TO/DATE:	C. Wood	10.31.02
SENT TO VALIDATION BY/DATE:	Conn	11/11/02
RUSH VALIDATION REQUIRED EST. TAT:		
VALIDATION COMPLETED BY/DATE:	N	11.19.02
TO ERDMS OR RECORDS CENTER BY/DATE:	Conn	11/26/02

COMMENTS:

DEC - 3 2002

Sample Findings Summary

Site: DSS soil sampling | ARCOC: 605571, -72, -73 | Data: Organic, Inorganic and Radiochemistry

Sample ID	VOC(8260)	79-01-6 (trichloroethene)	Sample ID	SVOC(8270)	117-81-7 (bis(2-ethylhexyl)phthalate)	129-00-0 (pyrene)	All PCBs (8082):	HE(8330)	1946-51-0 (4-amino-2,6-dinitrotoluene)	479-45-8 (tetryl)	Metals	7440-39-3 (barium)	7440-47-3 (chromium)	7782-49-2 (selenium)	7440-38-2 (arsenic)	General Chemistry	5955-70-0 (total cyanide)	18540-29-9 (hexavalent chromium)	Radiochemistry
059627-001 6715/1035-SP1-TB		UJ	059626-003 6536/HP1110-EB				P2												
059626-001 6536/HP1110-EB		UJ	059626-009 6536/HP1110-EB															R,HT	
059640-001 6536/HP1110-TB		UJ	059626-007 6536/HP1110-EB									J,B3	J,B						
059649-001 6721/1090-DF1-TB		UJ																	
059620-001 MO 228-230/1092-DF1-BH1-8-S		UJ	059620-002 MO 228-230/1092-DF1-BH1-8-S		362U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		All QC acceptance criteria were met. No data will be qualified.
059621-001 MO 228-230/1092-DF1-BH1-11-S		UJ	059621-002 MO 228-230/1092-DF1-BH1-11-S		333U,B	J			UJ,A2,P1	UJ,A2,P1				UJ,B3	J				
059622-001 MO 228-230/1092-DF1-BH2-8-S		UJ	059622-002 MO 228-230/1092-DF1-BH2-8-S		333U,B				UJ,A2,P1	UJ,A2,P1				UJ,B3	J		J,B		
059623-001 MO 228-230/1092-DF1-BH2-11-S		UJ	059623-002 MO 228-230/1092-DF1-BH2-11-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059624-001 MO 228-230/1092-DF1-BH3-8-S		UJ	059624-002 MO 228-230/1092-DF1-BH3-8-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059625-001 MO 228-230/1092-DF1-BH3-11-S		UJ	059625-002 MO 228-230/1092-DF1-BH3-11-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059626-001 6536 HP/1110-DF1-BH1-15-S		UJ	059626-002 6536 HP/1110-DF1-BH1-15-S		333U,B				UJ,A2,P1	UJ,A2,P1				UJ,B3	J				
059629-001 6536 HP/1110-DF1-BH1-20-S		UJ	059629-002 6536 HP/1110-DF1-BH1-20-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B B3	J				
059636-001 6536 HP/1110-DF1-BH2-10-S		UJ	059636-002 6536 HP/1110-DF1-BH2-10-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059637-001 6536 HP/1110-DF1-BH2-15-S		UJ	059637-002 6536 HP/1110-DF1-BH2-15-S		333U,B				UJ,A2,P1	UJ,A2,P1				UJ,B3	J				
059638-001 6715/1035-SP1-BH1-11-S		UJ	059638-002 6715/1035-SP1-BH1-11-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059639-001 6715/1035-SP1-BH1-16-S		UJ	059639-002 6715/1035-SP1-BH1-16-S		333U,B				UJ,A2,P1	UJ,A2,P1				UJ,B3	J		J,B		
059641-001 6721/1090-DF1-BH1-4-S		UJ	059641-002 6721/1090-DF1-BH1-4-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059642-001 6721/1090-DF1-BH1-9-S		UJ	059642-002 6721/1090-DF1-BH1-9-S		333U,B				UJ,A2,P1	UJ,A2,P1				J,B,B3	J				
059643-001 6721/1090-DF1-BH2-4-S		UJ	059643-002 6721/1090-DF1-BH2-4-S		333U,B	J			UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059644-001 6721/1090-DF1-BH2-9-S		UJ	059644-002 6721/1090-DF1-BH2-9-S		333U,B	J			UJ,A2,P1	UJ,A2,P1				UJ,B3	J				
059645-001 6721/1090-DF1-BH2-4-DU		UJ	059646-001 6721/1090-DF1-BH2-4-DU		333U,B	J			UJ,A2,P1	UJ,A2,P1				UJ,B3	J		J,B		
059647-001 6721/1090-DF1-BH3-4-S		UJ	059647-002 6721/1090-DF1-BH3-4-S		333U,B	J			UJ,A2,P1	UJ,A2,P1				J,B,B3	J		J,B		
059648-001 6721/1090-DF1-BH3-9-S		UJ	059648-002 6721/1090-DF1-BH3-9-S		333U,B				UJ,A2,P1	UJ,A2,P1				UJ,B3	J		J,B		

Validated By: [signature] Date: 11/19/02

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Page 1 of 2

AR/COC 605671

Internal Lab

Batch No. N/A SMO Use

Dept. No./Mail Stop:	6135/1089	Date Samples Shipped:	9/16/02	Project/Task No.:	1223.02.03.02
Project/Task Manager:	~~Mike Sanders~~ Sue Collins	Carrier/Waybill No.	13479	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	SEE ATTACHED BOTTLE ORDER	
Logbook Ref. No.:	ER 090	SMO Contact/Phone:	Pam Puissant/505-844-3185		
Service Order No.	CF032-02-3	Send Report to SMO:	Wendy Palencia/505-844-3132		

☐ 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

Location	Tech Area
Building 228-230	Room

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
059820-001	MO 228-230/1092-DF1-BH1- 6 -S	6'	1092	9-9-02/1130	S	AS	4oz	4c	G	SA	VOC(8260B)	
059821-001	MO 228-230/1092-DF1-BH1- 11 -S	11'		1200	S	AS	4oz	4c	G	SA	VOC(8260B)	
059820-002	MO 228-230/1092-DF1-BH1- 6 -S	6'		1135	S	AG	500ml	4c	G	SA	see below for parameter *	
059821-002	MO 228-230/1092-DF1-BH1- 11 -S	11'		1205	S	AG	500ml	4c	G	SA	see below for parameter	
059822-001	MO 228-230/1092-DF1-BH2- 6 -S	6'		1330	S	AS	4oz	4c	G	SA	VOC(8260B)	
059823-001	MO 228-230/1092-DF1-BH2- 11 -S	11'		1345	S	AS	4oz	4c	G	SA	VOC(8260B)	
059822-002	MO 228-230/1092-DF1-BH2- 6 -S	6'		1335	S	AG	500ml	4c	G	SA	see below for parameter	
059823-002	MO 228-230/1092-DF1-BH2- 11 -S	11'		1350	S	AG	500ml	4c	G	SA	see below for parameter	
059824-001	MO 228-230/1092-DF1-BH3- 6 -S	6'		1400	S	AS	4oz	4c	G	SA	VOC(8260B)	
059825-001	MO 228-230/1092-DF1-BH3- 11 -S	11'		1420	S	AS	4oz	4c	G	SA	VOC(8260B)	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☑ Normal ☐ Rush

Sample Tracking — Date Entered(mm/dd/yy) 09/18/02 — Entered by: RK — Smo Use

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

Abnormal Conditions on Receipt — Lab Use

Return Samples By: — Level of Rush: — QC Inits. JAC

	Name	Signature	Init	Company/Organization/Phone/Cellular
Sample Team Members	J.Lee			Weston/6135/505-284-3309
	W.Gibson			MDM/6135/505-845-3267
	G.Quintana			Shaw/6135/505-284-3309

*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)

	Org.	Date	Time		Org.	Date	Time
1.Relinquished by	6135	9/16/02	0750	4.Relinquished by			
1. Received by	6132	9/16/02	0750	4. Received by			
2.Relinquished by	6132	9/16/02	1000	5.Relinquished by			
2. Received by	Org.	Date	Time	5. Received by	Org.	Date	Time
3.Relinquished by	Org.	Date	Time	6.Relinquished by	Org.	Date	Time
3. Received by	Org.	Date	Time	6. Received by	Org.	Date	Time

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

AR/COC 605671

Project Name:
Project/Task Manger:
Project/Task No.: 7220.02.03.02

Location Tech Area
Building Room

Reference LOV (available at SMO)

Lab use

Sample No-Fraction	ER Sample ID or Sample Location detail	Beginning Depth (ft)	ER Site No.	Date/Time (hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
059824-002	MO 228-230/1092-DF1-BH3- 6 -S	6'	1092	9-9-02/1405	S	AG	500ml	4c	G	SA	see below for parameter	
059825-002	MO 228-230/1092-DF1-BH3- 11 -S	11'	1092	↓ 1425	S	AG	500ml	4c	G	SA	see below for parameter	

LAB USE

Abnormal Conditions on Receipt:

Recipient Initials

Data Validation Qualifiers and Descriptive Flags*

Note: Qualifiers may be used in conjunction with descriptive flags [e.g., J,A; UJ,P; U,B].

Qualifiers	Comment
J	The associated value is an estimated quantity.
J1	The method requirements for sample preservation/temperature were not met for the sample analysis. The associated value is an estimated quantity.
J2	The holding time was exceeded for the associated sample analysis. The associated value is an estimated quantity.
UJ	The analyte was analyzed for but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
U	The associated result is less than ten times the concentration in any blank and is determined to be non-detect. The analyte is a common laboratory contaminant.
U1	The associated result is less than five times the concentration in any blank and is determined to be non-detect.
R	The data are unusable for their intended purpose. The analyte may or may not be present. (Note: Resampling and reanalysis is necessary for verification.)

Descriptive Flags	
A	Laboratory accuracy and/or bias measurements for the associated Laboratory Control Sample and/or duplicate (LCS/LCSD) do not meet acceptance criteria.
A1	Laboratory accuracy and/or bias measurements for the associated Surrogate Spike do not meet acceptance criteria.
A2	Laboratory accuracy and/or bias measurements for the associated Matrix Spike and/or duplicate (MS/MSD) do not meet acceptance criteria.
A3	Insufficient quality control data to determine laboratory accuracy.
B	Analyte present in laboratory method blank
B1	Analyte present in trip blank.
B2	Analyte present in equipment blank.
B3	Analyte present in calibration blank.
P	Laboratory precision measurements for the Laboratory Control Sample and duplicate (LCS/LCSD) do not meet acceptance criteria.
P1	Laboratory precision measurements for the Matrix Spike Sample and associated duplicate (MS/MSD) do not meet acceptance criteria
P2	Insufficient quality control data to determine laboratory precision.

* This is not a definitive list. Other qualifiers are potentially available, see TOP 94-03.

Updated: September 14, 1999

Beginning January 2000

Application of Data Validation Qualifiers to Data Tables

Laboratory Qualifier		Application to Data Tables
J	→	J (Reporting Limit)
U	→	ND (Detection Limit)
None	→	Detected concentration; See Data Validation Report
Laboratory Descriptive Flag		
B	→	Analyte concentration; See Data Validation Report, analyte present in method blank
Data Validation Qualifier		
J (Estimated quantity)	→	J* * - See Data Validation Report
UJ (Analyzed for but not detected; associated value is an estimate and may be inaccurate or imprecise)	→	ND (Detection Limit J); See Data Validation Report
U (Analyzed for but not detected)	→	ND (Reporting Limit or Reported Value if > Reporting Limit); See Data Validation Report
R (Data unusable)	→	R* * - See Data Validation Report
N (Presumptive evidence of the presence of the material)	→	Detected concentration(N); See Data Validation Report
NJ (Presumptive evidence of the presence of the material at an estimated quantity)	→	Detected concentration (NJ); See Data Validation Report
None (Data conforms to QC requirements)	→	Use Laboratory Qualifier

Note: Both the laboratory and data validation qualifiers are required to assure the data is correctly qualified. The descriptive flags are meant to assist the user in understanding the qualification of the data and in writing up the results of the data validation process. They are not for incorporation into the data tables.

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
Phone: 505-299-5201
Fax: 505-299-6744
Email: minteer@aol.com

MEMORANDUM

DATE: 11/19/02

TO: File

FROM: Linda Thal

SUBJECT: Inorganic Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC # 605671, -72, -73
GEL SDG # 67158 and 67169
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 # 202762 (Samples 67158-020 through –038)
Selenium was detected in the MB and CCB at a value > DL but < RL. All associated sample results that are detect, < 5X the blank value will be qualified "J". The descriptor flags "B" (MB) and "B3" (CCB) will be added.

Selenium was detected in the CCB at a negative value with an absolute value > DL but < RL. All associated sample results that are non-detect will be qualified "UJ, B3". All associated sample results that are detect, but < 5X the MDL will be qualified "J, B3".

The replicate RPD (44%) failed QC acceptance criteria (<35%) for arsenic. All associated sample results were > 5X RL and will be qualified "J".

ICP-AES-Metals Batch # 204455 (Sample 67169-010)
Barium was detected in the CCB, and chromium in the MB at values > DL but < RL. The sample results were <5X the blank value and will be qualified "J, B" for chromium and "J, B3" for barium.

Total Cyanide - Batch #202749 (Samples 67158-020 through –038)
The MB had a value > DL but < RL. All associated sample results that were > DL but < 5X MB value will be qualified "J, B".

Hexavalent Chromium – Batch # 201822
Sample 67169-009 was received by the laboratory and analyzed after 2X the holding time had expired. The sample result was non-detect and will be qualified "R, HT".

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

Holding Times/Preservation

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

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 # 202762 (Samples 67158-020 through –038)
Selenium was detected in the MB and CCB at a value > DL but < RL. All associated sample results that are non-detect will not be qualified.

Selenium was detected in the CCB at a negative value with an absolute value > DL but < RL. All associated sample results that are detect with values > 5X the MDL, will not be qualified.

Barium and chromium were detected in the EB, and arsenic in the CCB, at values > DL but < RL. All associated sample results were > 5X the blank values and will not be qualified.

ICP-AES-Metals Batch # 204455 (Sample 67169-010)
Cadmium and arsenic were detected in the CCB at values > DL but < RL. The sample results were non-detect and no data will be qualified.

Total Cyanide - Batch #202749 (Samples 67158-020 through –038)
The MB had a value > DL but < RL. Sample 67158-021, -026, -027 –029 and –033 were all non-detect and will not be qualified. Sample 67158-035 had a value at the RL and >5X MB value and will not be qualified.

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

All Analyses: The LCS met QC acceptance criteria. No LCSD was analyzed. No data will be qualified as a result.

Matrix Spike (MS) Analysis

All Analyses: The MS met QC acceptance criteria except as follows:

ICP-AES-Metals Batch # 204455 (Sample 67169-010)
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 67169--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 #202747 (Samples 67169-008)
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 # 204455 (Sample 67169-010)
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 67169--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 #202747 (Samples 67169-008)
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 67169-010)

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 was submitted on the ARCOC.There are no "required" validation procedures for assessing 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.

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
Phone: 505-299-5201
Fax: 505-299-6744
Email: minteer@aol.com

MEMORANDUM

DATE: 11/19/02

TO: File

FROM: Linda Thal

SUBJECT: Organic Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC # 605671, -72, -73 GEL SDG # 67158 and 67169
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.

VOC Batch # 202140 and 203595
Trichloroethene had a RF (0.21/0.23) < than the specified minimum (0.30) but > 0.01. All associated sample results were non-detect and will be qualified "UJ".

SVOC – Batch 201961 (Sample 67158-020 through 038)
Pyrene had a correlation coefficient < 0.99. All associated sample results were non-detect and will not be qualified, with the exception of samples 67158-021, and 034 through 037. These sample results will be qualified "J".

Bis(2-ethylhexyl)phthalate was detected in the method blank (MB) and the equipment blank (EB) at a value > DL but < RL. Sample 67158-021 through 038 had bis(2-ethylhexyl)phthalate values > DL, < RL and <10X the MB value and will be qualified "U, B" at the RL. Sample 67158-020 had a bis(2-ethylhexyl)phthalate value > RL but <10X MB value and will be qualified "U, B" at the reported value.

PCB Batch # 202231
No MS/MSD, LCS/LCSD or replicate was performed for sample 67169-006(EB). As there is no measure of precision for the sample, all results will be qualified "P2".

HE - Batch # 202056 (Sample 67158-020 through –038)
The MS %R (58%) and RPD (44%) failed QC acceptance criteria (71-120%/<20%) for 4-amino-2,6-dinitrotoluene.All associated sample results were non-detect and will be qualified "UJ, A2, P1".

The MS/MSD %R (32/18%) and RPD (58%) failed QC acceptance criteria (65-135%/<30%) for tetryl. All associated sample results were non-detect and will be qualified "UJ, A2, P1".

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.

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 # 203595
Chloroethane had %D > 20% but < 40% (23%). All associated sample results were non-detect and no data will be qualified.

SVOC – Batch 201961 and 201951
The CCVs preceding the samples had a %D > 20% but < 40% for several compounds (see DV worksheet). All associated sample results were non-detect and no data will be qualified.

Blanks

All Analysis: All method blank, equipment blank and trip blank acceptance criteria were met except as mentioned above in the summary section and as follows:

VOC Batch # 202140
Sample 67169-004 (trip blank) had a toluene value > DL but < RL. All associated samples (67158-013 through –019) were non-detect for toluene and no data will be qualified.

PCB Batch # 201940
Aroclor 1260 was detected in the EB at a value > DL but < RL. All associated sample results were either non-detect or > 5X EB value; 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 # 203595
The PS/PSD was run on a sample of similar matrix from another SNL SDG. No data will be qualified as a result.

SVOC – Batch 201961 and 201951
Several compounds (see DV worksheet) had %R < QC acceptance criteria (75 – 125%). Using professional judgment, no data will be qualified.

SVOC – Batch 201951
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.

HE - Batch 202049
No MS/MSD was extracted with this batch. An LCS/LCSD was extracted and met all QC acceptance criteria for accuracy and precision. No data will be qualified.

Laboratory Control Samples (LCS/LCSD) Analysis

All Analysis: The LCS/LCSD acceptance criteria were met.

VOC Batch # 202140 and 203595
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 201961 and 201951
It should be noted that no compound was associated with internal standard perylene-d12. No data will be qualified as a result.

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: The sample results were non-detect and therefore no confirmation analysis was required.

Other QC

VOC: A trip blank, equipment blank and a field dup were submitted on the ARCOC. There are no "required" criteria for assessing a field dup. 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 dup were submitted on the ARCOC. There are no "required" criteria for assessing a field dup. 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.

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
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Email: minteer@aol.com

MEMORANDUM

DATE: November 19, 2002

TO: File

FROM: Linda Thal

SUBJECT: Radiochemical Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC 605671, -72, -73
GEL SDG # 67158 and 67169 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.

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 analyses met all QC acceptance criteria.

Laboratory Control Sample (LCS) Analysis

The LCS analyses met all QC acceptance criteria.

Replicates

The replicate analyses met all QC acceptance criteria.

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 however, no "required" data validation procedures for assessing 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: DJJ Soil Sampling Project/Task #: 7223.02.03.02 # of Samples: 38 & 11 Matrix: Soil & Aqueous

AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 001 thru - 038

Laboratory: GEL 67169 - 001 thru - 011

Laboratory Report #: 67158

QC Element	Analysis									
	Organics				Inorganics				RAD	Hexavalent Chromium Other
	VOC	SVOC	Pesticide/PCB	HPLC (HE)	ICP/AES	GFAA/AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓	✓	✓	✓	NA	✓	✓	✓	✓ / J, [illegible]
2. Calibrations	UJ / UJ	J / ✓	✓	✓	✓		✓	✓	✓	✓
3. Method Blanks	✓	U, B / ✓	✓	✓	J, UJ, B, B3		✓	J, B / ✓	✓	✓
4. MS/MSD	✓	✓	✓ / P2	UJ, A2, P1 / NA	✓		✓	✓	✓	✓
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									NA	
13. Other QC	TB, FB DUP	FB DUP	FB DUP	FB DUP	FB DUP		FB DUP	FB DUP	EB DUP	FB DUP

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other: ______

Reviewed By: [signature] Date: 11.19.02

Holding Time and Preservation

Site/Project: DSS Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 – 001 thru -038
67169 – 001 thru – 011

Laboratory: GEL Laboratory Report #: 67158

# of Samples: 38 & 11 Matrix: Soil & H2O

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
67169-009	SW-846 7196A	24 hours	5 x 24 hours	NA	NA	R LT LT ~~UJ, HF~~ ~~prof. judgment~~ LT

Reviewed By: [signature] Date: 11.19.02

WS / L soils

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Soil Sampling AR/COC #: 605671, -72, -73 # of Samples: 19 Matrix: Soil

Laboratory: GRL Laboratory Report #: 67158 Laboratory Sample IDs: 67158-001 thru - 019

Methods: SW-846 8260A Batch #s: 202140

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	67169-003 Equip. Blanks	67169, Trip Blanks	-001, -003, -004
						>.05	<20%/ 0.99	20%											
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓							✓	✓	✓	* TB detected in TB-004 ARSOC 605673
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						✓			✓	✓	✓				SA associated with TB -003 thru -019 All ND TOC.
1	107-06-2	1,2-dichloroethane		0.10															
1	540-59-0	1,2-dichloroethane(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															SA -008 & -010 low level hits for TOC.
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						✓			✓	✓	✓				SA on diff. day shipped in a separate cooler
3	75-25-2	bromoform		0.10															
1	74-83-9	bromomethane		0.10															
1	75-15-0	carbon disulfide		0.10															
1	56-23-5	carbon tetrachloride		0.10															
2	108-90-7	chlorobenzene		0.50															
1	75-00-3	chloroethane		0.01						✓			✓	✓	✓				
1	67-66-3	chloroform		0.20															
1	74-87-3	chloromethane		0.10															
1	10061-01-5	cis-1,3-dichloropropene		0.20															
2	124-48-1	dibromochloromethane		0.10															
2	100-41-4	ethylbenzene		0.10															
1	75-09-2	methylene chloride (10xblk)		0.01	✓	✓	✓												
2	100-42-5	styrene		0.30															
2	127-18-4	tetrachloroethene		0.20															
2	108-88-3	toluene(10xblk)		0.40															
2	10061-02-6	trans-1,3-dichloropropene		0.10						✓			✓	✓	✓			¥	
1	79-01-6	trichloroethene		0.30		0.21				✓			✓	✓	✓			✓	
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.

Reviewed By: [signature] Date: 11.18.02

WS 1 of 2 soils

Volatile Organics

Site/Project: _____ AR/COC #: 605671, -72, -73 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:

WS 2 12 Water

Volatile Organics (SW 846 Method 8260)

Site/Project: DSD Soil Sample AR/COC #: 605671, -72, -73 # of Samples: 4 Matrix: Aqueous

Laboratory: GEL Laboratory Report #: 67158 (67169) Laboratory Sample IDs: 67169 - 001 thru -004

Methods: SW-846 8260 B Batch #s: 203595

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20%/ 0.99	CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks	
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															
1	56-23-5	carbon tetrachloride		0.10															
2	108-90-7	chlorobenzene		0.50						✓			✓	✓	✓				
1	75-00-3	chloroethane		0.01				+23											
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		0.23				✓			✓	✓	✓				
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: PS/PSD 67354 SM1 SO4

Notes: Shaded rows are RCRA compounds.

Reviewed By: [signature] Date: 11-18-02

WS 2 of 2 water

Volatile Organics

Site/Project: _____ AR/COC #: 605671, -72, -73 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 #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 020 thru -038

Laboratory: GEL Laboratory Report #: 67158 67169 - 005 (EB)

Methods: SW-846 8270C ① ②

# of Samples: 19 0 1 Matrix: Soil 0 H2O Batch #s: 201961 201951

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept 1 2	Calib. RF >.05 1 2	Calib. RSD/ R^2 <20%/0.992 1 2	CCV %D 20% 1 2	Method Blanks ① ②	LCS ①	LCSD ②	LCS RPD	MS ①	MSD ①	MS RPD ①	Field Dup. RPD	Equip. Blanks	Field Blanks	① MS	② MSD	② RPD
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						✓	✓		69	✓	✓				✓	✓	✓
3	A	88-06-2	2,4,6-Trichlorophenol		0.20						✓	✓		61	67	✓				✓	✓	✓
2	A	120-83-2	2,4-Dichlorophenol		0.20																	
2	A	105-67-9	2,4-Dimethylphenol		0.20																	
3	A	51-28-5	2,4-dinitrophenol		0.01	✓	✓ ✓	✓ ✓														
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						✓	✓		60	68	✓				✓	✓	✓
3	BN	88-74-4	2-Nitroaniline		0.01	✓	✓															
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	✓	✓ ✓	✓ ✓														
4	A	534-52-1	4,6-Dinitro-2-methylphenol		0.01	✓	✓															
4	BN	101-55-3	4-Bromophenyl-phenylether		0.10			✓														
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																	
1	A	106-44-5	4-Methylphenol (p-cresol)		0.60																	

Comments: m, p - cresol ✓

Notes: Shaded rows are RCRA compounds. ✓ ✓ 62 72 ✓ 72 71 ✓

Reviewed By: _____ Date: _____

Semivolatile Organics

Site/Project: _____ AR/COC #: 605671, -72, -73 Batch #s: _____

Laboratory: _____ Laboratory Report #: _____ # of Samples: _____ Matrix: _____

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF >.05	Calib. RSD/ R^2 <20%/ 0.99	CCV %D 20%	Method Blanks ① ②	LCS ①	LCSD ②	LCS RPD	MS ①	MSD ①	MS RPD ①	Field Dup. RPD	Equip. Blanks	Field Blanks	② MS	③ MSD	② RPD
3	BN	100-01-6	4-Nitroaniline	✓	0.01	✓	✓	✓	✓	✓			NA				✓	✓	NA	~~J~~ UJ	~~J~~ UJ	
3	A	100-02-7	4-Nitrophenol		0.01			✓	21		✓	✓		✓	✓	✓				✓	✓	✓
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																	
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																	
1	BN	108-60-1	bis(2-chloroisopropyl)ether		0.01																	
5	BN	117-81-7	bis(2-Ethylhexyl)phthalate		0.01	✓	✓	✓		105								2.29				
5	BN	85-68-7	Butylbenzylphthalate		0.01					✓								✓				
4	BN	86-74-8	Carbazole		0.01																	
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																	
3	BN	131-11-3	Dimethylphthalate		0.01																	
4	BN	84-74-2	Di-n-butylphthalate		0.01																	
6	BN	117-84-0	Di-n-octylphthalate		0.01	✓	✓	✓														
4	BN	206-44-0	Fluoranthene		0.60			✓														
3	BN	86-73-7	Fluorene		0.90																	
4	BN	118-74-1	Hexachlorobenzene		0.10						✓	✓		73	✓	✓				✓	✓	✓
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓	✓		56	60	✓				✓	✓	✓
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01				20													
1	BN	67-72-1	Hexachloroethane		0.30				✓		✓	✓		56	61	✓				✓	73	✓

Comments:

Semivolatile Organics

Site/Project: _____ AR/COC #: 605671, -72, -73 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	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	MS	MSD	RPD
							>.05	<20% / 0.99	±20%													
													NA				✓	✓	NA			
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓	✓	✓												
2	BN	78-59-1	Isophorone		0.40																	
2	BN	91-20-3	Naphthalene		0.70						✓	✓		61	65	✓				✓	✓	✓
2	BN	98-95-3	Nitrobenzene		0.20			✓														
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	✓	✓	✓	✓		✓	✓		✓	✓	✓						
			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: Phenanthrene-d10 (BN)
IS 5: Chrysene-d12 (BN)
IS 6: Perylene-d12 (BN)

Comments: pyrene on QC Summary not on TAL.

201951 MS/MSD = 500mL

PCBs (SW 846 - Method 8082)

Site/Project: DSS Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 020 → 038
67169 -006 (EB)

Laboratory: GEL Laboratory Report #: 67158

Methods: SW-846 8082 ① ②

# of Samples: 19 & 1 Matrix: Soils & Water Batch #s: 201940 202231

CAS #	Name	TCL	Intercept	Calib RSD / R^2 1 & 2 <20% / 0.99	CCV %D 1 & 2 20%	Method Blanks ① ②	LCS ①	LCSD ②	LCS RPD 20%	MS ①	MSD ①	MS RPD 20%	Field Dup. RPD	Equip. Blanks ug/L	Field Blanks		② MS MSD RPD
12674-11-2	Aroclor-1016	✓	NA	✓	✓	✓ ✓			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			✓	✓	✓ ✓	✓	✓		✓	✓	✓		0.056 J			

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

Confirmation

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

Comments: 202231
MS/MSD performed on another client's sample — All P_2

SA-20, 22, 24 > RL
23, 25 > DL All > 5X EB

Reviewed By: [signature] Date: 11.19.02

High Explosives (SW 846 Method 8330)

Site/Project: OSS Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 020 thru - 038

Laboratory: GEL Laboratory Report #: 67158 67169 - 007 (CB)

Methods: SW-846 8330 ① ②

\# of Samples: 19 & 1 Matrix: soils & H2O Batch #s: 202056 202049

CAS #	NAME	1/2	Intercept	Curve R^2	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	LCS ①	LCSD ①	RPD ②
			1 & 2	.99 2	20% 2	1 U 2	1		20%	1	1	20% 1		U	U			
2691-41-0	HMX		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								(55-135)	32	18	58 (<30%)						
479-45-8	Tetryl									✓	✓	✓						
118-96-7	2,4,6-trinitrotoluene									✓	✓	✓						
35572-78-2	2-amino-4,6-dinitrotoluene								(71-130)	58	✓	NA (<20%)						
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																	
99-08-1	3-nitrotoluene																	
78-11-5	PETN																	

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

Comments: 202056 All soils Tetryl & 4-amino A2, P1

202049 NO MS/MSD but LCS/LCSD good.

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
NA					

Solids-to-aqueous conversion:
mg / kg = µg / g : [(µg / g) x (sample mass (g) / sample vol. (ml)) x (1000 ml / 1 liter)] / Dilution Factor = µg / l

Reviewed By: [signature] Date: 11-19-02

WJ 1 of 2 LT Soils

Inorganic Metals

Site/Project: DSS Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 020 thru -038

Laboratory: GEL Laboratory Report #: GEL 67158

Methods: SW-846 7471A (Hg) 6010B (Metals)

# of Samples: 38 Matrix: Soils Batch #s: (Hg) 202730 (Metals) 202762

QC Element (ug/l mg/kg ... ug/l)

CAS #/ Analyte	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		
7429-90-5 Al								NA			NA							NA		
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			NA			✓	✓	✓	✓	.539 J			
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	✓	✓	✓			
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	1.46 J			
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	✓	✓	✓	✓			
7440-23-5 Na																			Se in	MB
7440-62-2 V																			.201 x 5 =	1.005 mg/kg
7440-66-6 Zn																				
																			Se in	CCB
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓		2.3X	5 = 11.5ug/l
7782-49-2 Se	✓	✓	✓	✓	2.3 (-1.1J)	.201	✓			✓			NA	✓	✓	✓	✓		-ve	5X MDL
7440-38-2 As	✓	✓	✓	✓	2.2	✓	✓			✓			NA	✓	✓	✓	✓			
7440-36-0 Sb																			As in	CCB
7440-28-0 Tl																			2.2X	5 = 11ug/l
7439-97-6 Hg	✓	✓	✓	✓	✓	✓	✓			✓			NA				ND			
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: ICP 2x.

Rep > 5X RL As

Reviewed By: [signature] Date: 11.19.02

WS 2 of 2 EB

Inorganic Metals

Site/Project: OSS Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67169 - 010 EB

Laboratory: GEL Laboratory Report #: 67158

Methods: SW-846 7470A ; 6010 B

# of Samples: 1 Matrix: Aqueous Batch #s: 204430 (Hg) 204455 (METALS)

CAS # / Analyte	QC Element (ug/l, mg/l)																			
	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		X5
7429-90-5 Al								NA			NA					NA				
7440-39-3 Ba	✓	✓	✓	✓	.429	✓	✓			✓			NA	✓	NA				J,B3	2.45 ug/l
7440-41-7 Be																				
7440-43-9 Cd	✓	✓	✓	✓	.343	✓	✓			✓			NA	✓	NA				NO	1.715 ug/l
7440-70-2 Ca																				
7440-47-3 Cr	✓	✓	✓	✓	✓	.000567	✓			✓			NA	✓	NA				J,B	2.855 ug/l
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	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA					
7440-38-2 As	✓	✓	✓	✓	N.O	✓	✓			✓			NA	✓	NA				NO	20 ug/l
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: ICP 67821 DUP /MS/ SD. } SDG

Hg 67354 DUP /MS } SDG

Reviewed By: [signature] Date: 11.19.04

General Chemistry

Site/Project: DSD Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 020 thru -038

Laboratory: GEL Laboratory Report #: 67158 67169 - 008 (EB-TCN) 67169 - 009 (EB-Cr6)

Methods: SW-846 9012A (TCN) 7196A (Cr6)

# of Samples: 19 & 2 Matrix: Soils & Aqueous Batch #s: 202749 (TCN) 203665 203661 (Cr6) 202747 (TCN EB) 201822 (Cr6-EB)

mg/kg

CAS #	Analyte	TAL	QC Element: 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	
																				5X MB
202749 67158-020→038	Total Cyanide		✓	✓	✓	✓	0.048J	✓ ✓	NA		✓ ✓	NA		NA NA	NA	NA	✓	NO	NA	0.24
202747 67169-008	Total Cyanide		✓	✓	✓	✓	✓	✓			✓ ✓			NA NA			NA	NA		
203665 67158-035-038	Hexavalent Chromium		✓	✓	✓	✓	✓	✓			✓			✓			✓	NO		
203661 67158-020→038 4	Hexavalent Chromium		✓	✓	✓	✓	✓	✓			** ✓			NA NA			✓	NO		
201822 *67169-009	Hexavalent Chromium		✓	✓	✓	✓	✓	✓			✓			NA			NA	NA		

Comments: * Exceeds 1HT 5X "R"

** ms from other SDG < 75%.

Batch # 202747 (TCN EB) 67082 DUP/MS SNA SDG.

Reviewed By: 11.19.02 Date: 11/19/02

Radiochemistry

Site/Project: DSS Soil Sampling AR/COC #: 605671, -72, -73 Laboratory Sample IDs: 67158 - 020 thru - 038

Laboratory: GEL Laboratory Report #: 67158 67169 - 011 (EB)

Methods: EPA 900.0

# of Samples: 19 & 1 Matrix: Soil & Aqueous Batch #s: 203325 (Soils) 204950 (EB)

Analyte	QC Element												
	Method Blanks	LCS	MS	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													
203325 Gross Alpha	✓	✓	✓	✓ ✓	✓	✓	✓	NA					
Nonvolatile Beta	✓	✓	✓	✓ ✓	✓	✓	✓	NA					
Ra-226													
Ra-28													
Ni-63													
Gamma Spec. Am-241													
Gamma Spec. Cs-137													
Gamma Spec. Co-60													
204950 Gross α	✓	✓	✓ ✓	✓	NA	NA	NA						
Nonvolatile β	✓	✓	✓ ✓	✓	NA	NA	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:

Reviewed By: [signature] Date: 11.19.02

Contract Verification Review (CVR)

Project Leader Collins | Project Name DSS Soil Sampling | Case No. 7223_02.03.02

AR/COC No. 605671, 605672, 605673 | Analytical Lab GEL | SDG No. 67158A, B, C

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	Cr6+ equipment blank analyzed out of holding time		
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	X		
c) Matrix spike recovery data reported and met		X	Several HPLC MS recoveries not within acceptance limits
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples		X	Arsenic not within acceptable limits
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	HPLC RPD not within acceptance limits; HPLC MS/MSD not performed due to limited sample:
3.5 Blank data a) Method or reagent blank data reported and met for all samples		X	bis(2-Ethylehexyl)phthalate detected in SVOC method blank; selenium and chromium detected in inorganic method blank; cyanide detected in method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	Toluene detected in trip blank; bis(2-Ethylhexyl)phthalate detected in SVOC equipment blank; Arocior 1260 detected in PCB equipment blank; barium and chromium detected in RCRA 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		

Contract Verification Review (Continued)

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
059820-002	SVOC	missing Certificate of Analysis

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 5166 and date correction request was submitted: 11/01/02

Reviewed by: [signature] Date: 11/01/02 Closed by: _____ Date: _____

ANNEX C
DSS Site 1092
Soil-Vapor Monitoring Well 1092-VW-01
Analytical Results and Data Validation Report

SEVERN TRENT STL

Analytical Report

ANALYTICAL REPORT

PROJECT NO. CASE#7223.02.02.01

DSS SOIL VAPOR WELL SAMPLING

Lot #: E3I150169

Pam Puissant

SANDIA NATIONAL LABORATORIES

SEVERN TRENT LABORATORIES, INC.

Marisol Tabirara
Project Manager

September 19, 2003

EXECUTIVE SUMMARY - Detection Highlights

E3I150169

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
063071-001/1092-VW-01-5-SV 09/09/03 09:05 001				
1,1,2-Trichloro-1,2,2-trifluoroethane	93	16	ppb(v/v)	EPA-21 TO-14A
Chloroform	8.1 J	16	ppb(v/v)	EPA-21 TO-14A
Trichloroethene	2300	16	ppb(v/v)	EPA-21 TO-14A
Tetrachloroethene	17	16	ppb(v/v)	EPA-21 TO-14A
063072-001/1092-VW-01-20-SV 09/09/03 09:10 002				
1,1,2-Trichloro-1,2,2-trifluoroethane	58	7.9	ppb(v/v)	EPA-21 TO-14A
Chloroform	5.0 J	7.9	ppb(v/v)	EPA-21 TO-14A
Trichloroethene	1300	7.9	ppb(v/v)	EPA-21 TO-14A
Toluene	4.1 J	7.9	ppb(v/v)	EPA-21 TO-14A
Tetrachloroethene	10	7.9	ppb(v/v)	EPA-21 TO-14A
063073-001/1092-VW-01-70-SV 09/09/03 09:15 003				
1,1,2-Trichloro-1,2,2-trifluoroethane	28	6.1	ppb(v/v)	EPA-21 TO-14A
Acetone	8.9 J	31	ppb(v/v)	EPA-21 TO-14A
2-Butanone (MEK)	8.0 J	31	ppb(v/v)	EPA-21 TO-14A
Trichloroethene	650	6.1	ppb(v/v)	EPA-21 TO-14A
Toluene	16	6.1	ppb(v/v)	EPA-21 TO-14A
Tetrachloroethene	5.2 J	6.1	ppb(v/v)	EPA-21 TO-14A
063074-001/1092-VW-01-100-SV 09/09/03 09:20 004				
1,1,2-Trichloro-1,2,2-trifluoroethane	14	3.9	ppb(v/v)	EPA-21 TO-14A
Acetone	9.0 J	20	ppb(v/v)	EPA-21 TO-14A
2-Butanone (MEK)	12 J	20	ppb(v/v)	EPA-21 TO-14A
Chloroform	1.9 J	3.9	ppb(v/v)	EPA-21 TO-14A
Trichloroethene	480	3.9	ppb(v/v)	EPA-21 TO-14A
Toluene	8.2	3.9	ppb(v/v)	EPA-21 TO-14A
Tetrachloroethene	3.8 J	3.9	ppb(v/v)	EPA-21 TO-14A
063075-001/1092-VW-01-150-SV 09/09/03 09:25 005				
Trichlorofluoromethane	0.54 J	2.0	ppb(v/v)	EPA-21 TO-14A
1,1,2-Trichloro-1,2,2-trifluoroethane	8.1	2.0	ppb(v/v)	EPA-21 TO-14A
2-Butanone (MEK)	9.2 J	10	ppb(v/v)	EPA-21 TO-14A
Chloroform	1.6 J	2.0	ppb(v/v)	EPA-21 TO-14A

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EXECUTIVE SUMMARY - Detection Highlights

E3I150169

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
063075-001/1092-VW-01-150-SV 09/09/03 09:25 005				
Trichloroethene	370	2.0	ppb(v/v)	EPA-21 TO-14A
Toluene	2.1	2.0	ppb(v/v)	EPA-21 TO-14A
Tetrachloroethene	2.8	2.0	ppb(v/v)	EPA-21 TO-14A

ANALYTICAL METHODS SUMMARY

E3I150169

PARAMETER	ANALYTICAL METHOD
Volatile Organics by TO-14A	EPA-21 TO-14A

References:

EPA-21 "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air", Second Edition, EPA/625/R-96/010b, January 1999

SAMPLE SUMMARY

E3I150169

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
F0C5X	001	063071-001/1092-VW-01-5-SV	09/09/03	09:05
F0C50	002	063072-001/1092-VW-01-20-SV	09/09/03	09:10
F0C51	003	063073-001/1092-VW-01-70-SV	09/09/03	09:15
F0C53	004	063074-001/1092-VW-01-100-SV	09/09/03	09:20
F0C54	005	063075-001/1092-VW-01-150-SV	09/09/03	09:25

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063071-001/1092-VW-01-5-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-001	**Work Order #...:** F0C5X1AC	**Matrix.....:** AIR	
Date Sampled...: 09/09/03	**Date Received..:** 09/12/03		
Prep Date.....: 09/16/03	**Analysis Date..:** 09/16/03		
Prep Batch #...: 3262242	**Analysis Time..:** 17:05		
Dilution Factor: 8.03			
Analyst ID.....: 117751	**Instrument ID..:** MSA		
	Method.....: EPA-21 TO-14A		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	16	ppb(v/v)	4.0
Chloromethane	ND	32	ppb(v/v)	8.0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	16	ppb(v/v)	6.4
Vinyl chloride	ND	16	ppb(v/v)	6.4
Bromomethane	ND	16	ppb(v/v)	8.0
Chloroethane	ND	32	ppb(v/v)	6.4
Trichlorofluoromethane	ND	16	ppb(v/v)	4.0
1,1-Dichloroethene	ND	16	ppb(v/v)	4.0
Carbon disulfide	ND	80	ppb(v/v)	16
1,1,2-Trichloro-1,2,2-trifluoroethane	**93**	**16**	**ppb(v/v)**	**4.0**
Acetone	ND	80	ppb(v/v)	16
Methylene chloride	ND	16	ppb(v/v)	6.4
trans-1,2-Dichloroethene	ND	16	ppb(v/v)	4.0
1,1-Dichloroethane	ND	16	ppb(v/v)	4.0
Vinyl acetate	ND	80	ppb(v/v)	16
cis-1,2-Dichloroethene	ND	16	ppb(v/v)	6.4
2-Butanone (MEK)	ND	80	ppb(v/v)	16
Chloroform	**8.1 J**	**16**	**ppb(v/v)**	**6.4**
1,1,1-Trichloroethane	ND	16	ppb(v/v)	4.0
Carbon tetrachloride	ND	16	ppb(v/v)	4.0
Benzene	ND	16	ppb(v/v)	6.4
1,2-Dichloroethane	ND	16	ppb(v/v)	6.4
Trichloroethene	**2300**	**16**	**ppb(v/v)**	**4.0**
1,2-Dichloropropane	ND	16	ppb(v/v)	6.4
Bromodichloromethane	ND	16	ppb(v/v)	6.4
cis-1,3-Dichloropropene	ND	16	ppb(v/v)	4.0
4-Methyl-2-pentanone (MIBK)	ND	80	ppb(v/v)	16
Toluene	ND	16	ppb(v/v)	4.0
trans-1,3-Dichloropropene	ND	16	ppb(v/v)	6.4
1,1,2-Trichloroethane	ND	16	ppb(v/v)	4.8
Tetrachloroethene	**17**	**16**	**ppb(v/v)**	**4.8**
2-Hexanone	ND	80	ppb(v/v)	8.0
Dibromochloromethane	ND	16	ppb(v/v)	4.0
1,2-Dibromoethane (EDB)	ND	16	ppb(v/v)	4.0

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SANDIA NATIONAL LABORATORIES

Client Sample ID: 063071-001/1092-VW-01-5-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-001 Work Order #...: F0C5X1AC Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Chlorobenzene	ND	16	ppb(v/v)	4.0
Ethylbenzene	ND	16	ppb(v/v)	4.0
m-Xylene & p-Xylene	ND	16	ppb(v/v)	8.0
o-Xylene	ND	16	ppb(v/v)	4.8
Styrene	ND	16	ppb(v/v)	4.8
Bromoform	ND	16	ppb(v/v)	4.0
1,1,2,2-Tetrachloroethane	ND	16	ppb(v/v)	4.0
Benzyl chloride	ND	80	ppb(v/v)	6.4
4-Ethyltoluene	ND	16	ppb(v/v)	5.6
1,3,5-Trimethylbenzene	ND	16	ppb(v/v)	6.4
1,2,4-Trimethylbenzene	ND	16	ppb(v/v)	6.4
1,3-Dichlorobenzene	ND	16	ppb(v/v)	5.6
1,4-Dichlorobenzene	ND	16	ppb(v/v)	6.4
1,2-Dichlorobenzene	ND	16	ppb(v/v)	6.4
1,2,4-Trichloro-benzene	ND	40	ppb(v/v)	8.0
Hexachlorobutadiene	ND	32	ppb(v/v)	8.0

NOTE(S):

J Estimated result. Result is less than RL.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063072-001/1092-VW-01-20-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-002 Work Order #...: F0C501AC Matrix.....: AIR
Date Sampled...: 09/09/03 Date Received..: 09/12/03
Prep Date.....: 09/16/03 Analysis Date..: 09/16/03
Prep Batch #...: 3262242 Analysis Time..: 17:39
Dilution Factor: 3.96
Analyst ID.....: 117751 Instrument ID..: MSA
Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	7.9	ppb(v/v)	2.0
Chloromethane	ND	16	ppb(v/v)	4.0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	7.9	ppb(v/v)	3.2
Vinyl chloride	ND	7.9	ppb(v/v)	3.2
Bromomethane	ND	7.9	ppb(v/v)	4.0
Chloroethane	ND	16	ppb(v/v)	3.2
Trichlorofluoromethane	ND	7.9	ppb(v/v)	2.0
1,1-Dichloroethene	ND	7.9	ppb(v/v)	2.0
Carbon disulfide	ND	40	ppb(v/v)	7.9
1,1,2-Trichloro-1,2,2-trifluoroethane	**58**	**7.9**	**ppb(v/v)**	**2.0**
Acetone	ND	40	ppb(v/v)	7.9
Methylene chloride	ND	7.9	ppb(v/v)	3.2
trans-1,2-Dichloroethene	ND	7.9	ppb(v/v)	2.0
1,1-Dichloroethane	ND	7.9	ppb(v/v)	2.0
Vinyl acetate	ND	40	ppb(v/v)	7.9
cis-1,2-Dichloroethene	ND	7.9	ppb(v/v)	3.2
2-Butanone (MEK)	ND	40	ppb(v/v)	7.9
Chloroform	**5.0 J**	**7.9**	**ppb(v/v)**	**3.2**
1,1,1-Trichloroethane	ND	7.9	ppb(v/v)	2.0
Carbon tetrachloride	ND	7.9	ppb(v/v)	2.0
Benzene	ND	7.9	ppb(v/v)	3.2
1,2-Dichloroethane	ND	7.9	ppb(v/v)	3.2
Trichloroethene	**1300**	**7.9**	**ppb(v/v)**	**2.0**
1,2-Dichloropropane	ND	7.9	ppb(v/v)	3.2
Bromodichloromethane	ND	7.9	ppb(v/v)	3.2
cis-1,3-Dichloropropene	ND	7.9	ppb(v/v)	2.0
4-Methyl-2-pentanone (MIBK)	ND	40	ppb(v/v)	7.9
Toluene	**4.1 J**	**7.9**	**ppb(v/v)**	**2.0**
trans-1,3-Dichloropropene	ND	7.9	ppb(v/v)	3.2
1,1,2-Trichloroethane	ND	7.9	ppb(v/v)	2.4
Tetrachloroethene	**10**	**7.9**	**ppb(v/v)**	**2.4**
2-Hexanone	ND	40	ppb(v/v)	4.0
Dibromochloromethane	ND	7.9	ppb(v/v)	2.0
1,2-Dibromoethane (EDB)	ND	7.9	ppb(v/v)	2.0

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SANDIA NATIONAL LABORATORIES

Client Sample ID: 063072-001/1092-VW-01-20-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-002 Work Order #...: F0C501AC Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Chlorobenzene	ND	7.9	ppb(v/v)	2.0
Ethylbenzene	ND	7.9	ppb(v/v)	2.0
m-Xylene & p-Xylene	ND	7.9	ppb(v/v)	4.0
o-Xylene	ND	7.9	ppb(v/v)	2.4
Styrene	ND	7.9	ppb(v/v)	2.4
Bromoform	ND	7.9	ppb(v/v)	2.0
1,1,2,2-Tetrachloroethane	ND	7.9	ppb(v/v)	2.0
Benzyl chloride	ND	40	ppb(v/v)	3.2
4-Ethyltoluene	ND	7.9	ppb(v/v)	2.8
1,3,5-Trimethylbenzene	ND	7.9	ppb(v/v)	3.2
1,2,4-Trimethylbenzene	ND	7.9	ppb(v/v)	3.2
1,3-Dichlorobenzene	ND	7.9	ppb(v/v)	2.8
1,4-Dichlorobenzene	ND	7.9	ppb(v/v)	3.2
1,2-Dichlorobenzene	ND	7.9	ppb(v/v)	3.2
1,2,4-Trichloro-benzene	ND	20	ppb(v/v)	4.0
Hexachlorobutadiene	ND	16	ppb(v/v)	4.0

NOTE(S):

J Estimated result. Result is less than RL.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063073-001/1092-VW-01-70-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-003 Work Order #...: F0C511AC Matrix.....: AIR
Date Sampled...: 09/09/03 Date Received..: 09/12/03
Prep Date.....: 09/16/03 Analysis Date..: 09/16/03
Prep Batch #...: 3262242 Analysis Time..: 18:13
Dilution Factor: 3.06
Analyst ID.....: 117751 Instrument ID..: MSA
Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	6.1	ppb(v/v)	1.5
Chloromethane	ND	12	ppb(v/v)	3.1
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	6.1	ppb(v/v)	2.4
Vinyl chloride	ND	6.1	ppb(v/v)	2.4
Bromomethane	ND	6.1	ppb(v/v)	3.1
Chloroethane	ND	12	ppb(v/v)	2.4
Trichlorofluoromethane	ND	6.1	ppb(v/v)	1.5
1,1-Dichloroethene	ND	6.1	ppb(v/v)	1.5
Carbon disulfide	ND	31	ppb(v/v)	6.1
1,1,2-Trichloro-1,2,2-trifluoroethane	**28**	**6.1**	**ppb(v/v)**	**1.5**
Acetone	**8.9 J**	**31**	**ppb(v/v)**	**6.1**
Methylene chloride	ND	6.1	ppb(v/v)	2.4
trans-1,2-Dichloroethene	ND	6.1	ppb(v/v)	1.5
1,1-Dichloroethane	ND	6.1	ppb(v/v)	1.5
Vinyl acetate	ND	31	ppb(v/v)	6.1
cis-1,2-Dichloroethene	ND	6.1	ppb(v/v)	2.4
2-Butanone (MEK)	**8.0 J**	**31**	**ppb(v/v)**	**6.1**
Chloroform	ND	6.1	ppb(v/v)	2.4
1,1,1-Trichloroethane	ND	6.1	ppb(v/v)	1.5
Carbon tetrachloride	ND	6.1	ppb(v/v)	1.5
Benzene	ND	6.1	ppb(v/v)	2.4
1,2-Dichloroethane	ND	6.1	ppb(v/v)	2.4
Trichloroethene	**650**	**6.1**	**ppb(v/v)**	**1.5**
1,2-Dichloropropane	ND	6.1	ppb(v/v)	2.4
Bromodichloromethane	ND	6.1	ppb(v/v)	2.4
cis-1,3-Dichloropropene	ND	6.1	ppb(v/v)	1.5
4-Methyl-2-pentanone (MIBK)	ND	31	ppb(v/v)	6.1
Toluene	**16**	**6.1**	**ppb(v/v)**	**1.5**
trans-1,3-Dichloropropene	ND	6.1	ppb(v/v)	2.4
1,1,2-Trichloroethane	ND	6.1	ppb(v/v)	1.8
Tetrachloroethene	**5.2 J**	**6.1**	**ppb(v/v)**	**1.8**
2-Hexanone	ND	31	ppb(v/v)	3.1
Dibromochloromethane	ND	6.1	ppb(v/v)	1.5
1,2-Dibromoethane (EDB)	ND	6.1	ppb(v/v)	1.5

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SANDIA NATIONAL LABORATORIES

Client Sample ID: 063073-001/1092-VW-01-70-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-003 Work Order #...: F0C511AC Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Chlorobenzene	ND	6.1	ppb(v/v)	1.5
Ethylbenzene	ND	6.1	ppb(v/v)	1.5
m-Xylene & p-Xylene	ND	6.1	ppb(v/v)	3.1
o-Xylene	ND	6.1	ppb(v/v)	1.8
Styrene	ND	6.1	ppb(v/v)	1.8
Bromoform	ND	6.1	ppb(v/v)	1.5
1,1,2,2-Tetrachloroethane	ND	6.1	ppb(v/v)	1.5
Benzyl chloride	ND	31	ppb(v/v)	2.4
4-Ethyltoluene	ND	6.1	ppb(v/v)	2.1
1,3,5-Trimethylbenzene	ND	6.1	ppb(v/v)	2.4
1,2,4-Trimethylbenzene	ND	6.1	ppb(v/v)	2.4
1,3-Dichlorobenzene	ND	6.1	ppb(v/v)	2.1
1,4-Dichlorobenzene	ND	6.1	ppb(v/v)	2.4
1,2-Dichlorobenzene	ND	6.1	ppb(v/v)	2.4
1,2,4-Trichloro-benzene	ND	15	ppb(v/v)	3.1
Hexachlorobutadiene	ND	12	ppb(v/v)	3.1

NOTE(S):

J Estimated result. Result is less than RL.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063074-001/1092-VW-01-100-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-004 Work Order #...: F0C531AC Matrix.....: AIR
Date Sampled...: 09/09/03 Date Received..: 09/12/03
Prep Date.....: 09/16/03 Analysis Date..: 09/16/03
Prep Batch #...: 3262242 Analysis Time..: 18:47
Dilution Factor: 1.95
Analyst ID.....: 117751 Instrument ID..: MSA
Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	3.9	ppb(v/v)	0.98
Chloromethane	ND	7.8	ppb(v/v)	2.0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	3.9	ppb(v/v)	1.6
Vinyl chloride	ND	3.9	ppb(v/v)	1.6
Bromomethane	ND	3.9	ppb(v/v)	2.0
Chloroethane	ND	7.8	ppb(v/v)	1.6
Trichlorofluoromethane	ND	3.9	ppb(v/v)	0.98
1,1-Dichloroethene	ND	3.9	ppb(v/v)	0.98
Carbon disulfide	ND	20	ppb(v/v)	3.9
1,1,2-Trichloro-1,2,2-trifluoroethane	**14**	**3.9**	**ppb(v/v)**	**0.98**
Acetone	**9.0 J**	**20**	**ppb(v/v)**	**3.9**
Methylene chloride	ND	3.9	ppb(v/v)	1.6
trans-1,2-Dichloroethene	ND	3.9	ppb(v/v)	0.98
1,1-Dichloroethane	ND	3.9	ppb(v/v)	0.98
Vinyl acetate	ND	20	ppb(v/v)	3.9
cis-1,2-Dichloroethene	ND	3.9	ppb(v/v)	1.6
2-Butanone (MEK)	**12 J**	**20**	**ppb(v/v)**	**3.9**
Chloroform	**1.9 J**	**3.9**	**ppb(v/v)**	**1.6**
1,1,1-Trichloroethane	ND	3.9	ppb(v/v)	0.98
Carbon tetrachloride	ND	3.9	ppb(v/v)	0.98
Benzene	ND	3.9	ppb(v/v)	1.6
1,2-Dichloroethane	ND	3.9	ppb(v/v)	1.6
Trichloroethene	**480**	**3.9**	**ppb(v/v)**	**0.98**
1,2-Dichloropropane	ND	3.9	ppb(v/v)	1.6
Bromodichloromethane	ND	3.9	ppb(v/v)	1.6
cis-1,3-Dichloropropene	ND	3.9	ppb(v/v)	0.98
4-Methyl-2-pentanone (MIBK)	ND	20	ppb(v/v)	3.9
Toluene	**8.2**	**3.9**	**ppb(v/v)**	**0.98**
trans-1,3-Dichloropropene	ND	3.9	ppb(v/v)	1.6
1,1,2-Trichloroethane	ND	3.9	ppb(v/v)	1.2
Tetrachloroethene	**3.8 J**	**3.9**	**ppb(v/v)**	**1.2**
2-Hexanone	ND	20	ppb(v/v)	2.0
Dibromochloromethane	ND	3.9	ppb(v/v)	0.98
1,2-Dibromoethane (EDB)	ND	3.9	ppb(v/v)	0.98

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SANDIA NATIONAL LABORATORIES

Client Sample ID: 063074-001/1092-VW-01-100-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-004 Work Order #...: F0C531AC Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Chlorobenzene	ND	3.9	ppb(v/v)	0.98
Ethylbenzene	ND	3.9	ppb(v/v)	0.98
m-Xylene & p-Xylene	ND	3.9	ppb(v/v)	2.0
o-Xylene	ND	3.9	ppb(v/v)	1.2
Styrene	ND	3.9	ppb(v/v)	1.2
Bromoform	ND	3.9	ppb(v/v)	0.98
1,1,2,2-Tetrachloroethane	ND	3.9	ppb(v/v)	0.98
Benzyl chloride	ND	20	ppb(v/v)	1.6
4-Ethyltoluene	ND	3.9	ppb(v/v)	1.4
1,3,5-Trimethylbenzene	ND	3.9	ppb(v/v)	1.6
1,2,4-Trimethylbenzene	ND	3.9	ppb(v/v)	1.6
1,3-Dichlorobenzene	ND	3.9	ppb(v/v)	1.4
1,4-Dichlorobenzene	ND	3.9	ppb(v/v)	1.6
1,2-Dichlorobenzene	ND	3.9	ppb(v/v)	1.6
1,2,4-Trichloro-benzene	ND	9.8	ppb(v/v)	2.0
Hexachlorobutadiene	ND	7.8	ppb(v/v)	2.0

NOTE(S):

J Estimated result. Result is less than RL.

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063075-001/1092-VW-01-150-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-005 Work Order #...: F0C541AC Matrix.....: AIR
Date Sampled...: 09/09/03 Date Received..: 09/12/03
Prep Date.....: 09/16/03 Analysis Date..: 09/16/03
Prep Batch #...: 3262242 Analysis Time..: 19:20
Dilution Factor: 1
Analyst ID.....: 117751 Instrument ID..: MSA
Method.....: EPA-21 TO-14A

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Dichlorodifluoromethane	ND	2.0	ppb(v/v)	0.50
Chloromethane	ND	4.0	ppb(v/v)	1.0
1,2-Dichloro-1,1,2,2-tetrafluoroethane	ND	2.0	ppb(v/v)	0.80
Vinyl chloride	ND	2.0	ppb(v/v)	0.80
Bromomethane	ND	2.0	ppb(v/v)	1.0
Chloroethane	ND	4.0	ppb(v/v)	0.80
Trichlorofluoromethane	**0.54 J**	**2.0**	**ppb(v/v)**	**0.50**
1,1-Dichloroethene	ND	2.0	ppb(v/v)	0.50
Carbon disulfide	ND	10	ppb(v/v)	2.0
1,1,2-Trichloro-1,2,2-trifluoroethane	**8.1**	**2.0**	**ppb(v/v)**	**0.50**
Acetone	ND	10	ppb(v/v)	2.0
Methylene chloride	ND	2.0	ppb(v/v)	0.80
trans-1,2-Dichloroethene	ND	2.0	ppb(v/v)	0.50
1,1-Dichloroethane	ND	2.0	ppb(v/v)	0.50
Vinyl acetate	ND	10	ppb(v/v)	2.0
cis-1,2-Dichloroethene	ND	2.0	ppb(v/v)	0.80
2-Butanone (MEK)	**9.2 J**	**10**	**ppb(v/v)**	**2.0**
Chloroform	**1.6 J**	**2.0**	**ppb(v/v)**	**0.80**
1,1,1-Trichloroethane	ND	2.0	ppb(v/v)	0.50
Carbon tetrachloride	ND	2.0	ppb(v/v)	0.50
Benzene	ND	2.0	ppb(v/v)	0.80
1,2-Dichloroethane	ND	2.0	ppb(v/v)	0.80
Trichloroethene	**370**	**2.0**	**ppb(v/v)**	**0.50**
1,2-Dichloropropane	ND	2.0	ppb(v/v)	0.80
Bromodichloromethane	ND	2.0	ppb(v/v)	0.80
cis-1,3-Dichloropropene	ND	2.0	ppb(v/v)	0.50
4-Methyl-2-pentanone (MIBK)	ND	10	ppb(v/v)	2.0
Toluene	**2.1**	**2.0**	**ppb(v/v)**	**0.50**
trans-1,3-Dichloropropene	ND	2.0	ppb(v/v)	0.80
1,1,2-Trichloroethane	ND	2.0	ppb(v/v)	0.60
Tetrachloroethene	**2.8**	**2.0**	**ppb(v/v)**	**0.60**
2-Hexanone	ND	10	ppb(v/v)	1.0
Dibromochloromethane	ND	2.0	ppb(v/v)	0.50
1,2-Dibromoethane (EDB)	ND	2.0	ppb(v/v)	0.50

(Continued on next page)

SANDIA NATIONAL LABORATORIES

Client Sample ID: 063075-001/1092-VW-01-150-SV

GC/MS Volatiles

Lot-Sample #...: E3I150169-005 Work Order #...: F0CS41AC Matrix.....: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Chlorobenzene	ND	2.0	ppb(v/v)	0.50
Ethylbenzene	ND	2.0	ppb(v/v)	0.50
m-Xylene & p-Xylene	ND	2.0	ppb(v/v)	1.0
o-Xylene	ND	2.0	ppb(v/v)	0.60
Styrene	ND	2.0	ppb(v/v)	0.60
Bromoform	ND	2.0	ppb(v/v)	0.50
1,1,2,2-Tetrachloroethane	ND	2.0	ppb(v/v)	0.50
Benzyl chloride	ND	10	ppb(v/v)	0.80
4-Ethyltoluene	ND	2.0	ppb(v/v)	0.70
1,3,5-Trimethylbenzene	ND	2.0	ppb(v/v)	0.80
1,2,4-Trimethylbenzene	ND	2.0	ppb(v/v)	0.80
1,3-Dichlorobenzene	ND	2.0	ppb(v/v)	0.70
1,4-Dichlorobenzene	ND	2.0	ppb(v/v)	0.80
1,2-Dichlorobenzene	ND	2.0	ppb(v/v)	0.80
1,2,4-Trichloro-benzene	ND	5.0	ppb(v/v)	1.0
Hexachlorobutadiene	ND	4.0	ppb(v/v)	1.0

NOTE(S):

J Estimated result. Result is less than RL.

The remaining portions of this report:

- **QA/QC;**
- **1092-VW-01 Extended Raw Data,**

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

Sample Findings Summary

Site: DSS-NFA

AR/COC: 606759

Data Type: Organic

Analysis met QC acceptance criteria. No data will be qualified.

Validated By: Kevin A Lambert

Date: 09/29/03

CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY

Internal Lab

Batch No. N/A

SMO Use

AR/COC 606759

Dept. No./Mail Stop:	6132/1089	Date Samples Shipped:	9/10/03	Project/Task No.:	7223.02.02.01
Project/Task Manager:	Mike Sanders	Carrier/Waybill No.	26418	SMO Authorization:	Tim SMO
Project Name:	DSS Soil Vapor Well Sampling	Lab Contact:	Mark Loeb(800)333-3305	Contract #:	PO 216913
Record Center Code:		Lab Destination:	Severn Trent St.Louis		SEE BOTTLE ORDER
Logbook Ref. No.:		SMO Contact/Phone:	Pam Puissant(505)844-3185		
Service Order No.	CF023-03	Send Report to SMO:	Wendy Palencia(505)844-3132		
Location	Tech Area 3				
Building	Room				

☐ Waste Characterization
-Send preliminary/copy report to:

☐ Released by COC No.:
☐ Validation Required

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

Reference LOV(available at SMO)

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container Type	Container Volume	Preserv-ative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
063071-001	1092-VW-01-5-SV	5		9-9-03/0905	SG	SC	6L	none	G	SA	TO-14 summa# 12341	
063072-001	1092-VW-01-20-SV	20		9-9-03/0910	SG	SC	6L	none	G	SA	TO-14 summa# 04340	
063073-001	1092-VW-01-70-SV	70		9-9-03/0915	SG	SC	6L	none	G	SA	TO-14 summa# 12607	
063074-001	1092-VW-01-100-SV	100		9-9-03/0920	SG	SC	6L	none	G	SA	TO-14 summa# A-331	
063075-001	1092-VW-01-150-SV	150		9-9-03/0925	SG	SC	6L	none	G	SA	TO-14 summa# 9340B	

RMMA ☐ Yes ☑ No Ref. No.

Sample Disposal ☐ Return to Client ☑ Disposal by lab

Turnaround Time ☐ 7 Day ☑ 15 Day ☐ 30 Day

Return Samples By: ☐ Negotiated TAT

Sample Tracking Smo Use
Date Entered(mm/dd/yy) 09/11/03
Entered by: JAK
QC Inits. RK

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

*Send report to:
Mike Sanders
Dept.6132 Mail stop 1089
505-284-2478
Tim Jackson Mail stop 1087
505-284-2547
*Please list as separate report.

Abnormal Conditions on Receipt

Lab Use

Sample Team Members	Name	Signature	Init	Company/Organization/Phone/Cellular
	J Lee	J. Lee	JDL	Weston Solutions 6134 (505-284-3309)

1.Relinquished by	J. Lee	Org. 6134	Date 9/10/03	Time 0805	4.Relinquished by		Org.	Date	Time
1. Received by	[illegible]	Org. 6133	Date 9/10/03	Time 0805	4. Received by		Org.	Date	Time
2.Relinquished by	[illegible]	Org. 6133	Date 9/10/03	Time 1100	5.Relinquished by		Org.	Date	Time
2. Received by		Org.	Date	Time	5. Received by		Org.	Date	Time
3.Relinquished by		Org.	Date	Time	6.Relinquished by		Org.	Date	Time
3. Received by		Org.	Date	Time	6. Received by		Org.	Date	Time

Analytical Quality Associates, Inc.
616 Maxine NE
Albuquerque, NM 87123
Phone: 505-299-5201
Fax: 505-299-6744
Email: minteer@aol.com

MEMORANDUM

DATE: September 29, 2003

TO: File

FROM: Kevin Lambert

SUBJECT: Organic Data Review and Validation – SNL
DSS-NFA, AR/COC No. 606759, SDG No. E31150169 (STCA), and Project/Task No. 7223.02.02.01

See the attached Data Validation Worksheets for supporting documentation on the data review and validation. Data are evaluated using SNL/NM ER Project AOP 00-03.

Summary

All samples were prepared and analyzed with accepted procedures using method EPA21 TO-14A. All compounds were successfully analyzed. No problems were identified with the data package that result 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

All samples were analyzed within the prescribed holding times.

Calibration

The initial calibration and continuing calibration data met QC acceptance criteria except as follows.

The calibration RF for chloromethane (0.089) was < the specified minimum RF (0.10). However, the calibration RSD and CCV %D for chloromethane met QC acceptance criteria. Associated sample results were non-detect (ND) and as a result based on professional judgment no data will be qualified.

The calibration RSD for benzyl chloride (29%) and bromoform (25%) were > 20% but $\leq$ 40%. Associated sample results were ND and as a result based on professional judgment no data will be qualified.

The CCV %D for vinyl acetate (-28%) was > 20% but $\leq$ 40%. Associated sample results were ND and as a result based on professional judgment no data will be qualified.

Blanks

No target analytes were detected in the blanks.

Surrogates

Surrogate assessment is not required for this analysis.

Internal Standards

Internal standards data met QC acceptance criteria.

Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD is not required. The LCS/LCSD is used to assess accuracy and precision.

Laboratory Control Sample (LCS)

The LCS/LCSD met QC acceptance criteria.

Detection Limits/Dilutions

All detection limits were properly reported; no dilutions were required

Other QC

No equipment blank (EB), trip blank (TB) or field duplicate pair was submitted on the ARCOC.

No other specific issues were identified which affect data quality.

Data Validation Summary

Site/Project: DSS-NFA Project/Task #: 7223.02.02.01 # of Samples: 5 Matrix: Soil/gas (air)

AR/COC #: 606759 Laboratory Sample IDs: E3I150169-001 to -005

Laboratory: STCA

SDG #: E3I150169

QC Element	Analysis									
	TO-14A Organics				Inorganics				RAD	Other
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓									
2. Calibrations	✓									
3. Method Blanks	✓									
4. MS/MSD	NA									
5. Laboratory Control Samples	✓				NA					
6. Replicates										
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	NA									

J = Estimated
U = Not Detected
UJ = Not Detected, Estimated
R = Unusable

Check (√) = Acceptable
Shaded Cells = Not Applicable (also "NA")
NP = Not Provided
Other: _____

Reviewed By: Kevin A Zambal Date: 9-29-03

Volatil)ganics (TO-14)

Site/Project: DSS-NFA AR/COC #: 606759 # of Samples: 5 Matrix: AIR

Laboratory: STCA Laboratory Report #: E3I150169 Laboratory Sample IDs: E3I150169-001 to -005

Methods: EPA 21 (TO-14A) Batch #s: 3262242

IS	CAS #	Name	T C L	Min. RF	Intercept	Calib. RF (1)	Calib. RSD/ R^2 (2)	CCV %D (3)	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
						>.05	<20% / 0.99	20%										
1	74-87-3	Chloromethane	✓	0.10	NA	0.094 ✓	✓	✓	✓									
1	74-83-9	Bromomethane	✓	0.10		✓												
1	75-01-4	Vinyl chloride	✓	0.10														
1	75-00-3	Chloroethane	✓	0.01						✓	✓	✓						
1	75-09-2	methylene chloride (10xblk)	✓	0.01						✓	✓	✓						
1	67-64-1	acetone (10xblk)	✓	0.01														
1	75-35-4	1,1-dichloroethene	✓	0.20														
1	75-34-3	1,1-dichloroethane	✓	0.10														
1	67-66-3	Chloroform	✓	0.20														
1	107-06-2	1,2-dichloroethane	✓	0.10														
1	78-93-3	2-butanone(10xblk)	✓	0.01														
2	71-55-6	1,1,1-trichloroethane	✓	0.10														
2	56-23-5	carbon tetrachloride	✓	0.10														
2	78-87-5	1,2-dichloropropane	✓	0.01														
2	10061-01-5	cis-1,3-dichloropropene	✓	0.20						✓	✓	✓						
2	79-01-6	Trichloroethene	✓	0.30														
2	79-00-5	1,1,2-trichloroethane	✓	0.10														
2	71-43-2	Benzene	✓	0.30														
2	10061-02-6	trans-1,3-dichloropropene	✓	0.10														
3	108-10-1	4-methyl-2-pentanone	✓	0.10														
3	127-18-4	Tetrachloroethene	✓	0.20						✓	✓	✓						
3	79-34-5	1,1,2,2-tetrachloroethane	✓	0.30						✓	✓	✓						
3	108-88-3	toluene(10xblk)	✓	0.40														
3	108-90-7	Chlorobenzene	✓	0.50														
3	100-41-4	Ethylbenzene	✓	0.10														
3	100-42-5	Styrene	✓	0.30														
	107-05-01	Allyl chloride	✓				29 ✓											
	100-44-7	Benzyl chloride	✓															
	106-93-4	1,2-dibromoethane	✓															
	95-50-1	1,2-dichlorobenzene	✓															
	541-73-1	1,3-dichlorobenzene	✓															
	106-46-7	1,4-dichlorobenzene	✓															
	75-71-8	dichlorodifluoromethane	✓															

N/A

Notes: Shaded rows are RCRA compounds.

Comments: NA - Not Applicable

(1) Calib RF < min RF RSD & CCV %D met QC criteria Sample results ND, no data qualified as a result

Reviewed By: Kim A Lambert Date: 9-29-03

Volatile Organics (TO-14)

Site/Project: _____ AR/COC #: 606759 # of Samples: _____ Matrix: _____

Laboratory: _____ Laboratory Report #: _____ Laboratory Sample IDs: _____

Methods: _____ Batch #s: _____

IS	CAS #	Name	TCL	Min. RF	Intercept	(1) Calib. RF >.05	(2) Calib. RSD/ R^2 <20% / 0.99	(3) CCV %D 20%	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks		
	76-14-2	1,2-dichloro-1,1,2,2-tetrafluoroethane	✓		NA	✓	✓	✓	✓											
	156-59-2	cis-1,2-dichloroethene	✓																	
	156-60-5	trans-1,2-dichloroethene	✓																	
	87-68-3	hexachlorobutadiene	✓																	
	120-82-1	1,2,4-trichlorobenzene	✓																	
	75-15-0	carbon disulfide	✓																	
	75-69-4	trichlorofluoromethane	✓																	
	95-63-6	1,2,4-trimethylbenzene	✓																	
	108-67-8	1,3,5-trimethylbenzene	✓																	
	76-13-1	1,1,2-trichloro-1,2,2-trifluoroethane	✓																	
	136777-61-2	m-, p-xylene	✓												N/A					
	95-47-6	o-xylene	✓																	
	622-96-8	4-ethyltoluene	✓																	
	108-05-4	vinyl acetate	✓					-28 ✓												
	75-27-4	bromodichloromethane	✓																	
	591-78-6	2-hexanone	✓																	
	124-48-1	dibromochloromethane	✓																	
	75-25-2	bromoform	✓		✓	✓	25	✓	✓											
	64-17-5	ethanol																		
	67-56-1	methanol																		
	80-62-6	methyl methacrylate																		
	141-78-6	ethyl acetate																		
	107-02-8	acrolein																		
	75-05-8	acetonitrile																		
	67-63-0	isopropanol																		
	107-13-1	acrylonitrile																		
	123-91-1	1,4,-dioxane																		

Notes: Shaded rows are RCRA compounds.

Comments: (2) RSD > 20 but < 40, Sample results ND, No data qualified as a result

(3) CCV %D > 20 but < 40, Sample results ND. No data qualified as a result

Volatile Organics (TO-14)

Site/Project: _____ AR/COC #: 606759 Batch #s: _____

Laboratory: _____ Laboratory Report #: _____ # of Samples: _____ Matrix: _____

Surrogate Recovery and Internal Standard Outliers (TO-14)

Sample	SMC 1	SMC 2	SMC 3	IS 1 area	IS 1 RT	IS 2 area	IS 2 RT	IS 3 area	IS 3 RT
						Met			
		NA							
						Criteria			

SMC 1: 4-Bromofluorobenzene
SMC 2: 1,2-Dichloroethane-d4
SMC 3: Toluene-d8

IS 1: Bromochloromethane
IS 2: 1,4-Difluorobenzene
IS 3: Chlorobenzene-d5

Comments:

Contract Validation Review (CVR)

Project Leader: COLLINS | Project Name: DSS-NFA | Case No.: 7223_02.02.01

AR/COC No.: 606759 | Analytical Lab: SEVERN TRENT | SDG No.: E31150169

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)	N/A				
2.5	Detection limits provided; PQL and MDL (or IDL), MDA and L_c	X				
2.6	QC batch numbers provided	X				
2.7	Dilution factors provided and all dilution levels reported	X				
2.8	Data reported in appropriate units and using correct significant figures	X				
2.9	Radiochemistry analysis uncertainty (2 sigma error) and tracer recovery (if applicable) reported	N/A				
2.10	Narrative provided	X				
2.11	TAT met	X				
2.12	Hold times met	X				
2.13	Contractual qualifiers provided	X				
2.14	All requested result and TIC (if requested) data provided	X				

Contract Verification Review (Continued)

3.0 Data Quality Evaluation

Item	Yes	No	If no, Sample ID No./Fraction(s) and Analysis
3.1 Are reporting units appropriate for the matrix and meet contract specified or project-specific requirements? Inorganics and metals reported as ppm (mg/liter or mg/Kg)? Tritium reported in picocuries per liter with percent moisture for soil samples? Units consistent between QC samples and sample data	X		
3.2 Quantitation limit met for all samples	X		
3.3 Accuracy a) Laboratory control samples accuracy reported and met for all samples	X		
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique	N/A		
c) Matrix spike recovery data reported and met	N/A		
3.4 Precision a) Replicate sample precision reported and met for all inorganic and radiochemistry samples	N/A		
b) Matrix spike duplicate RPD data reported and met for all organic samples	N/A		
3.5 Blank data a) Method or reagent blank data reported and met for all samples	X		
b) Sampling blank (e.g., field, trip, and equipment) data reported and met	N/A		
3.6 Contractual qualifiers provided: "J"- estimated quantity; "B"-analyte found in method blank above the MDL for organic or above the PQL for inorganic; "U"- analyte undetected (results are below the MDL, IDL, or MDA (radiochemical)); "H"-analysis done beyond the holding time	X		
3.7 Narrative addresses planchet flaming for gross alpha/beta	N/A		
3.8 Narrative included, correct, and complete	X		
3.9 Second column confirmation data provided for methods 8330 (high explosives) and 8082 (pesticides/PCBs)	N/A		

Contract Verification Review (Continued)

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	N/A		
b) Continuing calibration provided	N/A		
c) Instrument run logs provided	N/A		
4.3 Inorganics (metals) a) Initial calibration provided	N/A		
b) Continuing calibration provided	N/A		
c) ICP interference check sample data provided	N/A		
d) ICP serial dilution provided	N/A		
e) Instrument run logs provided	N/A		
4.4 Radiochemistry a) Instrument run logs provided	N/A		

Contract Verification Review (Concluded)

5.0 Problem Resolution

Summarize the findings in the table below. List only samples/fractions for which deficiencies have been noted.

Sample/Fraction No.	Analysis	Problems/Comments/Resolutions

Were deficiencies unresolved? Yes (No)

Based on the review, this data package is complete. (Yes) No

If no, provide: nonconformance report or correction request number _____ and date correction request was submitted:_____

Reviewed by: W. Palencia Date: 9-25-2003 Closed by:_____ Date:_____

RECORDS CENTER CODE: _____

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS-NFA
PROJECT/TASK: 7223_02.02.01
SNL TASK LEADER: Collins
ORG/MS/CF0#: 6133/1087/CF023-03
SMO PROJECT LEAD: Palencia
SAMPLE SHIP DATE: 9/10/2003

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD	EDD ON Q	Cust CD	RC CD
606759	STCA	E3I150169		9/24/2003	X	X		

DATA PACKAGE TAT:		RUSH	X	NORMAL
CORRECTIONS REQUESTED BY/DATE:				
PROBLEM #/DATE CORRECTION RECEIVED:				
CVR COMPLETED BY/DATE:	W. Palencia		9-25-03	
FINAL TRANSMITTED TO/DATE:	Sanders		9-25-03	
SENT TO VALIDATION BY/DATE:	J. Conn		09/25/03	
REVISIONS REQUESTED/REVISIONS RECEIVED (DATE):				
VALIDATION COMPLETED BY/DATE:				
COPY TO WM BY/DATE:				
CD REQUESTED BY/DATE	J. Conn		09/25/03	
CD RECEIVED BY/DATE				
TO ERDMS OR RECORDS CENTER BY/DATE:				

COMMENTS:

ANNEX D
DSS Site 1092
Risk Assessment

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DSS SITE 1092: RISK ASSESSMENT REPORT

I. Site Description and History

Drain and Septic Systems (DSS) Site 1092, the Mobile Office (MO) 228-230 Septic System at Sandia National Laboratories/New Mexico (SNL/NM), is located in Technical Area-III on federally owned land controlled by Kirtland Air Force Base (KAFB) and permitted to the U.S. Department of Energy (DOE). The abandoned septic system consisted of a 3,000-gallon septic tank connected to a distribution box and a drainfield consisting of four 70-foot-long drain lines. Available information indicates that the MO 228-230 complex was constructed in 1988 (SNL/NM March 2003), and it is assumed that the septic system was also constructed at that time. By early 1991, the septic system discharges were routed to the City of Albuquerque sanitary sewer system (Jones June 1991). The old septic system line was disconnected and capped, and the system was abandoned in place concurrent with this change (Romero September 2003). The septic system was uncovered with a backhoe on December 2, 2003, and the septic tank was found to have been backfilled with native soil. In April 2004, the MO 228-230 complex was removed.

Environmental concern about DSS Site 1092 is based upon the potential for the release of constituents of concern (COCs) in effluent discharged to the environment via the septic system 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 west. The closest major drainage is Arroyo del Coyote, located approximately 5,000 feet northeast of the site. No springs or perennial surface-water bodies are located within 2 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). Surface-water runoff in the vicinity of the site is minor because the surface is flat or slopes slightly to the west. Infiltration of precipitation is almost nonexistent as virtually all of the moisture subsequently undergoes evapotranspiration. The estimates of evapotranspiration for the KAFB area range from 95 to 99 percent of the annual rainfall (SNL/NM March 1996). Most of the area immediately surrounding DSS Site 1092 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS Site 1092 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 unconfined conditions in essentially unconsolidated silts, sands, and gravels. The depth to groundwater is approximately 488 feet below ground surface (bgs). Groundwater flow is thought to be to the west in this area (SNL/NM March 2002). The nearest groundwater monitoring well is TAV-MW2 located approximately 700 feet northeast of the site. The nearest production wells are north of the site and include KAFB-4 and KAFB-11, which are approximately 2.8 and 3.8 miles away, respectively.

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 1092 was effluent discharged to the environment from the drainfield at this site.

Table 1
Summary of Sampling Performed to Meet DQOs

DSS Site 1092 Sampling Area	Potential COC Source	Number of Sampling Locations	Sample Density (samples/acre)	Sampling Location Rationale
Soil beneath the septic system drainfield	Effluent discharged to the environment from the drainfield	3	NA	Evaluate potential COC releases to the environment from effluent discharged from the drainfield

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 three borehole locations at DSS Site 1092. Drainfield sampling intervals started at 6 and 11 feet bgs in each of the three drainfield borings. 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.

Table 2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 1092

Sample Type	VOCs	SVOCs	PCBs	HE	RCRA Metals	Hexavalent Chromium	Cyanide	Gamma Spectroscopy Radionuclides	Gross Alpha/Beta
Confirmatory	6	6	6	6	6	6	6	6	6
Duplicates	0	0	0	0	0	0	0	0	0
EBs and TBs[a]	1	0	0	0	0	0	0	0	0
Total Samples	7	6	6	6	6	6	6	6	6
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.

The soil samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), high explosive (HE) compounds, 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).

Table 3
Summary of Data Quality Requirements for DSS Site 1092

Analytical Method[a]	Data Quality Level	GEL	RPSD
VOCs EPA Method 8260	Defensible	6	None
SVOCs EPA Method 8270	Defensible	6	None
PCBs EPA Method 8082	Defensible	6	None
HE Compounds EPA Method 8330	Defensible	6	None
RCRA Metals EPA Method 6000/7000	Defensible	6	None
Hexavalent Chromium EPA Method 7196A	Defensible	6	None
Total Cyanide EPA Method 9012A	Defensible	6	None
Gamma Spectroscopy Radionuclides EPA Method 901.1	Defensible	None	6
Gross Alpha/Beta Activity EPA Method 900.0	Defensible	6	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.
RCRA = Resource Conservation and Recovery Act.
RPSD = Radiation Protection Sample Diagnostics Laboratory.
SVOC = Semivolatile organic compound.
VOC = Volatile organic compound.

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 one trip blank (for VOCs only) 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," AOP [Administrative Operating Procedure] 00-03 (SNL/NM December 1999). The data validation reports are presented in the associated DSS Site 1092 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 request for a determination of CAC without controls. 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 1092 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 active 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 1092, 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.

III.2 Nature of Contamination

Both the nature of contamination and the potential for the degradation of COCs at DSS Site 1092 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, PCBs, HE compounds, 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 1092.

III.3 Rate of Contaminant Migration

The septic system at DSS Site 1092 was deactivated in 1991 when the MO 228-230 complex was connected to an extension of the City of Albuquerque sanitary sewer system. The migration rate of COCs that may have been introduced into the subsurface via the septic system at this site was therefore dependent upon the volume of aqueous effluent discharged to the environment from this system when it was operational. Any migration of COCs from this site after use of the septic system was discontinued has been predominantly dependent upon precipitation. However, it is highly unlikely that sufficient precipitation has fallen on the site to

reach the depth at which COCs may have been discharged to the subsurface from this system. Analytical data generated from the soil sampling conducted at the site are adequate to characterize the rate of COC migration at DSS Site 1092.

III.4 Extent of Contamination

Subsurface soil samples were collected from boreholes drilled at three locations beneath the effluent release area (drainfield) 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 6 and 11 feet bgs in the drainfield area. Sampling intervals started at the depths at which effluent discharged from the drainfield drain lines 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 1092 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 lists the nonradiological COCs and Table 5 lists the radiological COCs for the human health risk assessment at DSS Site 1092. All samples were collected from depths greater than 5 feet bgs; 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.

Table 4
Nonradiological COCs for Human Health Risk Assessment at DSS Site 1092 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	3.6 J	4.4	Yes	44[c]	–	**Yes**
Barium	137	214	Yes	170[d]	–	**Yes**
Cadmium	0.516	0.9	Yes	64[c]	–	**Yes**
Chromium, total	30.4	15.9	**No**	16[c]	–	No
Chromium VI	0.0272[e]	1	Yes	16[c]	–	No
Cyanide	0.143 J	NC	**Unknown**	NC	–	**Unknown**
Lead	6.49	11.8	Yes	49[c]	–	**Yes**
Mercury	0.049	<0.1	Yes	5,500[c]	–	**Yes**
Selenium	0.402 J	<1	Yes	800[f]	–	**Yes**
Silver	21.5	<1	**No**	0.5[c]	–	No
Organic						
Acetone	0.00438 J	NA	**NA**	0.69[g]	0.24[g]	No
2-Butanone	0.0502	NA	**NA**	1[g]	0.29[g]	No
PCBs, Total[h]	0.026	NA	**NA**	31,200[c]	6.72[c]	**Yes**
Pyrene	0.134 J	NA	**NA**	36,300[c]	5.32[i]	**Yes**

Note: **Bold** indicates the COCs that exceed the background screening values and/or are bioaccumulators.

[a]Dinwiddie September 1997, Southwest Area Supergroup.

[b]NMED March 1998.

[c]Yanicak March 1997.

[d]Neumann 1976.

[e]Parameter was not detected. Concentration is one-half the detection limit.

[f]Callahan et al. 1979.

[g]Howard 1990.

[h]Aroclor-1260 in the sample with the highest PCB concentrations.

[i]Micromedex 1998.

Table 4 (Concluded)
Nonradiological COCs for Human Health Risk Assessment at DSS Site 1092 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 1092 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 (0.0309)	0.079	Yes	3,000[d]	**Yes**
Th-232	0.842	1.01	Yes	3,000[d]	**Yes**
U-235	**ND (0.228)**	0.16	**No**	900[d]	**Yes**
U-238	ND (0.747)	1.4	Yes	900[d]	**Yes**

Note: **Bold** indicates COCs that exceed the background screening values and/or are bioaccumulators.
[a]Value listed is the greater of either the maximum detection or the highest MDA.
[b]Dinwiddie September 1997, Southwest Area Supergroup.
[c]NMED March 1998.
[d]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.

V. Fate and Transport

The primary releases of COCs at DSS Site 1092 were to the subsurface soil resulting from the discharge of effluents from the MO 228-230 complex septic system. 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 seepage pits are no longer active, additional infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at DSS Site 1092, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 488 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 1092 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 1092 are limited to VOCs, SVOCs, 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 acetone and 2-butanone through volatilization is expected to be minimal.

Table 6 summarizes the fate and transport processes that can occur at DSS Site 1092. 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 1092

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 estimated incremental 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 1092. 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 1092 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 COCs as well. The dermal pathway is included for the nonradiological COCs because of the potential for the receptor to be exposed to contaminated soil. No water pathways to the groundwater are considered. Depth to groundwater at DSS Site 1092 is approximately 488 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 1092.

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.

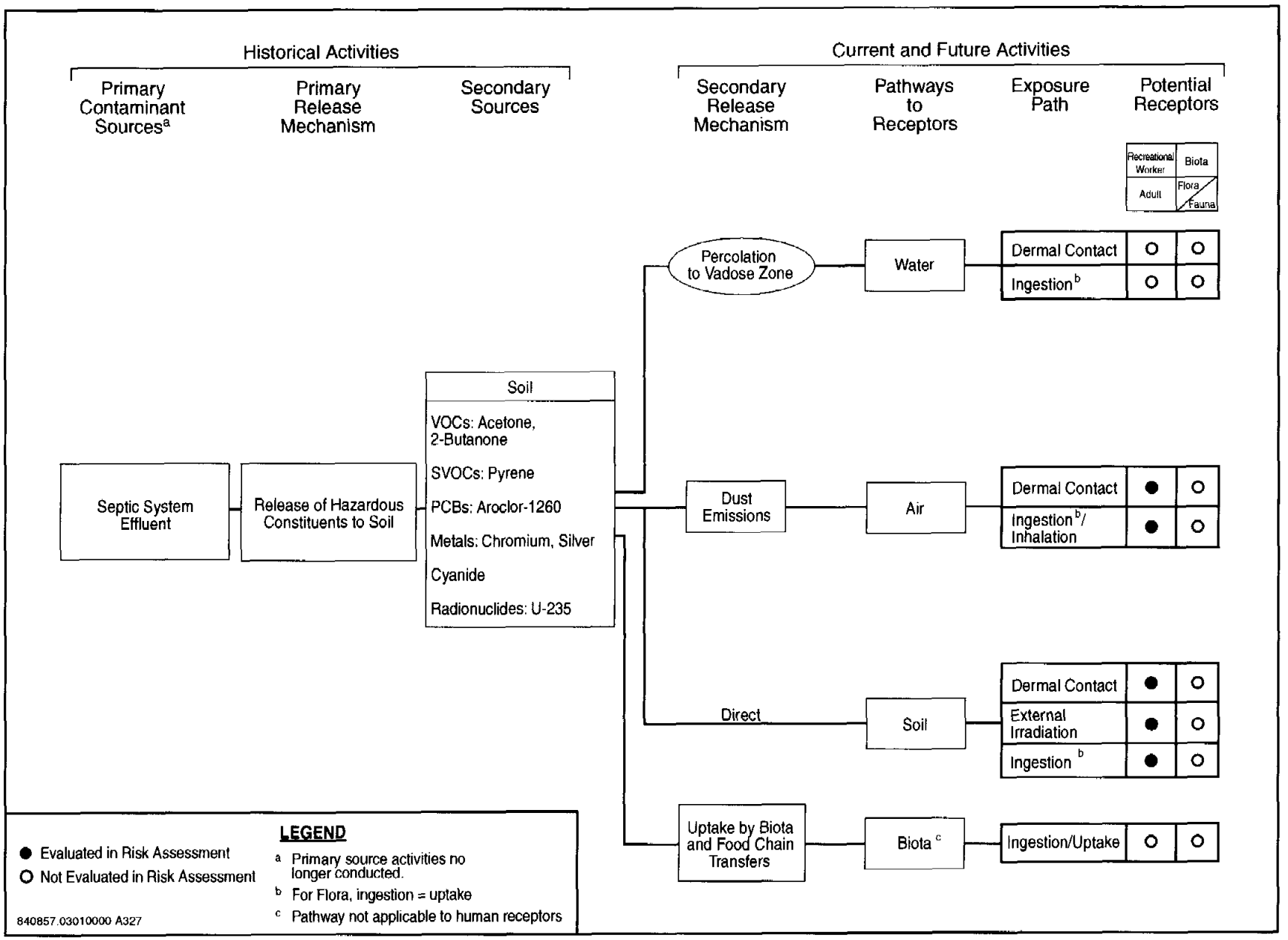

Figure 1

Conceptual Site Model Flow Diagram for DSS Site 1092, MO 228-230 Septic System

VI.4.2 Results

Tables 4 and 5 show the DSS Site 1092 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 metals were measured at concentrations greater than the background screening values. One constituent (cyanide) does not have a quantified background screening concentration; therefore it is unknown whether this COC exceeds background. Four constituents are organic compounds that do not have corresponding background screening values.

The maximum concentration value for total PCBs (Aroclor-1260 in the sample with the highest PCB concentrations) is 0.026 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) had detections and MDAs 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), the Technical Background Document for Development of Soil Screening Levels (NMED February 2004), and the EPA Region 6 (EPA 2004b) and Risk Assessment Information System (ORNL 2003) electronic databases. 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 1092 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								
Chromium, total	1.5E+0[c]	L	–	–	–	–	D	0.01[d]
Cyanide	2E-2[c]	M	–	–	–	–	D	0.1[d]
Silver	5E-3[c]	L	–	–	–	–	D	0.01[d]
Organic								
Acetone	1E-1[c]	L	1E-1[e]	–	–	–	D	0.01[f]
2-Butanone	6E-1[c]	L	2.9E-1[c]	L	–	–	D	0.1[d]
Pyrene	3E-2[c]	L	3E-2[e]	–	–	–	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):
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).
[e]Toxicological parameter values from EPA Region 6 (EPA 2004b).
[f]Toxicological parameter values from Risk Assessment Information System (ORNL 2003).

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 1092 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 estimated incremental 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 0.00 for the DSS Site 1092 nonradiological COCs and no quantified estimated excess cancer risk 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 0.00 and no quantified estimated excess cancer risk for the DSS Site 1092 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 9.8E-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 1092 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is 8.2E-8.

For the nonradiological COCs under the residential land-use scenario, the HI is 0.06 with no quantified estimated excess cancer risk (Table 9). The numbers in the table include exposure from soil ingestion, dermal contact, and dust and volatile inhalation. Although the EPA (1991) generally recommends 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 0.00 and no quantified estimated excess cancer risk for the DSS Site 1092 associated background constituents under the residential land-use scenario.

For the radiological COC, the incremental TEDE for the residential land-use scenario is 2.5E-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 1092 for the residential land-use scenario is well below this guideline. Consequently, DSS Site 1092 is eligible for unrestricted radiological release as the residential land-use scenario resulted in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is 2.4E-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.

For the nonradiological COCs under the industrial land-use scenario, the HI is 0.00 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). There is no quantified estimated excess cancer risk. NMED guidance states that cumulative excess lifetime cancer

Table 9
Risk Assessment Values for DSS Site 1092 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					
Chromium, total	30.4	0.00	–	0.00	–
Cyanide	0.143 J	0.00	–	0.00	–
Silver	21.5	0.00	–	0.06	–
Organic					
Acetone	0.00438 J	0.00	–	0.00	–
2-Butanone	0.0502	0.00	–	0.00	–
Pyrene	0.134 J	0.00	–	0.00	–
Total		0.00	–	0.06	–

[a]EPA 1989.
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 1092 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
Chromium, total	15.9	0.00	–	0.00	–
Cyanide	NC	–	–	–	–
Silver	<1	–	–	–	–
Total		0.00	–	0.00	–

[a]Dinwiddie September 1997, Southwest 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.

risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also determines risks considering background concentrations of the potential nonradiological COCs for both the industrial and residential land-use scenarios. Assuming the industrial land-use scenario, the HI is 0.0 and there is no quantified excess cancer risk for nonradiological COCs. 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 there is no quantified estimated incremental excess cancer risk 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 9.8E-3 mrem/yr, which is significantly lower than EPA's numerical guideline of 15 mrem/yr. The estimated incremental excess cancer risk is 8.2E-8.

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.06, which is below numerical guidance. There is no quantified estimated excess cancer risk. NMED guidance states that cumulative excess lifetime cancer risk must be less than 1E-5 (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. The incremental HI is 0.06 and there is no quantified estimated incremental cancer risk 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 2.5E-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 excess cancer risk is 2.4E-7.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 1092 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 effluent release points 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 1092.

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), EPA Region 6 (EPA 2004b), Technical Background Document for Development of Soil Screening Levels (NMED February 2004), and the Risk Assessment Information System (ORNL 2003). 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 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 both the industrial and residential land-use scenarios 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 1092 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 (0.00) is lower than the accepted numerical guidance from the EPA. There is no quantified estimated excess cancer risk; 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 there is no quantified estimated incremental excess cancer risk 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 (0.06) is below the accepted numerical guidance from the EPA. There is no quantified estimated excess cancer risk. Thus, excess cancer risk is below the acceptable risk value provided by the NMED

for a residential land-use scenario (Bearzi January 2001). The incremental HI is 0.06 and there is no quantified estimated incremental excess cancer risk 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 9.8E-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 estimated incremental cancer risk value is 8.2E-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 2.5E-2 mrem/yr with an associated risk of 2.4E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1092 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 1092, MO 228-230 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	0.00E+0	8.2E-8	8.2E-8
Residential	0.00E+0	2.4E-7	2.4E-7

DSS = Drain and Septic Systems.
MO = Mobile Office.

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 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 1092. 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 1092 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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DOE and USAF, see U.S. Department of Energy and U.S. Air Force.

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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

cc w/o enclosure:
D. Pepe, NMED-OB
J. Estrada, NNSA/SSO, MS 0184
F. Nimick, SNL, MS 1089
R. E. Fate, SNL, MS 1089
M. J. Davis, SNL, MS 1089
D. Stockham, SNL, MS 1087
B. Langkopf, SNL, MS 1087
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 #
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-4-S	059847-002	13-SEP-02	SOIL	HE-8330	GEL	202056
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-9-S	059848-002	13-SEP-02	SOIL	HE-8330	GEL	202056
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-4-S	059841-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-9-S	059842-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-DU	059845-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-S	059843-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-9-S	059844-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-4-S	059847-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-9-S	059848-001	13-SEP-02	SOIL	VOA-8260	GEL	202140
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-4-S	059841-002	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-9-S	059842-002	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-DU	059846-001	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-S	059843-002	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-9-S	059844-002	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-4-S	059847-002	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-9-S	059848-002	13-SEP-02	SOIL	TOTAL-CN	GEL	202749
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-4-S	059841-002	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-9-S	059842-002	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-DU	059846-001	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-S	059843-002	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-9-S	059844-002	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-4-S	059847-002	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-9-S	059848-002	13-SEP-02	SOIL	GROSS-A/B	GEL	203325
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-TB	059849-001	13-SEP-02	AQUEOUS	VOA-8260	GEL	203595
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-4-S	059841-002	13-SEP-02	SOIL	Cr+6	GEL	203661
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-9-S	059842-002	13-SEP-02	SOIL	Cr+6	GEL	203661
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-DU	059846-001	13-SEP-02	SOIL	Cr+6	GEL	203661
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1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-9-S	059844-002	13-SEP-02	SOIL	Cr+6	GEL	203661
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-4-S	059847-002	13-SEP-02	SOIL	Cr+6	GEL	203661
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-9-S	059848-002	13-SEP-02	SOIL	Cr+6	GEL	203661
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-4-S	059841-002	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH1-9-S	059842-002	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-DU	059846-001	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-4-S	059843-002	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH2-9-S	059844-002	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-4-S	059847-002	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1090	Bldg. 6721 SS	Volume 4	605673	6721/1090-DF1-BH3-9-S	059848-002	13-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1092	MO-228-230 SS	Volume 7	605733	MO 228-230/1092-DF1-BH1-11-S	059821-003	09-SEP-02	SOIL	GAMMA SPEC	RPSD	201314
1092	MO-228-230 SS	Volume 7	605733	MO 228-230/1092-DF1-BH1-6-S	059820-003	09-SEP-02	SOIL	GAMMA SPEC	RPSD	201314
1092	MO-228-230 SS	Volume 7	605733	MO 228-230/1092-DF1-BH2-11-S	059823-003	09-SEP-02	SOIL	GAMMA SPEC	RPSD	201314
1092	MO-228-230 SS	Volume 7	605733	MO 228-230/1092-DF1-BH2-6-S	059822-003	09-SEP-02	SOIL	GAMMA SPEC	RPSD	201314

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

DRAIN AND SEPTIC SYSTEMS PROJECT QC MASTER INDEX

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1092	MO-228-230 SS	Volume 7	605733	MO 228-230/1092-DF1-BH3-11-S	059825-003	09-SEP-02	SOIL	GAMMA SPEC	RPSD	201314
1092	MO-228-230 SS	Volume 7	605733	MO 228-230/1092-DF1-BH3-6-S	059824-003	09-SEP-02	SOIL	GAMMA SPEC	RPSD	201314
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	PCB-8082	GEL	201940
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	PCB-8082	GEL	201940
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	PCB-8082	GEL	201940
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	PCB-8082	GEL	201940
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	PCB-8082	GEL	201940
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	PCB-8082	GEL	201940
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	BNA-8270	GEL	201961
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	BNA-8270	GEL	201961
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	BNA-8270	GEL	201961
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	BNA-8270	GEL	201961
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	BNA-8270	GEL	201961
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	BNA-8270	GEL	201961
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	HE-8330	GEL	202056
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	HE-8330	GEL	202056
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	HE-8330	GEL	202056
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	HE-8330	GEL	202056
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	HE-8330	GEL	202056
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	HE-8330	GEL	202056
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-001	09-SEP-02	SOIL	VOA-8260	GEL	202140
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-001	09-SEP-02	SOIL	VOA-8260	GEL	202140
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-001	09-SEP-02	SOIL	VOA-8260	GEL	202140
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-001	09-SEP-02	SOIL	VOA-8260	GEL	202140
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-001	09-SEP-02	SOIL	VOA-8260	GEL	202140
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-001	09-SEP-02	SOIL	VOA-8260	GEL	202140
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	TOTAL-CN	GEL	202749
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	TOTAL-CN	GEL	202749
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	TOTAL-CN	GEL	202749
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	TOTAL-CN	GEL	202749
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	TOTAL-CN	GEL	202749
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	TOTAL-CN	GEL	202749
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	GROSS-A/B	GEL	203325
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	GROSS-A/B	GEL	203325
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	GROSS-A/B	GEL	203325
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	GROSS-A/B	GEL	203325
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	GROSS-A/B	GEL	203325
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	GROSS-A/B	GEL	203325
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	Cr+6	GEL	203661
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	Cr+6	GEL	203661
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	Cr+6	GEL	203661
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	Cr+6	GEL	203661

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

DRAIN AND SEPTIC SYSTEMS PROJECT QC MASTER INDEX

Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	Cr+6	GEL	203661
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	Cr+6	GEL	203661
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-11-S	059821-002	09-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH1-6-S	059820-002	09-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-11-S	059823-002	09-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH2-6-S	059822-002	09-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-11-S	059825-002	09-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1092	MO-228-230 SS	Volume 4	605671	MO 228-230/1092-DF1-BH3-6-S	059824-002	09-SEP-02	SOIL	RCRA METALS	GEL	202762, 202730
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-EB	041503-006	01-JUL-98	AQUEOUS	BNA-8270	GEL	125483
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH1-10-S	041488-002	01-JUL-98	SOIL	BNA-8270	GEL	125542
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH1-5-S	041487-002	01-JUL-98	SOIL	BNA-8270	GEL	125542
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH2-5-S	041489-002	01-JUL-98	SOIL	BNA-8270	GEL	125542
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH3-10-S	041492-002	01-JUL-98	SOIL	BNA-8270	GEL	125542
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH3-5-S	041491-002	01-JUL-98	SOIL	BNA-8270	GEL	125542
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-TB	041505-001	01-JUL-98	AQUEOUS	VOA-8260	GEL	125865
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH1-10-S	041488-002	01-JUL-98	SOIL	GROSS-A/B	GEL	125899
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH1-5-S	041487-002	01-JUL-98	SOIL	GROSS-A/B	GEL	125899
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH2-5-S	041489-002	01-JUL-98	SOIL	GROSS-A/B	GEL	125899
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH3-10-S	041492-002	01-JUL-98	SOIL	GROSS-A/B	GEL	125899
1093	Bldg. 6584 W. SS	Volume 2	600441	ER-1295-W6584-DF1-BH3-5-S	041491-002	01-JUL-98	SOIL	GROSS-A/B	GEL	125899
1093	Bldg. 6584 W. SS	Volume 2	600451	ER-1295-W6584-DF1-BH4-10-S	041490-002	13-JUL-98	SOIL	BNA-8270	GEL	126124
1093	Bldg. 6584 W. SS	Volume 2	600451	ER-1295-W6584-DF1-BH4-10-S	041490-002	13-JUL-98	SOIL	GROSS-A/B	GEL	126137
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-10-S	048404-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-5-S	048403-002	19-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-DU	048407-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-MSDS	048408-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-S	048406-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-5-S	048405-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-10-S	048410-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-5-S	048409-002	20-AUG-99	SOIL	PCB-8082	GEL	157066
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-10-S	048404-001	20-AUG-99	SOIL	VOA-8260	GEL	157173
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-5-S	048403-001	19-AUG-99	SOIL	VOA-8260	GEL	157173
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-S	048406-001	20-AUG-99	SOIL	VOA-8260	GEL	157173
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-5-S	048405-001	20-AUG-99	SOIL	VOA-8260	GEL	157173
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-10-S	048410-001	20-AUG-99	SOIL	VOA-8260	GEL	157173
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH3-5-S	048409-001	20-AUG-99	SOIL	VOA-8260	GEL	157173
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-10-S	048404-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157179
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH1-5-S	048403-002	19-AUG-99	SOIL	TOTAL-CN	GEL	157179
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-5-S	048405-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157179
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-DU	048407-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157237
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-MSDS	048408-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157237
1093	Bldg. 6584 W. SS	Volume 2	602763	B6584W-DF1-BH2-10-S	048406-002	20-AUG-99	SOIL	TOTAL-CN	GEL	157237

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

Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

April 2005

Volume 4 of 7
General Engineering Laboratories, Inc. (GEL) QC Data

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

GEL QC CROSS REFERENCE

COC 605671

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1092	MO-228-230 SS	059820	001	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	VOA-8260	202140
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	BNA-8270	201961
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	Cr+6	203661
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	GROSS-A/B	203325
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	HE-8330	202056
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	PCB-8082	201940
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	RCRA METALS	202762, 202730
1092	MO-228-230 SS	059820	002	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	TOTAL-CN	202749
1092	MO-228-230 SS	059821	001	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	VOA-8260	202140
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	BNA-8270	201961
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	Cr+6	203661
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	GROSS-A/B	203325
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	HE-8330	202056
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	PCB-8082	201940
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	RCRA METALS	202762, 202730
1092	MO-228-230 SS	059821	002	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	TOTAL-CN	202749
1092	MO-228-230 SS	059822	001	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	VOA-8260	202140
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	BNA-8270	201961
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	Cr+6	203661
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	GROSS-A/B	203325
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	HE-8330	202056
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	PCB-8082	201940
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	RCRA METALS	202762, 202730
1092	MO-228-230 SS	059822	002	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	TOTAL-CN	202749
1092	MO-228-230 SS	059823	001	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	VOA-8260	202140
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	BNA-8270	201961
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	Cr+6	203661
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	GROSS-A/B	203325
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	HE-8330	202056

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	PCB-8082	201940
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	RCRA METALS	202762, 202730
1092	MO-228-230 SS	059823	002	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	TOTAL-CN	202749
1092	MO-228-230 SS	059824	001	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	VOA-8260	202140
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	BNA-8270	201961
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	Cr+6	203661
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	GROSS-A/B	203325
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	HE-8330	202056
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	PCB-8082	201940
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	RCRA METALS	202762, 202730
1092	MO-228-230 SS	059824	002	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	TOTAL-CN	202749
1092	MO-228-230 SS	059825	001	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	VOA-8260	202140
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	BNA-8270	201961
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	Cr+6	203661
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	GROSS-A/B	203325
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	HE-8330	202056
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	PCB-8082	201940
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	RCRA METALS	202762, 202730
1092	MO-228-230 SS	059825	002	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	TOTAL-CN	202749

Sandia National Laboratories

Drain and Septic Systems Project Quality Control (QC) Report

April 2005

Volume 7 of 7
Radiation Protection & Sample Diagnostics (RPSD)
Laboratory Data

Environmental
Restoration
Project

United States Department of Energy
Sandia Site Office

RPSD QC CROSS REFERENCE

COC 605733
BATCH NO. 201314

Site #	Site Name	SAMPLE#	F#	ER SAMPLE ID	SAMPLE DATE	MATRIX	LAB TEST
1108	Bldg. 6531 SPs	059799	003	6531/1108-SP1-BH1-10-S	03-SEP-02	SOIL	GAMMA SPEC
1108	Bldg. 6531 SPs	059805	003	6531/1108-SP1-BH1-15-S	03-SEP-02	SOIL	GAMMA SPEC
1108	Bldg. 6531 SPs	059806	003	6531/1108-SP2-BH1-10-S	03-SEP-02	SOIL	GAMMA SPEC
1108	Bldg. 6531 SPs	059807	003	6531/1108-SP2-BH1-15-S	03-SEP-02	SOIL	GAMMA SPEC
1010	Bldg. 6536 SS	059808	003	6536/1010-SP1-BH1-25-S	04-SEP-02	SOIL	GAMMA SPEC
1010	Bldg. 6536 SS	059809	003	6536/1010-SP1-BH1-30-S	04-SEP-02	SOIL	GAMMA SPEC
1010	Bldg. 6536 SS	059810	003	6536/1010-SP2-BH1-15-S	04-SEP-02	SOIL	GAMMA SPEC
1010	Bldg. 6536 SS	059811	003	6536/1010-SP2-BH1-19-S	04-SEP-02	SOIL	GAMMA SPEC
1027	Bldg. 6530 SS	059813	003	6530/1027-SP1-BH1-20-S	18-SEP-02	SOIL	GAMMA SPEC
1027	Bldg. 6530 SS	059814	003	6530/1027-SP1-BH1-25-S	18-SEP-02	SOIL	GAMMA SPEC
1027	Bldg. 6530 SS	059815	003	6530/1027-SP2-BH1-15-S	19-SEP-02	SOIL	GAMMA SPEC
1027	Bldg. 6530 SS	059816	003	6530/1027-SP2-BH1-20-S	19-SEP-02	SOIL	GAMMA SPEC
1092	MO-228-230 SS	059820	003	MO 228-230/1092-DF1-BH1-6-S	09-SEP-02	SOIL	GAMMA SPEC
1092	MO-228-230 SS	059821	003	MO 228-230/1092-DF1-BH1-11-S	09-SEP-02	SOIL	GAMMA SPEC
1092	MO-228-230 SS	059822	003	MO 228-230/1092-DF1-BH2-6-S	09-SEP-02	SOIL	GAMMA SPEC
1092	MO-228-230 SS	059823	003	MO 228-230/1092-DF1-BH2-11-S	09-SEP-02	SOIL	GAMMA SPEC
1092	MO-228-230 SS	059824	003	MO 228-230/1092-DF1-BH3-6-S	09-SEP-02	SOIL	GAMMA SPEC
1092	MO-228-230 SS	059825	003	MO 228-230/1092-DF1-BH3-11-S	09-SEP-02	SOIL	GAMMA SPEC

CASE NARRATIVE
for
Sandia National Laboratories
ARCOC-605671
SDG#67158A
ARCOC-605672
SDG#67158B
ARCOC-605673
SDG#67158C
Case No. 7223.02.03.02

October 14, 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 thirty-eight soil samples and eleven aqueous samples on September 9, 10, 12, and 13, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on September 17, 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 3.0, 4.0, and 5.0°C, as measured from the temperature control bottles.

Sample ID 059826-006 was received out of holding. This was the equipment blank for Cr6. Client was contacted regarding the issue. 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
605671	67158A	12	09/09/02	09/17/02
605672	67158B	22	09/10/02,09/12/02	09/17/02
605673	67158C	15	09/13/02	09/17/02

The laboratory received the following samples:

Laboratory ID	Description
ARCOC-605671:	
67158001	059820-001
67158002	059821-001
67158003	059822-001
67158004	059823-001
67158005	059824-001
67158006	059825-001
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
ARCOC-605672:	
67158007	059828-001
67158008	059829-001
67158009	059836-001
67158010	059837-001
67158011	059838-001
67158012	059839-001
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002
67158031	059839-002
67169001	059827-001
67169002	059826-001
67169003	059840-001
67169005	059826-002
67169006	059826-003

67169007	059826-004
67169008	059826-005
67169009	059826-006
67169010	059826-007
67169011	059826-008

ARCOC-605673:

67158013	059841-001
67158014	059842-001
67158015	059843-001
67158016	059844-001
67158017	059845-001
67158018	059847-001
67158019	059848-001
67158032	059841-002
67158033	059842-002
67158034	059843-002
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
67169004	059849-001

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

GENERAL ENGINEERING LABORATORIES
P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29407
(843) 556-8171 • Fax (843) 766-1178

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GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG# 67158-1

Method/Analysis Information

Procedure:	Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method:	SW846 8260B
Prep Method:	SW846 5030B
Analytical Batch Number:	203595

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
67169001	059827-001
67169002	059826-001
67169003	059840-001
67169004	059849-001
1200305537	VBLK01 (Blank)
1200305538	VBLK01LCS (Laboratory Control Sample)

Preparation/Analytical Method Verification

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-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.

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Initial Calibration
All the initial calibration requirements were met.

CCV Requirements
All the calibration verification standard (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.

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

QC Sample Designation
Matrix spike analyses were analyzed on a sample of similar matrix in SNLS sample delivery group order, # 67354.

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.

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.

TIC Comment
Tentatively identified compounds (TIC) were not required for this sample delivery group/work order.

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

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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: Nicol Mulloy Date: 10/15/02

QC Summary

Report Date: September 30, 2002

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

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 203595										
QC1200305538 LCS										
1,1-Dichloroethylene	50.0			45.0	ug/L		90	(78%-140%)	MAP	09/24/02 06:58
Benzene	50.0			45.8	ug/L		92	(78%-119%)		
Chlorobenzene	50.0			49.4	ug/L		99	(82%-120%)		
Toluene	50.0			50.3	ug/L		101	(68%-133%)		
Trichloroethylene	50.0			47.1	ug/L		94	(80%-123%)		
**Bromofluorobenzene	50.0			64.8	ug/L		130	(67%-136%)		
**Dibromofluoromethane	50.0			60.5	ug/L		121	(62%-148%)		
**Toluene-d8	50.0			58.7	ug/L		117	(58%-139%)		
QC1200306542 LCS										
1,1-Dichloroethylene	50.0			49.6	ug/L		99	(78%-140%)		09/25/02 10:00
Benzene	50.0			46.9	ug/L		94	(78%-119%)		
Chlorobenzene	50.0			50.9	ug/L		102	(82%-120%)		
Toluene	50.0			52.0	ug/L		104	(68%-133%)		
Trichloroethylene	50.0			50.7	ug/L		101	(80%-123%)		
**Bromofluorobenzene	50.0			64.2	ug/L		128	(67%-136%)		
**Dibromofluoromethane	50.0			61.4	ug/L		123	(62%-148%)		
**Toluene-d8	50.0			57.7	ug/L		115	(58%-139%)		
QC1200307213 LCS										
1,1-Dichloroethylene	50.0			44.0	ug/L		88	(78%-140%)		09/24/02 18:08
Benzene	50.0			45.4	ug/L		91	(78%-119%)		
Chlorobenzene	50.0			47.2	ug/L		94	(82%-120%)		
Toluene	50.0			46.7	ug/L		93	(68%-133%)		
Trichloroethylene	50.0			46.9	ug/L		94	(80%-123%)		
**Bromofluorobenzene	50.0			62.7	ug/L		125	(67%-136%)		
**Dibromofluoromethane	50.0			63.4	ug/L		127	(62%-148%)		
**Toluene-d8	50.0			56.8	ug/L		114	(58%-139%)		
QC1200305537 MB										
1,1,1-Trichloroethane			U	ND	ug/L					09/24/02 08:17
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					

QC Summary

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch: 203595										
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					
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			63.9	ug/L		128	(67%-136%)		
Dibromofluoromethane	50.0			63.1	ug/L		126	(62%-148%)		
Toluene-d8	50.0			56.8	ug/L		114	(58%-139%)		
QC1200206541 MB										
1,1,1-Trichloroethane			U	ND	ug/L					09/25/02 11:19
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					
Styrene			U	ND	ug/L					

QC Summary

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 203595											
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			61.9	ug/L		124	(67%-136%)			
**Dibromofluoromethane	50.0			60.7	ug/L		121	(62%-148%)			
**Toluene-d8	50.0			56.3	ug/L		113	(58%-139%)			
QC1200307212 MB											
1,1,1-Trichloroethane			U	ND	ug/L					09/24/02	19:27
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						
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			60.6	ug/L		121	(67%-136%)			

QC Summary

Workorder: 67169

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal											
Batch 203595											
**Dibromofluoromethane	50.0				62.2	ug/L		124	(62%-148%)		
**Toluene-d8	50.0				56.8	ug/L		114	(58%-139%)		
QC1200305539 67354001 PS											
1,1-Dichloroethylene	50.0	U	ND		43.1	ug/L		86	(67%-129%)		09/25/02 15:07
Benzene	50.0	U	ND		44.0	ug/L		88	(74%-112%)		
Chlorobenzene	50.0	U	ND		45.8	ug/L		92	(77%-113%)		
Toluene	50.0	U	ND		46.1	ug/L		92	(74%-109%)		
Trichloroethylene	50.0	U	ND		44.8	ug/L		90	(71%-118%)		
**Bromofluorobenzene	50.0		61.5		64.1	ug/L		128	(67%-136%)		
**Dibromofluoromethane	50.0		61.2		64.1	ug/L		128	(62%-148%)		
**Toluene-d8	50.0		56.6		59.1	ug/L		118	(58%-139%)		
QC1200305540 67354001 PSD											
1,1-Dichloroethylene	50.0	U	ND		40.5	ug/L	6	81	(0%-11%)		09/25/02 15:33
Benzene	50.0	U	ND		42.0	ug/L	5	84	(0%-8%)		
Chlorobenzene	50.0	U	ND		44.4	ug/L	3	89	(0%-11%)		
Toluene	50.0	U	ND		44.1	ug/L	5	88	(0%-12%)		
Trichloroethylene	50.0	U	ND		42.9	ug/L	4	86	(0%-9%)		
**Bromofluorobenzene	50.0		61.5		65.5	ug/L		131	(67%-136%)		
**Dibromofluoromethane	50.0		61.2		63.3	ug/L		127	(62%-148%)		
**Toluene-d8	50.0		56.6		59.2	ug/L		118	(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 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.

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GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG# 67158

Method/Analysis Information

Procedure:	Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method:	SW846 8260A
Prep Method:	SW846 5030
Analytical Batch Number:	202140
Prep Batch Number:	202138

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
67158001	059820-001
67158002	059821-001
67158003	059822-001
67158004	059823-001
67158005	059824-001
67158006	059825-001
67158007	059828-001
67158008	059829-001
67158009	059836-001
67158010	059837-001
67158011	059838-001
67158012	059839-001
67158013	059841-001

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67158014	059842-001
67158015	059843-001
67158016	059844-001
67158017	059845-001
67158018	059847-001
67158019	059848-001
1200301914	VBLK01 (Blank)
1200301915	VBLK01LCS (Laboratory Control Sample)
1200301916	059820-001MS (Matrix Spike)
1200301917	059820-001MSD (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 calibration verification standard (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.

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

QC Sample Designation
The following sample was designated for matrix spike analysis:

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67158001 059820 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.

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TIC Comment
Tentatively identified compounds (TIC) were not required for this sample delivery group/work order.

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: Neal Mellon Date: 10/15/02

QC Summary

Report Date: October 10, 2002

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

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal										
Batch 202140										
QC1200301915 LCS										
1,1-Dichloroethylene	50.0			45.8	ug/kg		92	(75%-134%)	TLW	09/20/02 21:06
Benzene	50.0			47.3	ug/kg		95	(80%-120%)		
Chlorobenzene	50.0			49.0	ug/kg		98	(82%-118%)		
Toluene	50.0			47.5	ug/kg		95	(74%-115%)		
Trichloroethylene	50.0			46.1	ug/kg		92	(80%-119%)		
**Bromofluorobenzene	50.0			56.1	ug/kg		112	(69%-138%)		
**Dibromofluoromethane	50.0			62.7	ug/kg		125	(67%-137%)		
**Toluene-d8	50.0			61.0	ug/kg		122	(67%-139%)		
QC1200301914 MB										
1,1,1-Trichloroethane			U	ND	ug/kg					09/20/02 22:02
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					
,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: 67158

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal											
Batch 202140											
trans-1,2-Dichloroethylene				U	ND	ug/kg					
trans-1,3-Dichloropropylene				U	ND	ug/kg					
**Bromofluorobenzene	50.0				59.0	ug/kg		118	(69%-138%)		
**Dibromofluoromethane	50.0				62.8	ug/kg		126	(67%-137%)		
**Toluene-d8	50.0				64.4	ug/kg		129	(67%-139%)		
QC1200301916 67158001 PS											
1,1-Dichloroethylene	50.0	U	ND		43.7	ug/L		87	(55%-128%)		09/21/02 07:12
Benzene	50.0	U	ND		41.5	ug/L		83	(53%-118%)		
Chlorobenzene	50.0	U	ND		39.2	ug/L		78	(53%-116%)		
Toluene	50.0	U	ND		39.8	ug/L		80	(56%-113%)		
Trichloroethylene	50.0	U	ND		44.7	ug/L		89	(54%-119%)		
**Bromofluorobenzene	50.0		60.0		58.0	ug/L		116	(69%-138%)		
**Dibromofluoromethane	50.0		63.5		67.3	ug/L		135	(67%-137%)		
**Toluene-d8	50.0		62.0		61.0	ug/L		122	(67%-139%)		
QC1200301917 67158001 PSD											
1,1-Dichloroethylene	50.0	U	ND		41.6	ug/L	5	83	(0%-21%)		09/21/02 07:40
Benzene	50.0	U	ND		42.0	ug/L	1	84	(0%-17%)		
Chlorobenzene	50.0	U	ND		39.7	ug/L	1	80	(0%-21%)		
Toluene	50.0	U	ND		39.9	ug/L	0	80	(0%-25%)		
Trichloroethylene	50.0	U	ND		43.3	ug/L	3	87	(0%-25%)		
**Bromofluorobenzene	50.0		60.0		59.7	ug/L		119	(69%-138%)		
*Dibromofluoromethane	50.0		63.5		64.0	ug/L		128	(67%-137%)		
*Toluene-d8	50.0		62.0		62.1	ug/L		124	(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 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.

QC Summary

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.

Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 67158-1

Method/Analysis Information

Procedure:	**Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8270C
Prep Method:	SW846 3510C
Analytical Batch Number:	201951
Prep Batch Number:	201948

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8270C:

Sample ID	Client ID
67169005	059826-002
1200301424	SBLK01 (Blank)
1200301425	SBLK01LCS (Laboratory Control Sample)
1200301426	059826-002MS (Matrix Spike)
1200301427	059826-002MSD (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
Target analytes were detected in the blank below the reporting limit.

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.
*67169005 (*059826-002)

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. 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.

Additional Comments
No additional comments are needed for 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: 10/9/02

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: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS											
Batch 201951											
QC1200301425 LCS											
1,2,4-Trichlorobenzene	50.0			38.5	ug/L		77	(53%-104%)	JWF	09/18/02	15:21
1,4-Dichlorobenzene	50.0			39.1	ug/L		78	(47%-102%)			
2,4,5-Trichlorophenol	100			89.1	ug/L		89	(67%-106%)			
2,4,6-Trichlorophenol	100			86.0	ug/L		86	(45%-111%)			
2,4-Dinitrotoluene	50.0			45.3	ug/L		91	(55%-121%)			
2-Chlorophenol	100			71.9	ug/L		72	(47%-87%)			
4-Chloro-3-methylphenol	100			81.1	ug/L		81	(51%-100%)			
4-Nitrophenol	100			32.1	ug/L		32	(10%-55%)			
Acenaphthene	50.0			44.0	ug/L		88	(63%-111%)			
Hexachlorobenzene	50.0			42.0	ug/L		84	(67%-114%)			
Hexachlorobutadiene	50.0			38.5	ug/L		77	(44%-108%)			
Hexachloroethane	50.0			37.3	ug/L		75	(47%-97%)			
N-Nitrosodipropylamine	50.0			42.5	ug/L		85	(52%-118%)			
Nitrobenzene	50.0			41.7	ug/L		83	(49%-110%)			
Pentachlorophenol	100			75.6	ug/L		76	(31%-110%)			
Phenol	100			31.9	ug/L		32	(16%-44%)			
Pyrene	50.0			38.5	ug/L		77	(68%-117%)			
m,p-Cresols	100			61.1	ug/L		61	(43%-100%)			
o-Cresol	100			68.3	ug/L		68	(47%-87%)			
*2,4,6-Tribromophenol	100			93.1	ug/L		93	(27%-126%)			
*2-Fluorobiphenyl	50.0			39.9	ug/L		80	(32%-109%)			
*2-Fluorophenol	100			45.4	ug/L		45	(13%-73%)			
*Nitrobenzene-d5	50.0			36.8	ug/L		74	(33%-107%)			
*Phenol-d5	100			30.2	ug/L		30	(14%-66%)			
*p-Terphenyl-d14	50.0			40.8	ug/L		82	(36%-130%)			
QC1200301424 MB											
1,2,4-Trichlorobenzene			U	ND	ug/L					09/18/02	14:59
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						
2-Nitrophenol			U	ND	ug/L						

QC Summary

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS											
Batch 201951											
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						
p-Nitroaniline			U	ND	ug/L						

QC Summary

Workorder: 67169

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi Volatiles-GC/MS									
Batch 20195									
*2,4,6-Tribromophenol	100		75.0	ug/L		75	(27%-126%)		
*2-Fluorobiphenyl	50.0		42.5	ug/L		85	(32%-109%)		
*2-Fluorophenol	100		46.7	ug/L		47	(13%-73%)		
*Nitrobenzene-d5	50.0		42.1	ug/L		84	(33%-107%)		
*Phenol-d5	100		31.3	ug/L		31	(14%-66%)		
*p-Terphenyl-d14	50.0		49.8	ug/L		100	(36%-130%)		
QC1200301426 67169005 MS									
1,2,4-Trichlorobenzene	100		82.9	ug/L		83	(44%-102%)		09/18/02 18:49
1,4-Dichlorobenzene	100		80.3	ug/L		80	(48%-95%)		
2,4,5-Trichlorophenol	200		185	ug/L		93			
2,4,6-Trichlorophenol	200		183	ug/L		91			
2,4-Dinitrotoluene	100		96.4	ug/L		96	(48%-120%)		
2-Chlorophenol	200		150	ug/L		75	(32%-98%)		
4-Chloro-3-methylphenol	200		177	ug/L		88	(40%-107%)		
4-Nitrophenol	200		110	ug/L		55	(16%-78%)		
Acenaphthene	100		94.3	ug/L		94	(32%-127%)		
Hexachlorobenzene	100		86.2	ug/L		86			
Hexachlorobutadiene	100		84.4	ug/L		84			
Hexachloroethane	100		78.6	ug/L		79			
N-Nitrosodipropylamine	100		85.5	ug/L		86	(44%-119%)		
Nitrobenzene	100		82.9	ug/L		83			
Pentachlorophenol	200		180	ug/L		90	(44%-104%)		
Phenol	200		89.2	ug/L		45	(15%-70%)		
Pyrene	100		75.0	ug/L		75	(29%-142%)		
m,p-Cresols	200		145	ug/L		72			
o-Cresol	200		153	ug/L		76			
*2,4,6-Tribromophenol	200		200	ug/L		100	(27%-126%)		
*2-Fluorobiphenyl	100		80.5	ug/L		81	(32%-109%)		
*2-Fluorophenol	200		113	ug/L		57	(13%-73%)		
*Nitrobenzene-d5	100		74.9	ug/L		75	(33%-107%)		
*Phenol-d5	200		86.7	ug/L		43	(14%-66%)		
*p-Terphenyl-d14	100		80.4	ug/L		80	(36%-130%)		
QC1200302427 67169005 MSD									
1,2,4-Trichlorobenzene	100		77.5	ug/L	7	78	(0%-20%)		09/18/02 19:12
1,4-Dichlorobenzene	100		75.5	ug/L	6	76	(0%-20%)		
2,4,5-Trichlorophenol	200		184	ug/L	1	92			
2,4,6-Trichlorophenol	200		179	ug/L	2	90			
2,4-Dinitrotoluene	100		91.0	ug/L	6	91	(0%-16%)		
2-Chlorophenol	200		144	ug/L	4	72	(0%-25%)		
4-Chloro-3-methylphenol	200		165	ug/L	7	83	(0%-25%)		
4-Nitrophenol	200		100	ug/L	9	50	(0%-25%)		
Acenaphthene	100		90.9	ug/L	4	91	(0%-24%)		
Hexachlorobenzene	100		85.4	ug/L	1	85			
Hexachlorobutadiene	100		79.3	ug/L	6	80			
Hexachloroethane	100		73.0	ug/L	7	73			
N-Nitrosodipropylamine	100		83.4	ug/L	3	83	(0%-20%)		
Nitrobenzene	100		78.9	ug/L	5	79			
Pentachlorophenol	200		165	ug/L	8	83	(0%-17%)		

QC Summary

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS											
Batch 201951											
Phenol	200			86.3	ug/L	3	43	(0%-29%)			
Pyrene	100			82.3	ug/L	9	82	(0%-30%)			
m,p-Cresols	200			142	ug/L	2	71				
o-Cresol	200			149	ug/L	3	75				
*2,4,6-Tribromophenol	200			186	ug/L		93	(27%-126%)			
*2-Fluorobiphenyl	100			78.2	ug/L		78	(32%-109%)			
*2-Fluorophenol	200			109	ug/L		54	(13%-73%)			
*Nitrobenzene-d5	100			72.0	ug/L		72	(33%-107%)			
*Phenol-d5	200			84.8	ug/L		42	(14%-66%)			
*p-Terphenyl-d14	100			87.4	ug/L		87	(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 th
- ** 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. F
- 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.

Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 67158

Method/Analysis Information

Procedure:	**Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer**
Analytical Method:	SW846 8270C
Prep Method:	SW846 3550B
Analytical Batch Number:	201961
Prep Batch Number:	201960

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8270C:

Sample ID	Client ID
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002
67158031	059839-002

67158032	059841-002
67158033	059842-002
67158034	059843-002
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200301450	MBSBLK01 (Blank)
1200301451	SBLK01LCS (Laboratory Control Sample)
1200301452	059820-002MS (Matrix Spike)
1200301453	059820-002MSD (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
Target analytes were detected in the method blank; however, the hits were below the reporting limit.

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.
67158020 (059820-002)

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. 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.

Additional Comments
No additional comments are needed for 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:** 10/9/02

QC Summary

Report Date: October 9, 2002
Page 1 of 4

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

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 201961										
QC1200301451 LCS										
Pyridine	1670			730	ug/kg		44		GB1	09/18/02 16:48
1,2,4-Trichlorobenzene	1670			1170	ug/kg		70	(27%-91%)		
1,4-Dichlorobenzene	1670			1060	ug/kg		64	(25%-85%)		
2,4,5-Trichlorophenol	3330			2750	ug/kg		83	(42%-96%)		
2,4,6-Trichlorophenol	3330			2520	ug/kg		76	(32%-91%)		
2,4-Dinitrotoluene	1670			1320	ug/kg		79	(50%-109%)		
2-Chlorophenol	3330			2310	ug/kg		69	(31%-85%)		
4-Chloro-3-methylphenol	3330			2760	ug/kg		83	(34%-97%)		
4-Nitrophenol	3330			2410	ug/kg		72	(22%-128%)		
Acenaphthene	1670			1250	ug/kg		75	(39%-98%)		
Hexachlorobenzene	1670			1310	ug/kg		79	(41%-105%)		
Hexachlorobutadiene	1670			1080	ug/kg		65	(21%-94%)		
Hexachloroethane	1670			1060	ug/kg		64	(25%-86%)		
N-Nitrosodipropylamine	1670			1160	ug/kg		69	(34%-90%)		
Nitrobenzene	1670			1130	ug/kg		68	(30%-84%)		
Pentachlorophenol	3330			1910	ug/kg		57	(27%-109%)		
Phenol	3330			2430	ug/kg		73	(31%-83%)		
Pyrene	1670			1230	ug/kg		74	(37%-110%)		
m,p-Cresols	3330			2420	ug/kg		73	(40%-83%)		
o-Cresol	3330			2350	ug/kg		70	(34%-86%)		
*2,4,6-Tribromophenol	3330			2490	ug/kg		75	(23%-111%)		
*2-Fluorobiphenyl	1670			1200	ug/kg		72	(21%-104%)		
*2-Fluorophenol	3330			2390	ug/kg		72	(22%-93%)		
*Nitrobenzene-d5	1670			1110	ug/kg		67	(24%-97%)		
*Phenol-d5	3330			2480	ug/kg		74	(22%-99%)		
*p-Terphenyl-d14	1670			1470	ug/kg		88	(30%-133%)		
QC1200301450 MB										
1,2,4-Trichlorobenzene			U	ND	ug/kg					09/18/02 16:27
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					

QC Summary

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 201961											
2-Nitrophenol			U	ND	ug/kg						
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	105	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						

QC Summary

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-GC/MS Federal										
Batch 201961										
p-Nitroaniline			U	ND	ug/kg					
*2,4,6-Tribromophenol	3330			2100	ug/kg		63	(23%-111%)		
*2-Fluorobiphenyl	1670			1110	ug/kg		67	(21%-104%)		
*2-Fluorophenol	3330			2350	ug/kg		70	(22%-93%)		
*Nitrobenzene-d5	1670			1180	ug/kg		71	(24%-97%)		
*Phenol-d5	3330			2300	ug/kg		69	(22%-99%)		
*p-Terphenyl-d14	1670			1350	ug/kg		81	(30%-133%)		
QC1200301452 67158020 MS										
Pyridine	1670			0.00	ug/kg					09/18/02 17:30
1,2,4-Trichlorobenzene	1670	U	ND	1010	ug/kg		61	(15%-112%)		
1,4-Dichlorobenzene	1670	U	ND	923	ug/kg		55	(19%-89%)		
2,4,5-Trichlorophenol	3330	U	ND	2300	ug/kg		69			
2,4,6-Trichlorophenol	3330	U	ND	2020	ug/kg		61			
2,4-Dinitrotoluene	1670	U	ND	1230	ug/kg		74	(32%-117%)		
2-Chlorophenol	3330	U	ND	1940	ug/kg		58	(13%-101%)		
4-Chloro-3-methylphenol	3330	U	ND	2460	ug/kg		74	(23%-114%)		
4-Nitrophenol	3330	U	ND	2300	ug/kg		69	(20%-126%)		
Acenaphthene	1670	U	ND	1010	ug/kg		61	(15%-114%)		
Hexachlorobenzene	1670	U	ND	1220	ug/kg		73			
Hexachlorobutadiene	1670	U	ND	928	ug/kg		56			
Hexachloroethane	1670	U	ND	940	ug/kg		56			
N-Nitrosodipropylamine	1670	U	ND	986	ug/kg		59	(18%-106%)		
Nitrobenzene	1670	U	ND	1012	ug/kg		61			
Pentachlorophenol	3330	U	ND	1640	ug/kg		49	(34%-110%)		
Phenol	3330	U	ND	2010	ug/kg		60	(17%-104%)		
Pyrene	1670	U	ND	1180	ug/kg		71	(26%-130%)		
m,p-Cresols	3330	U	ND	2060	ug/kg		62			
o-Cresol	3330	U	ND	1990	ug/kg		60			
*2,4,6-Tribromophenol	3330		2030	2210	ug/kg		69	(23%-111%)		
*2-Fluorobiphenyl	1670		983	947	ug/kg		57	(21%-104%)		
*2-Fluorophenol	3330		2140	1980	ug/kg		59	(22%-93%)		
*Nitrobenzene-d5	1670		1090	952	ug/kg		60	(24%-97%)		
*Phenol-d5	3330		2050	2020	ug/kg		61	(22%-99%)		
*p-Terphenyl-d14	1670		1360	1390	ug/kg		84	(30%-133%)		
QC1200301453 67158020 MSD										
Pyridine	1670			0.00	ug/kg					09/18/02 17:51
1,2,4-Trichlorobenzene	1670	U	ND	1080	ug/kg	6	65	(0%-31%)		
1,4-Dichlorobenzene	1670	U	ND	1030	ug/kg	11	62	(0%-36%)		
2,4,5-Trichlorophenol	3330	U	ND	2680	ug/kg	15	80			
2,4,6-Trichlorophenol	3330	U	ND	2220	ug/kg	10	67			
2,4-Dinitrotoluene	1670	U	ND	1380	ug/kg	12	83	(0%-37%)		
2-Chlorophenol	3330	U	ND	2180	ug/kg	12	65	(0%-34%)		
4-Chloro-3-methylphenol	3330	U	ND	2710	ug/kg	10	81	(0%-34%)		
4-Nitrophenol	3330	U	ND	2550	ug/kg	10	77	(0%-35%)		
Acenaphthene	1670	U	ND	1140	ug/kg	12	69	(0%-33%)		
Hexachlorobenzene	1670	U	ND	1420	ug/kg	15	85			
Hexachlorobutadiene	1670	U	ND	996	ug/kg	7	60			
Hexachloroethane	1670	U	ND	1010	ug/kg	7	61			

QC Summary

Workorder: 67158

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal												
Batch 201961												
N-Nitrosodipropylamine	1670	U	ND		1090	ug/kg	10	66	(0%-29%)			
Nitrobenzene	1670	U	ND		1080	ug/kg	6	65				
Pentachlorophenol	3330	U	ND		1800	ug/kg	9	54	(0%-40%)			
Phenol	3330	U	ND		2260	ug/kg	12	68	(0%-37%)			
Pyrene	1670	U	ND		1230	ug/kg	5	74	(0%-39%)			
m,p-Cresols	3330	U	ND		2400	ug/kg	15	72				
o-Cresol	3330	U	ND		2270	ug/kg	13	68				
*2,4,6-Tribromophenol	3330		2030		2610	ug/kg		78	(23%-111%)			
*2-Fluorobiphenyl	1670		983		1000	ug/kg		60	(21%-104%)			
*2-Fluorophenol	3330		2140		2120	ug/kg		64	(22%-93%)			
*Nitrobenzene-d5	1670		1090		983	ug/kg		59	(24%-97%)			
*Phenol-d5	3330		2050		2220	ug/kg		67	(22%-99%)			
*p-Terphenyl-d14	1670		1360		1370	ug/kg		83	(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 th
- ** 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. F
- 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.

PCB Case Narrative
Sandia National Labs (SNLS)
SDG# 67158

Method/Analysis Information

Procedure:	**Polychlorinated Biphenyls by Method 8082**
Analytical Method:	SW846 8082
Prep Method:	SW846 3550B
Analytical Batch Number:	201940
Prep Batch Number:	201939

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8082:

Sample ID	Client ID
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002
67158031	059839-002
67158032	059841-002
67158033	059842-002
67158034	059843-002

67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200301403	PBLK01(Method Blank)
1200301404	PBLK01LCS(Laboratory Control Sample)
1200301405	059820-002MS(Matrix Spike)
1200301406	059820-002MSD(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 0.53mm 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
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.

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 following sample was selected for the PCB method QC:

Client Sample ID#	Laboratory Sample ID#
059820-002	67158020

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 and alumina cleanup procedure.

Sample Dilutions

None of the samples in this SDG were required 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

Due to software limitations, some manual integrations were performed on standards or samples in order for the integration of some analytes to match their integration in the calibration used. 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 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: Jimmie Cao Date: 10/11/06

QC Summary

Workorder: 67158

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 10, 2002

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

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB Federal										
Batch 201940										
QC1200301404 LCS										
Aroclor-1260	33.3			29.0	ug/kg		87	(48%-116%)	GH1	09/25/02 17:05
**4cmx	6.67			171	ug/kg		86	(31%-120%)		
**Decachlorobiphenyl	6.67			187	ug/kg		93	(34%-115%)		
QC1200301405 MB										
Aroclor-1016			U	ND	ug/kg					09/25/02 16:53
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			170	ug/kg		85	(31%-120%)		
**Decachlorobiphenyl	6.67			183	ug/kg		91	(34%-115%)		
QC1200301405 67158020 MS										
Aroclor-1260	33.3	10.9		37.2	ug/kg		79	(36%-134%)		09/25/02 17:29
**4cmx	6.67	5.06		151	ug/kg		75	(31%-120%)		
**Decachlorobiphenyl	6.67	5.24		147	ug/kg		74	(34%-115%)		
QC1200301406 67158020 MSD										
Aroclor-1260	33.3	10.9		37.8	ug/kg	2	81	(0%-30%)		09/25/02 17:42
**4cmx	6.67	5.06		140	ug/kg		70	(31%-120%)		
**Decachlorobiphenyl	6.67	5.24		151	ug/kg		75	(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.)
- 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.

PCB Case Narrative
Sandia National Labs (SNLS)
SDG# 67158-1

Method/Analysis Information

Procedure:	**Polychlorinated Biphenyls by Method 8082**
Analytical Method:	SW846 8082
Prep Method:	SW846 3510C
Analytical Batch Number:	202231
Prep Batch Number:	202230

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8082:

Sample ID	Client ID
67169006	059826-003
1200302125	PBLK01(Method Blank)
1200302128	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	
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.

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 a non-client's SDG.

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 and alumina cleanup procedure.

Sample Dilutions

None of the samples in this SDG were required 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

Due to software limitations, some manual integrations were performed on standards or samples in order for the integration of some analytes to match their integration in the calibration used. 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 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: Jimmie Cao **Date:** 10/11/12

QC Summary

Report Date: October 11, 2002

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

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-PCB Federal											
Batch 202231											
QC1200302128 LCS											
Aroclor-1260	1.00			0.540	ug/L		54	(47%-131%)	GH1	09/23/02	11:39
**4cmx	0.200			154	ug/L		77	(34%-116%)			
**Decachlorobiphenyl	0.200			123	ug/L		62	(21%-122%)			
QC1200302125 MB											
Aroclor-1016			U	ND	ug/L					09/23/02	11:27
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			162	ug/L		81	(34%-116%)			
**Decachlorobiphenyl	0.200			136	ug/L		68	(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 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.

HPLC Narrative
Sandia National Labs (SNLS)
SDG 67158

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:	202056
Prep Batch Number:	202053

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8330:

Sample ID	Client ID
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002

67158030	059838-002
67158031	059839-002
67158032	059841-002
67158033	059842-002
67158034	059843-002
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200301707	XBLK01 (Blank)
1200301708	XBLK01LCS (Laboratory Control Sample)
1200301709	059846-001MS (Matrix Spike)
1200301710	059846-001MSD (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 were within the established acceptance limits.

QC Sample Designation
The following sample analyzed with this SDG was chosen for matrix spike analysis:
67158036 (059846-001).

MS Recovery Statement
One or more of the required spiking analytes were not within the acceptance limits in the matrix spike (MS). The matrix spike duplicate (MSD) also failed recoveries. The failing recoveries are attributed to matrix interference.

MSD Recovery Statement
One or more of the required spiking analytes were not within the acceptance limits in the matrix spike duplicate (MSD). The matrix spike (MS) also failed recoveries. The failing recoveries are attributed to matrix interference.

MS/MSD RPD Statement
The relative percent differences (RPD) between the MS and MSD were not 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 Integration
Some initial calibration standards, continuing calibration standards, and/or samples required manual integrations due to software limitations. All samples.

Additional Comments
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.

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.

The samples were concentrated prior to analysis to achieve the required detection limit.

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 Mann **Date:** 10/14/02

QC Summary

Report Date: October 14, 2002

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

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 202056										
QC1200301708 LCS										
1,3,5-Trinitrobenzene	800			766	ug/kg		96	(77%-124%)	JLW	09/29/02 14:21
2,4,6-Trinitrotoluene	800			766	ug/kg		96	(80%-120%)		
2,4-Dinitrotoluene	800			739	ug/kg		92	(77%-122%)		
2,6-Dinitrotoluene	800			765	ug/kg		96	(74%-121%)		
2-Amino-4,6-dinitrotoluene	800			775	ug/kg		97	(81%-125%)		
4-Amino-2,6-dinitrotoluene	800			656	ug/kg		82	(79%-123%)		
HMX	800			777	ug/kg		97	(84%-131%)		
Nitrobenzene	800			709	ug/kg		89	(75%-125%)		
RDX	800			798	ug/kg		100	(80%-123%)		
Tetryl	800			644	ug/kg		81	(65%-124%)		
m-Dinitrobenzene	800			754	ug/kg		94	(77%-124%)		
m-Nitrotoluene	800			719	ug/kg		90	(77%-117%)		
o-Nitrotoluene	800			704	ug/kg		88	(75%-119%)		
p-Nitrotoluene	800			711	ug/kg		89	(76%-121%)		
**1,2-dinitrobenzene	400			370	ug/kg		92	(71%-118%)		
QC1200301707 MB										
1,3,5-Trinitrobenzene			U	ND	ug/kg					09/29/02 15:05
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			352	ug/kg		88	(71%-118%)		
QC1200301709 67158036 MS										
1,3,5-Trinitrobenzene	800	U	ND	776	ug/kg		97	(66%-133%)		09/29/02 13:39
2,4,6-Trinitrotoluene	800	U	ND	864	ug/kg		108	(77%-132%)		
2,4-Dinitrotoluene	800	U	ND	776	ug/kg		97	(61%-134%)		
2,6-Dinitrotoluene	800	U	ND	835	ug/kg		104	(70%-121%)		
2-Amino-4,6-dinitrotoluene	800	U	ND	720	ug/kg		90	(79%-124%)		
4-Amino-2,6-dinitrotoluene	800	U	ND	467	ug/kg		58*	(71%-120%)		
HMX	800	U	ND	783	ug/kg		98	(75%-138%)		
Nitrobenzene	800	U	ND	749	ug/kg		94	(72%-120%)		
RDX	800	U	ND	778	ug/kg		97	(61%-136%)		
Tetryl	800	U	ND	256	ug/kg		32*	(65%-135%)		

QC Summary

Workorder: 67158

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal											
Batch 202056											
m-Dinitrobenzene	800	U	ND		788	ug/kg		99	(75%-125%)		
m-Nitrotoluene	800	U	ND		776	ug/kg		97	(73%-116%)		
o-Nitrotoluene	800	U	ND		746	ug/kg		93	(68%-122%)		
p-Nitrotoluene	800	U	ND		757	ug/kg		95	(67%-125%)		
**1,2-dinitrobenzene	400		372		383	ug/kg		96	(71%-118%)		
QC1200301710 67158036 MSD											
1,3,5-Trinitrobenzene	800	U	ND		822	ug/kg	6	103	(0%-20%)		09/28/02 17:49
2,4,6-Trinitrotoluene	800	U	ND		922	ug/kg	7	115	(0%-20%)		
2,4-Dinitrotoluene	800	U	ND		782	ug/kg	1	98	(0%-24%)		
2,6-Dinitrotoluene	800	U	ND		847	ug/kg	1	106	(0%-21%)		
2-Amino-4,6-dinitrotoluene	800	U	ND		824	ug/kg	13	103	(0%-20%)		
4-Amino-2,6-dinitrotoluene	800	U	ND		733	ug/kg	44*	92	(0%-20%)		
HMX	800	U	ND		843	ug/kg	7	105	(0%-38%)		
Nitrobenzene	800	U	ND		771	ug/kg	3	96	(0%-21%)		
RDX	800	U	ND		797	ug/kg	2	100	(0%-35%)		
Tetryl	800	U	ND		141	ug/kg	58*	18	(0%-30%)		
m-Dinitrobenzene	800	U	ND		828	ug/kg	5	104	(0%-23%)		
m-Nitrotoluene	800	U	ND		775	ug/kg	0	97	(0%-20%)		
o-Nitrotoluene	800	U	ND		776	ug/kg	4	97	(0%-23%)		
p-Nitrotoluene	800	U	ND		798	ug/kg	5	100	(0%-22%)		
**1,2-dinitrobenzene	400		372		397	ug/kg		99	(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. 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 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.

HPLC Narrative
Sandia National Labs (SNLS)
SDG 67158-1

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:	202049
Prep Batch Number:	202046

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8330:

Sample ID	Client ID
67169007	059826-004
1200301687	XBLK01 (Blank)
1200301688	XBLK01 LCS (Laboratory Control Sample)
1200301689	XBLK01LCSD (Laboratory Control Sample 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
Two of the required spiking analytes were not within the SNLS 80-120% acceptance limits in the laboratory control sample (LCS). All the LCS recoveries were within the GEL SPC limits. The GEL SPC limits are on the Certificate of Analysis. Please see the emails in the Miscellaneous Section.

LCSD Recovery Statement
Two of the required spiking analytes were not within the SNLS 80-120% acceptance limits in the laboratory control sample duplicate (LCSD). All the LCSD recoveries were within the GEL SPC limits. The GEL SPC limits are on the Certificate of Analysis. Please see the emails in the Miscellaneous Section.

LCS/LCSD RPD Statement
All the relative percent differences (RPD) between each LCS and LCSD were within the required acceptance limits.

QC Sample Designation
A matrix spike/matrix spike duplicate was not performed with this batch due to limited sample.

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 Integration
No manual integrations were required for any data file in this SDG.

Additional Comments
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 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.

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 M Mauk **Date:** 10/14/02

QC Summary

Report Date: October 14, 2002

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

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 202049										
QC1200301688 LCS										
1,3,5-Trinitrobenzene	1.04			0.956	ug/L		92	(84%-110%)	JLW	09/19/02 10:56
2,4,6-Trinitrotoluene	1.04			0.965	ug/L		93	(85%-110%)		
2,4-Dinitrotoluene	1.04			0.863	ug/L		83	(78%-110%)		
2,6-Dinitrotoluene	1.04			0.915	ug/L		88	(79%-110%)		
2-Amino-4,6-dinitrotoluene	1.04			0.967	ug/L		93	(77%-110%)		
4-Amino-2,6-dinitrotoluene	1.04			0.909	ug/L		88	(59%-110%)		
HMX	1.04			0.975	ug/L		94	(86%-110%)		
Nitrobenzene	1.04			0.770	ug/L		74	(68%-110%)		
RDX	1.04			0.932	ug/L		90	(76%-110%)		
Tetryl	1.04			1.01	ug/L		97	(73%-110%)		
m-Dinitrobenzene	1.04			0.868	ug/L		84	(76%-110%)		
m-Nitrotoluene	1.04			0.829	ug/L		80	(73%-110%)		
o-Nitrotoluene	1.04			0.830	ug/L		80	(69%-110%)		
p-Nitrotoluene	1.04			0.854	ug/L		82	(73%-110%)		
**1,2-dinitrobenzene	0.519			0.442	ug/L		85	(59%-118%)		
QC1200301689 LCSD										
1,3,5-Trinitrobenzene	1.04			0.960	ug/L	0	92	(0%-20%)		09/19/02 11:19
2,4,6-Trinitrotoluene	1.04			0.966	ug/L	0	93	(0%-20%)		
2,4-Dinitrotoluene	1.04			0.848	ug/L	2	82	(0%-20%)		
2,6-Dinitrotoluene	1.04			0.876	ug/L	4	84	(0%-20%)		
2-Amino-4,6-dinitrotoluene	1.04			0.969	ug/L	0	93	(0%-20%)		
4-Amino-2,6-dinitrotoluene	1.04			0.909	ug/L	0	88	(0%-24%)		
HMX	1.04			0.974	ug/L	0	94	(0%-20%)		
Nitrobenzene	1.04			0.762	ug/L	1	73	(0%-20%)		
RDX	1.04			0.928	ug/L	0	89	(0%-20%)		
Tetryl	1.04			1.01	ug/L	0	97	(0%-20%)		
m-Dinitrobenzene	1.04			0.849	ug/L	2	82	(0%-20%)		
m-Nitrotoluene	1.04			0.819	ug/L	1	79	(0%-20%)		
o-Nitrotoluene	1.04			0.814	ug/L	2	78	(0%-23%)		
p-Nitrotoluene	1.04			0.855	ug/L	0	82	(0%-20%)		
**1,2-dinitrobenzene	0.519			0.437	ug/L		84	(59%-118%)		
QC1200301687 MB										
1,3,5-Trinitrobenzene			U	ND	ug/L					09/19/02 09:54
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					

QC Summary

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal											
Batch 202049											
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			0.474	ug/L		91	(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 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. J
- 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.

Inorganic Case Narrative for
Sandia National Laboratory
SDG# 67158

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
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002
67158031	059839-002
67158032	059841-002
67158033	059842-002
67158034	059843-002
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200303449	Method Blank (MB) ICP-202762/202760
1200303453	Laboratory Control Sample (LCS)
1200303451	059846-001L (67158036) Serial Dilution (SD)
1200303450	059846-001D (67158036) Sample Duplicate (DUP)
1200303452	059846-001S (67158036) Matrix Spike (MS)
1200303376	Method Blank (MB) CVAA-202730/202729
1200303379	Laboratory Control Sample (LCS)
1200303377	059846-001D (67158036) Sample Duplicate (DUP)
1200303378	059846-001S (67158036) Matrix Spike (MS)

Method/Analysis Information:

Analytical Batch #:	202762, 202730
Prep Batch #:	202760, 202729
Standard Operating Procedure:	GL-MA-E-013 REV.6; GL-MA-E-010 REV.10
Analytical Method:	SW846 6010B; SW846 7471A
Prep Method:	SW846 3050B; SW846 7471A

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 059846-001 (67158036) 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 except arsenic, as indicated by the "*" qualifier on the QC summary.

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 instrument detection limit (IDL) 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: ____________

Date: 10/9/02

QC Summary

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

Report Date: October 8, 2002

Workorder: 67158

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP Federal											
Batch 202762											
QC1200303450 67158036 DUP											
Arsenic			4.96		3.18	mg/kg	44*		(0%-20%)	HSC	10/03/02 23:13
Barium			228		216	mg/kg	5		(0%-20%)		
Cadmium		J	0.194	J	0.211	mg/kg	N/A ^		(+/-0.490)		
Chromium			9.50		9.61	mg/kg	1		(0%-20%)		
Lead			5.47		5.14	mg/kg	6		(0%-20%)		
Selenium		BU	ND	BU	ND	mg/kg	N/A		(+/-0.490)		
Silver		J	0.441	J	0.089	mg/kg	N/A ^		(+/-0.490)		
QC1200303453 LCS											
Arsenic	192				205	mg/kg		107	(79%-121%)		10/03/02 20:56
Barium	417				462	mg/kg		111	(80%-120%)		
Cadmium	125				137	mg/kg		110	(81%-119%)		
Chromium	133				144	mg/kg		108	(77%-123%)		
Lead	160				175	mg/kg		109	(78%-123%)		
Selenium	97.0			B	103	mg/kg		106	(72%-128%)		
Silver	115				135	mg/kg		118	(55%-145%)		
QC1200303449 MB											
Arsenic				U	ND	mg/kg					10/03/02 20:50
Barium				U	ND	mg/kg					
Cadmium				U	ND	mg/kg					
Chromium				U	ND	mg/kg					
Lead				U	ND	mg/kg					
Selenium				J	0.201	mg/kg					
Silver				U	ND	mg/kg					
QC1200303452 67158036 MS											
Arsenic	23.6		4.96		24.7	mg/kg		84	(75%-125%)		10/03/02 23:19
Barium	23.6		228		264	mg/kg		N/A	(75%-125%)		
Cadmium	23.6	J	0.194		22.0	mg/kg		92	(75%-125%)		
Chromium	23.6		9.50		33.3	mg/kg		101	(75%-125%)		
Lead	23.6		5.47		27.5	mg/kg		93	(75%-125%)		
Selenium	23.6	BU	ND	B	20.9	mg/kg		88	(75%-125%)		
Silver	23.6	J	0.441		23.0	mg/kg		96	(75%-125%)		
QC1200303451 67158036 SDILT											
Arsenic			50.6		9.65	ug/L	4.75				10/03/02 23:07
Barium			2320		466	ug/L	226				
Cadmium		J	1.98	U	ND	ug/L	N/A				
Chromium			96.9		19.6	ug/L	1				
Lead			55.8		11.4	ug/L	1.86				
Selenium		BU	ND	BU	ND	ug/L	N/A				
Silver		J	4.50	J	1.10	ug/L	21.9				
Metals Analysis-Mercury Federal											
Batch 202730											
QC1200303377 67158036 DUP											

QC Summary

Workorder: 67158

Parmname			NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury Federal														
Batch 202730														
Mercury				J	0.00718	J	0.00775	mg/kg	N/A		(+/-0.00965)	NORI	10/07/02	11:10
QC1200303379	LCS													
Mercury			25.6				26.2	mg/kg		111	(66%-134%)		10/07/02	10:30
QC1200303376	MB													
Mercury						U	ND	mg/kg					10/07/02	10:26
QC1200303378	67158036	MS												
Mercury			0.089	J	0.00718		0.0995	mg/kg		104	(75%-125%)		10/07/02	11:16

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. J
- 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.

Metals Case Narrative for
Sandia National Labs (SNLS)
SDG# 67158-1

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
67169010	059826-007
1200307728	Methods Blank (MB) ICP-204455/204453
1200307729	Laboratory Control Sample (LCS)
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 necessary.

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: Allison M. S

Date: 10/13/06

QC Summary

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

Report Date: October 3, 2002

Workorder: 67169

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 3.81	ug/L	N/A ^		(+/-5.00)		
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	0.00587	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	500			516	ug/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	ug/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	500			523	ug/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	0.00587	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 2.55	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	146				
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 67354028 DUP										

QC Summary

Workorder: 67169

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 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.

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Prep Method:	SW846 3060A
Analytical Batch Number:	203661
Prep Batch Number:	203660

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002
67158031	059839-002
67158032	059841-002
67158033	059842-002
67158034	059843-002
1200305731	MB for batch 203661

1200305732	DUP of 67099003
1200305733	DUP of 67158024
1200305734	MS of 67099003
1200305735	MS of 67158024
1200305736	LCS for batch 203661

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
Samples 67099003 and 67158024 were designated for Quality Control.

Sample Spike Recovery
The matrix spike for SNLS sample 67099003 (1200305734) falls within GEL's acceptance limits, but outside the client's acceptance limits of 75%-125%. Per client, the batch is reported as is, since another SNLS sample in this batch passed their QC criteria.

Sample Duplicate Acceptance
The values for the samples and duplicates for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPDs are 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.

Sample Reanalysis
The samples in this batch were reprepped and reanalyzed due to batch failure. When reagents were added, the samples had a massive reaction. The LCS and matrix spikes did not change color; therefore, they did not have acceptable recoveries. The analyst added spiking reagents to post prep to verify a mistake occurred in the prep process.

Miscellaneous Information:

Nonconformance Reports
No Nonconformance Reports (NCR) were required for any of the samples in this sample group for this analysis.

General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 67158

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	202749
Prep Batch Number:	202748

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9012A:

Sample ID	Client ID
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002

67158031	059839-002
67158032	059841-002
67158033	059842-002
67158034	059843-002
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200303418	MB for batch 202749
1200303419	DUP of 67158020
1200303420	DUP of 67158036
1200303421	MS of 67158020
1200303422	MS of 67158036
1200303423	LCS for batch 202749
1200303424	LCS for batch 202749

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.

Quality Control
Samples 67158020 and 67158036 were designated for Quality Control.

Sample Spike Recovery
The spike recoveries for this sample set were within the required acceptance limits.

Sample Duplicate Acceptance
The values for the samples and duplicates for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPDs are 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: *1200303424*.

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:	203665
Prep Batch Number:	203662

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200305737	MB for batch 203665
1200305738	DUP of 67158036
1200305739	MS of 67158036
1200305740	LCS for batch 203665

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
Sample 67158036 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:** 10/09/02

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: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rapid Flow Analysis Federal										
Batch 202749										
QC1200303419 67158020 DUP										
Cyanide, Total	BJ	0.110	BJ	0.077	mg/kg	N/A ^		(+/-0.227)	ADF	09/23/02 16:05
QC1200303420 67158036 DUP										
Cyanide, Total	BJ	0.117	BJ	0.0523	mg/kg	N/A ^		(+/-0.227)		09/23/02 16:24
QC1200303423 LCS										
Cyanide, Total	2.50		B	2.43	mg/kg		97	(62%-138%)		09/23/02 16:01
QC1200303424 LCS										
Cyanide, Total	275		B	242	mg/kg		88	(62%-138%)		09/23/02 16:04
QC1200303418 MB										
Cyanide, Total			J	0.048	mg/kg					09/23/02 16:00
QC1200303421 67158020 MS										
Cyanide, Total	4.55	BJ	0.110	B	5.32	mg/kg		115	(55%-145%)		09/23/02 16:06
QC1200303422 67158036 MS										
Cyanide, Total	4.55	BJ	0.117	B	4.55	mg/kg		98	(55%-145%)		09/23/02 16:24
Spectrometric Analysis Federal										
Batch 203661										
QC1200305732 67099003 DUP										
Hexavalent Chromium	J	0.0704	U	ND	mg/kg	N/A ^		(+/-0.0985)	BEP2	10/02/02 07:00
QC1200305733 67158024 DUP										
Hexavalent Chromium	U	ND	U	ND	mg/kg	N/A		(+/-0.0995)		
QC1200305736 LCS										
Hexavalent Chromium	0.998			1.02	mg/kg		102	(72%-121%)		
QC1200305731 MB										
Hexavalent Chromium			U	ND	mg/kg					
QC1200305734 67099003 MS										
Hexavalent Chromium	0.959	J	0.0704		0.700	mg/kg		66	(49%-130%)	
QC1200305735 67158024 MS										
Hexavalent Chromium	0.988	U	ND		0.909	mg/kg		92	(49%-130%)	
Batch 203665										
QC1200305738 67158036 DUP										
Hexavalent Chromium	U	ND	U	ND	mg/kg	N/A		(+/-0.0971)	BEP2	10/02/02 06:30
QC1200305740 LCS										
Hexavalent Chromium	0.993			1.05	mg/kg		106	(72%-121%)		
QC1200305737 MB										
Hexavalent Chromium			U	ND	mg/kg					
QC1200305739 67158036 MS										
Hexavalent Chromium	0.964	U	ND		0.790	mg/kg		82	(49%-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 th

** Indicates analyte is a surrogate compound.

B The analyte was found in the blank above the effective MDL.

QC Summary

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RPD%	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. J

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 Narrative
Sandia National Labs (SNLS)
SDG 67158-1

Method/Analysis Information

Procedure:	**Hexavalent Chromium**
Analytical Method:	SW846 7196A
Analytical Batch Number:	201822

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:.

Sample ID	Client ID
67169009	059826-006
1200301230	MB for batch 201822
1200301231	DUP of 67169009
1200301232	PS of 67169009
1200301233	LCS for batch 201822

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
The following sample was designated for Quality Control: *67169009*.

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
The samples from this sample group were received by the lab outside of the method specified holding time.

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) 4012 was submitted by the PM for sample 67169009 in this sample group because the sample was received beyond the recommended holding time for this analysis.

Method/Analysis Information

Procedure:	**Total Cyanide**
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	202747
Prep Batch Number:	202746

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9012A:

Sample ID	Client ID
67169008	059826-005
1200303412	MB for batch 202746
1200303413	DUP of 67082013
1200303414	DUP of 67082014
1200303415	MS of 67082013
1200303416	MS of 67082014
1200303417	LCS for batch 202746

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.

Quality Control
The following SNLS samples were designated for Quality Control: *67082013, 67082014.*

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
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: 10/02/02

QC Summary

Report Date: September 27, 2002

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

Workorder: 67169

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Rapid Flow Analysis Federal										
Batch 202747										
QC1200303413 67082013 DUP Cyanide, Total		U	ND	U	ND	mg/L	N/A	(+/-0.005)	ADF	09/23/02 15:51
QC1200303414 67082014 DUP Cyanide, Total		J	0.00469	J	0.00428	mg/L	N/A *	(+/-0.005)		09/23/02 15:53
QC1200303417 LCS Cyanide, Total	0.050				0.0475	mg/L	95	(90%-110%)		09/23/02 15:38
QC1200303412 MB Cyanide, Total				U	ND	mg/L				
QC1200303415 67082013 MS Cyanide, Total	0.100	U	ND		0.0927	mg/L	91	(72%-133%)		09/23/02 15:52
QC1200303416 67082014 MS Cyanide, Total	0.100	J	0.00469		0.101	mg/L	96	(72%-133%)		09/23/02 15:54
Spectrometric Analysis Federal										
Batch 201822										
QC1200301231 67169009 DUP Hexavalent Chromium		HU	ND	HU	ND	mg/L	N/A	(+/-0.010)	VH1	09/18/02 12:45
QC1200301233 LCS Hexavalent Chromium	0.100				0.101	mg/L	101	(89%-110%)		
QC1200301230 MB Hexavalent Chromium				U	ND	mg/L				
QC1200301232 67169009 PS Hexavalent Chromium	0.100	HU	ND	H	0.087	mg/L	87	(80%-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 spectroscopy.

QC Summary

Workorder: 67169

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.

Radiochemistry Case Narrative
Sandia National Labs (SNLS)
SDG 67158-1

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
67169011	059826-008
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*.

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.

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: D. Thomas Date: 11 Oct 2012

GENERAL ENGINEERING LABORATORIES
Meeting today's needs with a vision for tomorrow.

QC Summary

Report Date: October 11, 2002

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

Workorder: 67169

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.

P O Box 30712 * Charleston, SC 29417 * 2040 Savage Road * 29407
(843) 556-8171 * Fax (843) 766-1178

QC Summary

Workorder: 67169

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.

Radiochemistry Case Narrative
Sandia National Labs (SNLS)
Workorder 67158

Method/Analysis Information

Batch Number:	203325
Procedure:	Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method:	EPA 900.0

Sample ID	Client ID
67158020	059820-002
67158021	059821-002
67158022	059822-002
67158023	059823-002
67158024	059824-002
67158025	059825-002
67158026	059828-002
67158027	059829-002
67158028	059836-002
67158029	059837-002
67158030	059838-002
67158031	059839-002
67158032	059841-002
67158033	059842-002
67158034	059843-002
67158035	059844-002
67158036	059846-001
67158037	059847-002
67158038	059848-002
1200304874	MB for batch 203325
1200304875	059846-001(67158036DUP)
1200304876	059846-001(67158036MS)
1200304877	059846-001(67158036MSD)
1200304878	LCS for batch 203325

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 13, 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: *67158036.*

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.

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: M. Morris **Date:** 11 Oct 2002

QC Summary

Report Date: October 11, 2002

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

Workorder: 67158

Parmname	NOM	Sample	Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
Gravimetric Solids											
Batch 201819											
QC1200301324 67158020 DUP											
Moisture		2.08		1.89	percent	10		(0%-24%)	AWB	09/17/02	15:04
Rad Gas Flow											
Batch 203325											
QC1200304875 67158036 DUP											
Alpha		10.5		8.80	pCi/g	0.318		(0%-20%)	HOB1	10/07/02	12:34
	Uncert:	+/-2.49		+/-2.60							
	TPU:	2.67		2.64							
Beta		17.3		16.1	pCi/g	0.326		(0%-20%)			
	Uncert:	+/-1.73		+/-1.91							
	TPU:	1.78		2.02							
QC1200304878 LCS											
Alpha	9.89			9.64	pCi/g		98	(75%-125%)		10/07/02	13:17
	Uncert:			+/-1.49							
	TPU:			1.69							
Beta	39.7			42.1	pCi/g		106	(75%-125%)			
	Uncert:			+/-1.79							
	TPU:			2.35							
QC1200304874 MB											
Alpha			U	-0.0264	pCi/g					10/07/02	12:33
	Uncert:			+/-0.079							
	TPU:			0.079							
Beta			U	0.165	pCi/g						
	Uncert:			+/-0.348							
	TPU:			0.348							
QC1200304876 67158036 MS											
Alpha	94.2	10.5		105	pCi/g		100	(75%-125%)		10/07/02	12:34
	Uncert:	+/-2.49		+/-7.11							
	TPU:	2.67		18.0							
Beta	378	17.3		402	pCi/g		102	(75%-125%)			
	Uncert:	+/-1.73		+/-24.2							
	TPU:	1.78		29.1							
QC1200304877 67158036 MSD											
Alpha	96.9	10.5		103	pCi/g		96				
	Uncert:	+/-2.49		+/-7.28							
	TPU:	2.67		14.3							
Beta	389	17.3		422	pCi/g		104				
	Uncert:	+/-1.73		+/-25.1							
	TPU:	1.78		29.9							

QC Summary

Workorder: 67158

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 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.

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:46:55 AM

Analyzed by: 9/27/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059799-003
Lab Sample ID : 20131401

Sample Description : 6531/1108-SP1-BH1-10-S
Sample Quantity : 927.000 gram
Sample Date/Time : 9/3/02 11:15:00 AM
Acquire Start Date/Time : 9/20/02 2:44:16 PM
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	---	4.25E-001
RA-226	9.65E-001	4.49E-001	6.64E-001
PB-214	5.06E-001	7.95E-002	4.91E-002
BI-214	5.05E-001	8.58E-002	4.87E-002
PB-210	Not Detected	---	7.19E+000
TH-232	4.64E-001	2.31E-001	1.55E-001
RA-228	4.59E-001	1.10E-001	1.32E-001
AC-228	4.18E-001	9.95E-002	9.07E-002
TH-228	5.81E-001	1.89E-001	3.93E-001
RA-224	6.12E-001	1.58E-001	8.46E-002
PB-212	5.22E-001	7.89E-002	3.32E-002
BI-212	3.62E-001	4.44E-001	7.15E-001
TL-208	4.65E-001	8.89E-002	7.20E-002
U-235	Not Detected	---	1.67E-001
TH-231	Not Detected	---	5.61E+000
PA-231	Not Detected	---	1.16E+000
TH-227	Not Detected	---	2.54E-001
RA-223	Not Detected	---	2.64E-001
RN-219	Not Detected	---	3.10E-001
PB-211	Not Detected	---	7.20E-001
TL-207	Not Detected	---	1.31E+001
AM-241	Not Detected	---	1.47E-001
PU-239	Not Detected	---	2.97E+002
NP-237	Not Detected	---	1.58E+000
PA-233	Not Detected	---	4.99E-002
TH-229	Not Detected	---	1.60E-001

[Summary Report] - Sample ID: : 20131401

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.61E-002
AG-110m	Not Detected	---	2.81E-002
BA-133	Not Detected	---	3.60E-002
BE-7	Not Detected	---	2.67E-001
CD-115	Not Detected	---	1.11E+001
CE-139	Not Detected	---	2.26E-002
CE-141	Not Detected	---	5.28E-002
CE-144	Not Detected	---	1.70E-001
CM-243	Not Detected	---	1.40E-001
CO-56	Not Detected	---	3.53E-002
CO-57	Not Detected	---	2.09E-002
CO-58	Not Detected	---	3.39E-002
CO-60	Not Detected	---	3.73E-002
CR-51	Not Detected	---	2.97E-001
CS-134	Not Detected	---	3.76E-002
CS-137	Not Detected	---	2.93E-002
EU-152	Not Detected	---	6.03E-002
EU-154	Not Detected	---	1.68E-001
EU-155	~~6.51E-002~~	~~6.48E-002~~ Not Detected	1.03E-001
FE-59	Not Detected	---	9.10E-002
GD-153	Not Detected	---	5.60E-002
HG-203	Not Detected	---	3.24E-002
I-131	Not Detected	---	9.69E-002
IR-192	Not Detected	---	2.66E-002
K-40	1.69E+001	2.30E+000	2.50E-001
MN-52	Not Detected	---	2.46E-001
MN-54	Not Detected	---	3.06E-002
MO-99	Not Detected	---	1.58E+001
NA-22	Not Detected	---	4.32E-002
NA-24	Not Detected	---	5.65E+006
ND-147	Not Detected	---	5.13E-001
NI-57	Not Detected	---	1.43E+002
RU-103	Not Detected	---	3.26E-002
RU-106	Not Detected	---	2.36E-001
SB-122	Not Detected	---	2.67E+000
SB-124	Not Detected	---	3.13E-002
SB-125	Not Detected	---	7.28E-002
SN-113	Not Detected	---	3.45E-002
SR-85	Not Detected	---	3.51E-002
TA-182	Not Detected	---	1.67E-001
TA-183	Not Detected	---	1.27E+000
TL-201	Not Detected	---	3.34E+000
Y-88	Not Detected	---	2.45E-002
ZN-65	Not Detected	---	1.05E-001
ZR-95	Not Detected	---	5.98E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:48:01 AM

Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059805-003
Lab Sample ID : 20131402

Sample Description : 6531/1108-SP1-BH1-15-S
Sample Quantity : 731.000 gram
Sample Date/Time : 9/3/02 11:40:00 AM
Acquire Start Date/Time : 9/20/02 4:26:37 PM
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	---	5.19E-001
RA-226	1.73E+000	5.77E-001	7.88E-001
PB-214	6.61E-001	1.03E-001	6.13E-002
BI-214	6.22E-001	1.04E-001	5.34E-002
PB-210	Not Detected	---	8.90E+000
TH-232	6.42E-001	3.12E-001	1.87E-001
RA-228	7.57E-001	1.59E-001	1.55E-001
AC-228	8.02E-001	1.60E-001	1.06E-001
TH-228	Not Detected	---	7.72E-001
RA-224	8.91E-001	2.17E-001	8.68E-002
PB-212	7.61E-001	1.13E-001	3.88E-002
BI-212	7.50E-001	2.89E-001	3.73E-001
TL-208	5.75E-001	1.13E-001	9.63E-002
U-235	Not Detected	---	1.94E-001
TH-231	Not Detected	---	6.50E+000
PA-231	Not Detected	---	1.39E+000
TH-227	Not Detected	---	3.36E-001
RA-223	Not Detected	---	3.08E-001
RN-219	Not Detected	---	3.53E-001
PB-211	Not Detected	---	7.72E-001
TL-207	Not Detected	---	1.48E+001
AM-241	Not Detected	---	1.71E-001
PU-239	Not Detected	---	3.56E+002
NP-237	Not Detected	---	1.89E+000
PA-233	Not Detected	---	5.87E-002
TH-229	Not Detected	---	1.96E-001

[Summary Report] - Sample ID: : 20131402

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.23E-002
AG-110m	Not Detected	---------	3.47E-002
BA-133	Not Detected	---------	4.48E-002
BE-7	Not Detected	---------	3.07E-001
CD-115	Not Detected	---------	1.42E+001
CE-139	Not Detected	---------	2.81E-002
CE-141	Not Detected	---------	6.09E-002
CE-144	Not Detected	---------	2.01E-001
CM-243	Not Detected	---------	1.71E-001
CO-56	Not Detected	---------	4.14E-002
CO-57	Not Detected	---------	2.66E-002
CO-58	Not Detected	---------	3.89E-002
CO-60	Not Detected	---------	3.93E-002
CR-51	Not Detected	---------	3.41E-001
CS-134	Not Detected	---------	4.48E-002
CS-137	Not Detected	---------	3.73E-002
EU-152	Not Detected	---------	7.67E-002
EU-154	Not Detected	---------	2.02E-001
EU-155	Not Detected	---------	1.13E-001
FE-59	Not Detected	---------	1.07E-001
GD-153	Not Detected	---------	6.75E-002
HG-203	Not Detected	---------	4.03E-002
I-131	Not Detected	---------	1.19E-001
IR-192	Not Detected	---------	3.15E-002
K-40	1.53E+001	2.13E+000	4.00E-001
MN-52	Not Detected	---------	3.02E-001
MN-54	Not Detected	---------	3.87E-002
MO-99	Not Detected	---------	2.03E+001
NA-22	Not Detected	---------	5.17E-002
NA-24	Not Detected	---------	6.72E+006
ND-147	Not Detected	---------	6.17E-001
NI-57	Not Detected	---------	1.77E+002
RU-103	Not Detected	---------	3.83E-002
RU-106	Not Detected	---------	2.89E-001
SB-122	Not Detected	---------	3.47E+000
SB-124	Not Detected	---------	3.65E-002
SB-125	Not Detected	---------	9.03E-002
SN-113	Not Detected	---------	4.26E-002
SR-85	Not Detected	---------	4.44E-002
TA-182	Not Detected	---------	1.99E-001
TA-183	Not Detected	---------	1.50E+000
TL-201	Not Detected	---------	4.11E+000
Y-88	Not Detected	---------	3.50E-002
ZN-65	Not Detected	---------	1.29E-001
ZR-95	Not Detected	---------	7.32E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:49:06 AM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059806-003
Lab Sample ID : 20131403

Sample Description : 6531/1108-SP2-BH1-10-S
Sample Quantity : 961.000 gram
Sample Date/Time : 9/3/02 1:45:00 PM
Acquire Start Date/Time : 9/20/02 6:08:56 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	---	4.02E-001
RA-226	1.09E+000	4.37E-001	6.27E-001
PB-214	5.03E-001	8.03E-002	5.42E-002
BI-214	4.46E-001	7.74E-002	4.69E-002
PB-210	Not Detected	---	7.10E+000
TH-232	4.91E-001	2.43E-001	1.63E-001
RA-228	5.54E-001	1.22E-001	1.36E-001
AC-228	5.70E-001	1.18E-001	8.63E-002
TH-228	4.38E-001	1.73E-001	3.99E-001
RA-224	5.52E-001	1.45E-001	8.27E-002
PB-212	5.69E-001	8.51E-002	3.22E-002
BI-212	5.33E-001	2.38E-001	3.29E-001
TL-208	4.92E-001	9.27E-002	7.55E-002
U-235	1.10E-001	1.44E-001	1.68E-001
TH-231	Not Detected	---	5.52E+000
PA-231	Not Detected	---	1.17E+000
TH-227	Not Detected	---	2.58E-001
RA-223	Not Detected	---	2.54E-001
RN-219	Not Detected	---	3.23E-001
PB-211	Not Detected	---	7.19E-001
TL-207	Not Detected	---	1.25E+001
AM-241	Not Detected	---	1.39E-001
PU-239	Not Detected	---	2.95E+002
NP-237	Not Detected	---	1.57E+000
PA-233	Not Detected	---	4.70E-002
TH-229	Not Detected	---	1.66E-001

[Summary Report] - Sample ID: : 20131403

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.65E-002
AG-110m	Not Detected	---------	2.65E-002
BA-133	Not Detected	---------	3.62E-002
BE-7	Not Detected	---------	2.58E-001
CD-115	Not Detected	---------	1.11E+001
CE-139	Not Detected	---------	2.20E-002
CE-141	Not Detected	---------	5.14E-002
CE-144	Not Detected	---------	1.65E-001
CM-243	Not Detected	---------	1.44E-001
CO-56	Not Detected	---------	3.30E-002
CO-57	Not Detected	---------	2.16E-002
CO-58	Not Detected	---------	3.20E-002
CO-60	Not Detected	---------	3.41E-002
CR-51	Not Detected	---------	2.79E-001
CS-134	Not Detected	---------	3.56E-002
CS-137	Not Detected	---------	2.72E-002
EU-152	Not Detected	---------	6.25E-002
EU-154	Not Detected	---------	1.72E-001
EU-155	Not Detected	---------	9.44E-002
FE-59	Not Detected	---------	8.60E-002
GD-153	Not Detected	---------	5.87E-002
HG-203	Not Detected	---------	3.33E-002
I-131	Not Detected	---------	1.03E-001
IR-192	Not Detected	---------	2.53E-002
K-40	1.67E+001	2.27E+000	2.45E-001
MN-52	Not Detected	---------	2.26E-001
MN-54	Not Detected	---------	3.09E-002
MO-99	Not Detected	---------	1.60E+001
NA-22	Not Detected	---------	4.20E-002
NA-24	Not Detected	---------	6.12E+006
ND-147	Not Detected	---------	5.29E-001
NI-57	Not Detected	---------	1.40E+002
RU-103	Not Detected	---------	3.23E-002
RU-106	Not Detected	---------	2.46E-001
SB-122	Not Detected	---------	2.88E+000
SB-124	Not Detected	---------	2.97E-002
SB-125	Not Detected	---------	7.17E-002
SN-113	Not Detected	---------	3.47E-002
SR-85	Not Detected	---------	3.62E-002
TA-182	Not Detected	---------	1.58E-001
TA-183	Not Detected	---------	1.22E+000
TL-201	Not Detected	---------	3.43E+000
Y-88	Not Detected	---------	2.81E-002
ZN-65	Not Detected	---------	1.03E-001
ZR-95	Not Detected	---------	5.92E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:49:58 AM

Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059807-003
Lab Sample ID : 20131404

Sample Description : 6531/1108-SP2-BH1-15-S
Sample Quantity : 886.000 gram
Sample Date/Time : 9/3/02 2:30:00 PM
Acquire Start Date/Time : 9/20/02 7:51:15 PM
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	---	4.36E-001
RA-226	1.42E+000	4.89E-001	6.77E-001
PB-214	6.31E-001	9.51E-002	5.09E-002
BI-214	5.50E-001	9.35E-002	5.52E-002
PB-210	Not Detected	---	7.72E+000
TH-232	5.32E-001	2.66E-001	1.85E-001
RA-228	5.73E-001	1.28E-001	1.50E-001
AC-228	5.62E-001	1.21E-001	9.56E-002
TH-228	7.05E-001	2.13E-001	3.90E-001
RA-224	6.82E-001	1.69E-001	6.99E-002
PB-212	6.06E-001	9.07E-002	3.34E-002
BI-212	1.08E+000	3.06E-001	3.46E-001
TL-208	5.12E-001	9.45E-002	7.06E-002
U-235	8.06E-002	1.51E-001	1.76E-001
TH-231	Not Detected	---	5.85E+000
PA-231	Not Detected	---	1.27E+000
TH-227	Not Detected	---	2.75E-001
RA-223	Not Detected	---	2.73E-001
RN-219	Not Detected	---	3.41E-001
PB-211	Not Detected	---	7.76E-001
TL-207	Not Detected	---	1.36E+001
AM-241	Not Detected	---	1.49E-001
PU-239	Not Detected	---	3.12E+002
NP-237	Not Detected	---	1.66E+000
PA-233	Not Detected	---	5.14E-002
TH-229	Not Detected	---	1.67E-001

[Summary Report] - Sample ID: : 20131404

uclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.96E-002
AG-110m	Not Detected	---------	2.65E-002
BA-133	Not Detected	---------	3.85E-002
BE-7	Not Detected	---------	2.75E-001
CD-115	Not Detected	---------	1.24E+001
CE-139	Not Detected	---------	2.43E-002
CE-141	Not Detected	---------	5.50E-002
CE-144	Not Detected	---------	1.78E-001
CM-243	Not Detected	---------	1.52E-001
CO-56	Not Detected	---------	3.68E-002
CO-57	Not Detected	---------	2.31E-002
CO-58	Not Detected	---------	3.44E-002
CO-60	Not Detected	---------	3.57E-002
CR-51	Not Detected	---------	3.21E-001
CS-134	Not Detected	---------	3.99E-002
CS-137	Not Detected	---------	2.94E-002
EU-152	Not Detected	---------	6.68E-002
EU-154	Not Detected	---------	1.86E-001
EU-155	Not Detected	---------	9.93E-002
FE-59	Not Detected	---------	9.88E-002
GD-153	Not Detected	---------	5.96E-002
HG-203	Not Detected	---------	3.52E-002
I-131	Not Detected	---------	1.09E-001
IR-192	Not Detected	---------	2.84E-002
K-40	1.74E+001	2.37E+000	2.55E-001
MN-52	Not Detected	---------	2.56E-001
MN-54	Not Detected	---------	2.25E-002
MO-99	Not Detected	---------	1.72E+001
NA-22	Not Detected	---------	4.38E-002
NA-24	Not Detected	---------	6.28E+006
ND-147	Not Detected	---------	5.73E-001
NI-57	Not Detected	---------	1.42E+002
RU-103	Not Detected	---------	3.34E-002
RU-106	Not Detected	---------	2.78E-001
SB-122	Not Detected	---------	3.07E+000
SB-124	Not Detected	---------	3.24E-002
SB-125	Not Detected	---------	7.42E-002
SN-113	Not Detected	---------	3.75E-002
SR-85	Not Detected	---------	3.81E-002
TA-182	Not Detected	---------	1.65E-001
TA-183	Not Detected	---------	1.31E+000
TL-201	Not Detected	---------	3.70E+000
Y-88	Not Detected	---------	2.88E-002
ZN-65	Not Detected	---------	1.07E-001
ZR-95	Not Detected	---------	6.29E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:51:11 AM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059808-003
Lab Sample ID : 20131405

Sample Description : 6536/1010-SP1-BH1-25-S
Sample Quantity : 795.000 gram
Sample Date/Time : 9/4/02 9:55:00 AM
Acquire Start Date/Time : 9/20/02 9:33:34 PM
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	---	4.11E-001
RA-226	1.51E+000	4.70E-001	6.23E-001
PB-214	4.70E-001	7.76E-002	5.32E-002
BI-214	4.31E-001	7.75E-002	4.84E-002
PB-210	Not Detected	---	7.39E+000
TH-232	4.52E-001	2.23E-001	1.39E-001
RA-228	3.51E-001	1.44E-001	1.95E-001
AC-228	Not Detected	---	1.78E-001
TH-228	Not Detected	---	6.05E-001
RA-224	4.62E-001	1.40E-001	1.05E-001
PB-212	5.05E-001	7.77E-002	3.37E-002
BI-212	3.98E-001	2.30E-001	3.33E-001
TL-208	4.66E-001	9.32E-002	7.97E-002
U-235	Not Detected	---	1.74E-001
TH-231	Not Detected	---	5.64E+000
PA-231	Not Detected	---	1.22E+000
TH-227	Not Detected	---	2.68E-001
RA-223	Not Detected	---	2.56E-001
RN-219	~~2.70E-001~~	~~2.74E-001~~ Not Detected	3.32E-001
PB-211	Not Detected	---	7.39E-001
TL-207	Not Detected	---	1.33E+001
AM-241	Not Detected	---	1.42E-001
PU-239	Not Detected	---	3.11E+002
NP-237	Not Detected	---	1.63E+000
PA-233	Not Detected	---	5.05E-002
TH-229	Not Detected	---	1.64E-001

[Summary Report] - Sample ID: : 20131405

uclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.62E-002
AG-110m	Not Detected	---------	2.87E-002
BA-133	Not Detected	---------	3.81E-002
BE-7	Not Detected	---------	2.42E-001
CD-115	Not Detected	---------	9.61E+000
CE-139	Not Detected	---------	2.36E-002
CE-141	Not Detected	---------	5.28E-002
CE-144	Not Detected	---------	1.73E-001
CM-243	Not Detected	---------	1.49E-001
CO-56	Not Detected	---------	3.56E-002
CO-57	Not Detected	---------	2.17E-002
CO-58	Not Detected	---------	3.26E-002
CO-60	Not Detected	---------	3.31E-002
CR-51	Not Detected	---------	2.99E-001
CS-134	Not Detected	---------	3.63E-002
CS-137	Not Detected	---------	3.02E-002
EU-152	Not Detected	---------	6.27E-002
EU-154	Not Detected	---------	1.68E-001
EU-155	Not Detected	---------	9.50E-002
FE-59	Not Detected	---------	8.76E-002
GD-153	Not Detected	---------	5.66E-002
HG-203	Not Detected	---------	3.35E-002
I-131	Not Detected	---------	1.02E-001
IR-192	Not Detected	---------	2.80E-002
K-40	1.31E+001	1.82E+000	2.66E-001
MN-52	Not Detected	---------	2.20E-001
MN-54	Not Detected	---------	3.21E-002
MO-99	Not Detected	---------	1.45E+001
NA-22	Not Detected	---------	4.22E-002
NA-24	Not Detected	---------	2.80E+006
ND-147	Not Detected	---------	5.16E-001
NI-57	Not Detected	---------	1.01E+002
RU-103	Not Detected	---------	3.42E-002
RU-106	Not Detected	---------	2.56E-001
SB-122	Not Detected	---------	2.35E+000
SB-124	Not Detected	---------	3.00E-002
SB-125	Not Detected	---------	7.36E-002
SN-113	Not Detected	---------	3.60E-002
SR-85	Not Detected	---------	3.61E-002
TA-182	Not Detected	---------	1.57E-001
TA-183	Not Detected	---------	1.15E+000
TL-201	Not Detected	---------	3.01E+000
Y-88	Not Detected	---------	3.00E-002
ZN-65	Not Detected	---------	1.05E-001
ZR-95	Not Detected	---------	6.21E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:52:07 AM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059809-003
Lab Sample ID : 20131406

Sample Description : 6536/1010-SP1-BH1-30-S
Sample Quantity : 815.000 gram
Sample Date/Time : 9/4/02 10:40:00 AM
Acquire Start Date/Time : 9/20/02 11:15:53 PM
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	---	4.61E-001
RA-226	1.20E+000	4.61E-001	6.52E-001
PB-214	4.99E-001	8.18E-002	5.70E-002
BI-214	5.08E-001	8.91E-002	5.62E-002
PB-210	Not Detected	---	8.23E+000
TH-232	4.91E-001	2.52E-001	1.91E-001
RA-228	5.52E-001	1.25E-001	1.32E-001
AC-228	5.23E-001	1.18E-001	9.98E-002
TH-228	6.32E-001	2.10E-001	3.93E-001
RA-224	5.47E-001	1.50E-001	8.73E-002
PB-212	5.97E-001	9.00E-002	3.67E-002
BI-212	5.61E-001	2.77E-001	3.93E-001
TL-208	6.27E-001	1.13E-001	8.37E-002
U-235	Not Detected	---	1.84E-001
TH-231	Not Detected	---	6.08E+000
PA-231	Not Detected	---	1.30E+000
TH-227	Not Detected	---	2.85E-001
RA-223	Not Detected	---	2.75E-001
RN-219	Not Detected	---	3.59E-001
PB-211	Not Detected	---	7.80E-001
TL-207	Not Detected	---	1.51E+001
AM-241	Not Detected	---	1.56E-001
PU-239	Not Detected	---	3.23E+002
NP-237	Not Detected	---	1.72E+000
PA-233	Not Detected	---	5.26E-002
TH-229	Not Detected	---	1.75E-001

Summary Report] - Sample ID: : 20131406

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.83E-002
AG-110m	Not Detected	---	3.14E-002
BA-133	Not Detected	---	4.15E-002
BE-7	Not Detected	---	2.82E-001
CD-115	Not Detected	---	1.04E+001
CE-139	Not Detected	---	2.56E-002
CE-141	Not Detected	---	5.72E-002
CE-144	Not Detected	---	1.84E-001
CM-243	Not Detected	---	1.57E-001
CO-56	Not Detected	---	3.96E-002
CO-57	Not Detected	---	2.32E-002
CO-58	Not Detected	---	3.77E-002
CO-60	Not Detected	---	3.97E-002
CR-51	Not Detected	---	3.28E-001
CS-134	Not Detected	---	4.13E-002
CS-137	Not Detected	---	3.23E-002
EU-152	Not Detected	---	6.70E-002
EU-154	Not Detected	---	1.79E-001
EU-155	Not Detected	---	1.01E-001
FE-59	Not Detected	---	1.07E-001
GD-153	Not Detected	---	6.30E-002
HG-203	Not Detected	---	3.62E-002
I-131	Not Detected	---	1.11E-001
IR-192	Not Detected	---	2.90E-002
K-40	1.92E+001	2.61E+000	3.02E-001
MN-52	Not Detected	---	2.46E-001
MN-54	Not Detected	---	3.61E-002
MO-99	Not Detected	---	1.61E+001
NA-22	Not Detected	---	4.96E-002
NA-24	Not Detected	---	3.14E+006
ND-147	Not Detected	---	5.46E-001
NI-57	Not Detected	---	1.17E+002
RU-103	Not Detected	---	3.54E-002
RU-106	Not Detected	---	2.87E-001
SB-122	Not Detected	---	2.77E+000
SB-124	Not Detected	---	3.37E-002
SB-125	Not Detected	---	7.74E-002
SN-113	Not Detected	---	3.84E-002
SR-85	Not Detected	---	3.95E-002
TA-182	Not Detected	---	1.77E-001
TA-183	Not Detected	---	1.25E+000
TL-201	Not Detected	---	3.33E+000
Y-88	Not Detected	---	3.12E-002
ZN-65	Not Detected	---	1.15E-001
ZR-95	Not Detected	---	6.97E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:53:13 AM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059810-003
Lab Sample ID : 20131407

Sample Description : 6536/1010-SP2-BH1-15-S
Sample Quantity : 768.000 gram
Sample Date/Time : 9/4/02 2:40:00 PM
Acquire Start Date/Time : 9/21/02 12:58:12 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	---	4.81E-001
RA-226	1.33E+000	5.13E-001	7.27E-001
PB-214	6.11E-001	9.65E-002	6.12E-002
I-214	5.61E-001	9.61E-002	5.39E-002
B-210	Not Detected	---	8.24E+000
TH-232	4.46E-001	2.27E-001	1.62E-001
RA-228	5.12E-001	1.27E-001	1.62E-001
AC-228	4.95E-001	1.16E-001	1.00E-001
TH-228	6.69E-001	2.24E-001	4.28E-001
RA-224	6.48E-001	1.72E-001	9.39E-002
PB-212	6.19E-001	9.35E-002	3.59E-002
BI-212	5.72E-001	2.62E-001	3.59E-001
TL-208	5.67E-001	1.06E-001	8.15E-002
U-235	Not Detected	---	1.85E-001
TH-231	Not Detected	---	6.02E+000
PA-231	Not Detected	---	1.32E+000
TH-227	Not Detected	---	3.02E-001
RA-223	Not Detected	---	2.84E-001
RN-219	Not Detected	---	3.69E-001
PB-211	Not Detected	---	7.85E-001
TL-207	Not Detected	---	1.49E+001
AM-241	Not Detected	---	1.62E-001
PU-239	Not Detected	---	3.47E+002
NP-237	Not Detected	---	1.84E+000
PA-233	Not Detected	---	5.43E-002
TH-229	Not Detected	---	1.84E-001

[Summary Report] - Sample ID: : 20131407

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.15E-002
AG-110m	Not Detected	---------	2.87E-002
BA-133	Not Detected	---------	4.19E-002
BE-7	Not Detected	---------	2.76E-001
CD-115	Not Detected	---------	1.02E+001
CE-139	Not Detected	---------	2.45E-002
CE-141	Not Detected	---------	5.76E-002
CE-144	Not Detected	---------	1.92E-001
CM-243	Not Detected	---------	1.65E-001
CO-56	Not Detected	---------	3.90E-002
CO-57	Not Detected	---------	2.45E-002
CO-58	Not Detected	---------	3.70E-002
CO-60	Not Detected	---------	4.14E-002
CR-51	Not Detected	---------	3.35E-001
CS-134	Not Detected	---------	4.40E-002
CS-137	Not Detected	---------	3.06E-002
EU-152	Not Detected	---------	7.09E-002
EU-154	Not Detected	---------	1.97E-001
EU-155	Not Detected	---------	1.08E-001
FE-59	Not Detected	---------	1.06E-001
GD-153	Not Detected	---------	6.48E-002
HG-203	Not Detected	---------	3.78E-002
I-131	Not Detected	---------	1.01E-001
IR-192	Not Detected	---------	2.98E-002
K-40	1.70E+001	2.34E+000	3.22E-001
MN-52	Not Detected	---------	2.24E-001
MN-54	Not Detected	---------	3.50E-002
MO-99	Not Detected	---------	1.51E+001
NA-22	Not Detected	---------	4.83E-002
NA-24	Not Detected	---------	2.99E+006
ND-147	Not Detected	---------	5.53E-001
NI-57	Not Detected	---------	1.06E+002
RU-103	Not Detected	---------	3.78E-002
RU-106	Not Detected	---------	2.76E-001
SB-122	Not Detected	---------	2.75E+000
SB-124	Not Detected	---------	3.46E-002
SB-125	Not Detected	---------	8.35E-002
SN-113	Not Detected	---------	3.93E-002
SR-85	Not Detected	---------	3.97E-002
TA-182	Not Detected	---------	1.85E-001
TA-183	Not Detected	---------	1.29E+000
TL-201	Not Detected	---------	3.27E+000
Y-88	Not Detected	---------	3.46E-002
ZN-65	Not Detected	---------	1.21E-001
ZR-95	Not Detected	---------	7.16E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:54:00 AM

Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059811-003
Lab Sample ID : 20131408

Sample Description : 6536/1010-SP2-BH1-19-S
Sample Quantity : 736.000 gram
Sample Date/Time : 9/4/02 3:15:00 PM
Acquire Start Date/Time : 9/21/02 2:40:31 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	---------	4.96E-001
RA-226	1.39E+000	5.47E-001	7.82E-001
PB-214	6.60E-001	1.02E-001	6.03E-002
BI-214	5.72E-001	9.72E-002	5.06E-002
PB-210	Not Detected	---------	8.48E+000
TH-232	4.79E-001	2.53E-001	2.10E-001
RA-228	5.40E-001	1.31E-001	1.57E-001
AC-228	5.70E-001	1.37E-001	1.31E-001
TH-228	4.96E-001	2.08E-001	4.77E-001
RA-224	5.46E-001	1.55E-001	9.43E-002
PB-212	5.81E-001	8.89E-002	3.89E-002
BI-212	4.34E-001	2.86E-001	4.28E-001
TL-208	5.76E-001	1.10E-001	8.76E-002
U-235	9.39E-002	1.73E-001	2.02E-001
TH-231	Not Detected	---------	6.41E+000
PA-231	Not Detected	---------	1.41E+000
TH-227	Not Detected	---------	3.04E-001
RA-223	Not Detected	---------	2.92E-001
RN-219	Not Detected	---------	3.71E-001
PB-211	Not Detected	---------	8.66E-001
TL-207	Not Detected	---------	1.66E+001
AM-241	Not Detected	---------	1.65E-001
PU-239	Not Detected	---------	3.52E+002
NP-237	Not Detected	---------	1.86E+000
PA-233	Not Detected	---------	5.89E-002
TH-229	Not Detected	---------	1.89E-001

[Summary Report] - Sample ID: : 20131408

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	4.17E-002
AG-110m	Not Detected	---------	3.29E-002
BA-133	Not Detected	---------	4.47E-002
BE-7	Not Detected	---------	3.11E-001
CD-115	Not Detected	---------	1.08E+001
CE-139	Not Detected	---------	2.63E-002
CE-141	Not Detected	---------	6.20E-002
CE-144	Not Detected	---------	2.00E-001
CM-243	Not Detected	---------	1.71E-001
CO-56	Not Detected	---------	4.28E-002
CO-57	Not Detected	---------	2.54E-002
CO-58	Not Detected	---------	3.90E-002
CO-60	Not Detected	---------	4.41E-002
CR-51	Not Detected	---------	3.42E-001
CS-134	Not Detected	---------	4.37E-002
CS-137	Not Detected	---------	3.43E-002
EU-152	Not Detected	---------	7.35E-002
EU-154	Not Detected	---------	1.96E-001
EU-155	Not Detected	---------	1.08E-001
FE-59	Not Detected	---------	1.07E-001
GD-153	Not Detected	---------	6.55E-002
HG-203	Not Detected	---------	3.96E-002
I-131	Not Detected	---------	1.17E-001
[illegible]R-192	Not Detected	---------	3.19E-002
[illegible]-40	1.75E+001	2.42E+000	3.35E-001
[illegible]N-52	Not Detected	---------	2.74E-001
MN-54	Not Detected	---------	3.80E-002
MO-99	Not Detected	---------	1.74E+001
NA-22	Not Detected	---------	5.29E-002
NA-24	Not Detected	---------	3.36E+006
ND-147	Not Detected	---------	5.76E-001
NI-57	Not Detected	---------	1.18E+002
RU-103	Not Detected	---------	3.75E-002
RU-106	Not Detected	---------	2.90E-001
SB-122	Not Detected	---------	2.68E+000
SB-124	Not Detected	---------	3.38E-002
SB-125	Not Detected	---------	8.22E-002
SN-113	Not Detected	---------	4.15E-002
SR-85	Not Detected	---------	3.96E-002
TA-182	Not Detected	---------	1.95E-001
TA-183	Not Detected	---------	1.31E+000
TL-201	Not Detected	---------	3.38E+000
Y-88	Not Detected	---------	3.89E-002
ZN-65	Not Detected	---------	1.27E-001
ZR-95	Not Detected	---------	7.29E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 6:54:59 AM

* Analyzed by: 9/22/02 Reviewed by: 9/23/02

Customer : SANDERS, M (6135)
Customer Sample ID : 059813-003
Lab Sample ID : 20131409

Sample Description : 6530/1027-SP1-BH1-20-S
Sample Quantity : 948.000 gram
Sample Date/Time : 9/18/02 9:55:00 AM
Acquire Start Date/Time : 9/21/02 4:22:50 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	---	4.21E-001
RA-226	1.25E+000	4.55E-001	6.38E-001
PB-214	5.83E-001	8.95E-002	5.33E-002
BI-214	5.45E-001	9.06E-002	4.79E-002
PB-210	Not Detected	---	7.36E+000
TH-232	5.04E-001	2.56E-001	1.90E-001
RA-228	6.43E-001	1.34E-001	1.34E-001
AC-228	4.64E-001	1.08E-001	9.80E-002
TH-228	6.78E-001	1.98E-001	3.68E-001
RA-224	6.61E-001	1.64E-001	7.61E-002
PB-212	5.65E-001	8.45E-002	3.23E-002
BI-212	6.24E-001	2.40E-001	3.13E-001
TL-208	5.58E-001	9.89E-002	7.04E-002
U-235	Not Detected	---	1.71E-001
TH-231	Not Detected	---	5.68E+000
PA-231	Not Detected	---	1.21E+000
TH-227	Not Detected	---	2.63E-001
RA-223	Not Detected	---	1.10E-001
RN-219	Not Detected	---	2.96E-001
PB-211	Not Detected	---	6.76E-001
TL-207	Not Detected	---	1.30E+001
AM-241	Not Detected	---	1.44E-001
PU-239	Not Detected	---	2.98E+002
NP-237	Not Detected	---	1.67E+000
PA-233	Not Detected	---	4.84E-002
TH-229	Not Detected	---	1.64E-001

[Summary Report] - Sample ID: : 20131409

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.79E-002
AG-110m	Not Detected	---------	2.66E-002
BA-133	Not Detected	---------	3.72E-002
BE-7	Not Detected	---------	2.15E-001
CD-115	Not Detected	---------	1.32E-001
CE-139	Not Detected	---------	2.13E-002
CE-141	Not Detected	---------	3.93E-002
CE-144	Not Detected	---------	1.68E-001
CM-243	Not Detected	---------	1.48E-001
CO-56	Not Detected	---------	3.06E-002
CO-57	Not Detected	---------	2.10E-002
CO-58	Not Detected	---------	2.94E-002
CO-60	Not Detected	---------	3.62E-002
CR-51	Not Detected	---------	2.04E-001
CS-134	Not Detected	---------	3.70E-002
CS-137	Not Detected	---------	2.94E-002
EU-152	Not Detected	---------	6.27E-002
EU-154	Not Detected	---------	1.77E-001
EU-155	Not Detected	---------	9.61E-002
FE-59	Not Detected	---------	7.58E-002
GD-153	Not Detected	---------	5.55E-002
HG-203	Not Detected	---------	2.70E-002
I-131	Not Detected	---------	2.95E-002
IR-192	Not Detected	---------	2.30E-002
K-40	1.67E+001	2.27E+000	2.49E-001
MN-52	Not Detected	---------	3.68E-002
MN-54	Not Detected	---------	3.09E-002
MO-99	Not Detected	---------	4.27E-001
NA-22	Not Detected	---------	4.19E-002
NA-24	Not Detected	---------	7.17E-001
ND-147	Not Detected	---------	2.02E-001
NI-57	Not Detected	---------	1.77E-001
RU-103	Not Detected	---------	2.55E-002
RU-106	Not Detected	---------	2.46E-001
SB-122	Not Detected	---------	6.83E-002
SB-124	Not Detected	---------	2.59E-002
SB-125	Not Detected	---------	7.40E-002
SN-113	Not Detected	---------	3.25E-002
SR-85	Not Detected	---------	3.08E-002
TA-182	Not Detected	---------	1.51E-001
TA-183	Not Detected	---------	1.77E-001
TL-201	Not Detected	---------	1.32E-001
Y-88	Not Detected	---------	2.42E-002
ZN-65	Not Detected	---------	9.97E-002
ZR-95	Not Detected	---------	5.33E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/20/02 4:23:16 PM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059814-003
Lab Sample ID : 20131410

Sample Description : 6530/1027-SP1-BH1-25-S
Sample Quantity : 802.800 gram
Sample Date/Time : 9/18/02 11:05:00 AM
Acquire Start Date/Time : 9/20/02 2:42:54 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	---	5.63E-001
RA-226	8.94E-001	3.95E-001	5.77E-001
PB-214	4.53E-001	7.31E-002	5.22E-002
BI-214	4.55E-001	7.55E-002	4.00E-002
B-210	Not Detected	---	2.15E+001
TH-232	5.81E-001	2.79E-001	1.63E-001
RA-228	4.03E-001	1.20E-001	1.44E-001
AC-228	Not Detected	---	1.46E-001
TH-228	3.67E-001	3.16E-001	4.97E-001
RA-224	5.76E-001	1.36E-001	5.40E-002
PB-212	5.39E-001	8.01E-002	3.14E-002
BI-212	5.20E-001	2.32E-001	3.26E-001
TL-208	4.68E-001	9.88E-002	1.03E-001
U-235	Not Detected	---	1.79E-001
TH-231	Not Detected	---	9.00E+000
PA-231	Not Detected	---	1.09E+000
TH-227	Not Detected	---	2.67E-001
RA-223	Not Detected	---	1.60E-001
RN-219	~~1.56E-001~~	~~2.30E-001~~ Not Detected 9/23/02	2.71E-001
PB-211	Not Detected	---	6.08E-001
TL-207	Not Detected	---	1.03E+001
AM-241	Not Detected	---	3.27E-001
PU-239	Not Detected	---	3.22E+002
NP-237	Not Detected	---	1.73E+000
PA-233	Not Detected	---	4.12E-002
TH-229	Not Detected	---	1.85E-001

[Summary Report] - Sample ID: : 20131410

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.56E-002
AG-110m	Not Detected	---------	2.05E-002
BA-133	Not Detected	---------	3.71E-002
BE-7	Not Detected	---------	1.78E-001
CD-115	Not Detected	---------	9.75E-002
CE-139	Not Detected	---------	2.24E-002
CE-141	Not Detected	---------	4.09E-002
CE-144	Not Detected	---------	1.72E-001
CM-243	Not Detected	---------	1.34E-001
CO-56	Not Detected	---------	2.37E-002
CO-57	Not Detected	---------	2.30E-002
CO-58	Not Detected	---------	2.32E-002
CO-60	Not Detected	---------	2.66E-002
CR-51	Not Detected	---------	1.77E-001
CS-134	Not Detected	---------	2.90E-002
CS-137	Not Detected	---------	2.12E-002
EU-152	Not Detected	---------	6.91E-002
EU-154	Not Detected	---------	1.18E-001
EU-155	Not Detected	---------	1.04E-001
FE-59	Not Detected	---------	5.52E-002
GD-153	Not Detected	---------	7.79E-002
HG-203	Not Detected	---------	2.49E-002
I-131	Not Detected	---------	2.53E-002
IR-192	Not Detected	---------	2.01E-002
K-40	1.38E+001	1.87E+000	2.25E-001
MN-52	Not Detected	---------	2.85E-002
MN-54	Not Detected	---------	2.47E-002
MO-99	Not Detected	---------	2.80E-001
NA-22	Not Detected	---------	3.12E-002
NA-24	Not Detected	---------	2.77E-001
ND-147	Not Detected	---------	1.66E-001
NI-57	Not Detected	---------	5.39E-002
RU-103	Not Detected	---------	2.02E-002
RU-106	Not Detected	---------	2.02E-001
SB-122	Not Detected	---------	5.02E-002
SB-124	Not Detected	---------	2.08E-002
SB-125	Not Detected	---------	5.92E-002
SN-113	Not Detected	---------	2.68E-002
SR-85	Not Detected	---------	2.72E-002
TA-182	Not Detected	---------	1.09E-001
TA-183	Not Detected	---------	3.77E-001
TL-201	Not Detected	---------	1.96E-001
Y-88	Not Detected	---------	1.72E-002
ZN-65	Not Detected	---------	7.08E-002
ZR-95	Not Detected	---------	4.11E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/20/02 6:05:15 PM

* Analyzed by: 9/21/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059815-003
Lab Sample ID : 20131411

Sample Description : 6530/1027-SP2-BH1-15-S
Sample Quantity : 770.300 gram
Sample Date/Time : 9/19/02 8:55:00 AM
Acquire Start Date/Time : 9/20/02 4:25:00 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	---	6.26E-001
RA-226	1.28E+000	4.58E-001	6.41E-001
PB-214	6.49E-001	9.71E-002	5.56E-002
BI-214	6.33E-001	1.01E-001	4.82E-002
PB-210	Not Detected	---	2.49E+001
TH-232	7.56E-001	3.55E-001	1.80E-001
RA-228	6.67E-001	1.27E-001	1.08E-001
AC-228	7.38E-001	1.38E-001	8.43E-002
TH-228	6.57E-001	3.73E-001	5.61E-001
RA-224	7.69E-001	1.73E-001	6.74E-002
PB-212	6.99E-001	1.02E-001	3.58E-002
BI-212	7.05E-001	2.62E-001	3.49E-001
TL-208	6.32E-001	1.06E-001	7.09E-002
U-235	Not Detected	---	1.99E-001
TH-231	Not Detected	---	1.00E+001
PA-231	Not Detected	---	1.21E+000
TH-227	Not Detected	---	3.14E-001
RA-223	Not Detected	---	1.70E-001
RN-219	Not Detected	---	3.08E-001
PB-211	Not Detected	---	6.92E-001
TL-207	Not Detected	---	1.11E+001
AM-241	Not Detected	---	3.66E-001
PU-239	Not Detected	---	3.71E+002
NP-237	Not Detected	---	1.98E+000
PA-233	Not Detected	---	4.79E-002
TH-229	Not Detected	---	2.07E-001

[Summary Report] - Sample ID: : 20131411

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.13E-002
AG-110m	Not Detected	---------	2.32E-002
BA-133	Not Detected	---------	4.27E-002
BE-7	Not Detected	---------	2.08E-001
CD-115	Not Detected	---------	8.54E-002
CE-139	Not Detected	---------	2.52E-002
CE-141	Not Detected	---------	4.38E-002
CE-144	Not Detected	---------	1.99E-001
CM-243	Not Detected	---------	1.52E-001
CO-56	Not Detected	---------	2.58E-002
CO-57	Not Detected	---------	2.59E-002
CO-58	Not Detected	---------	2.48E-002
CO-60	Not Detected	---------	2.86E-002
CR-51	Not Detected	---------	1.93E-001
CS-134	Not Detected	---------	3.53E-002
CS-137	Not Detected	---------	2.53E-002
EU-152	Not Detected	---------	7.81E-002
EU-154	Not Detected	---------	1.44E-001
EU-155	Not Detected	---------	1.17E-001
FE-59	Not Detected	---------	5.47E-002
GD-153	Not Detected	---------	8.67E-002
HG-203	Not Detected	---------	2.78E-002
I-131	Not Detected	---------	2.56E-002
IR-192	Not Detected	---------	2.29E-002
K-40	1.48E+001	2.01E+000	2.62E-001
MN-52	Not Detected	---------	3.03E-002
MN-54	Not Detected	---------	2.75E-002
MO-99	Not Detected	---------	2.57E-001
NA-22	Not Detected	---------	3.27E-002
NA-24	Not Detected	---------	1.13E-001
ND-147	Not Detected	---------	1.68E-001
NI-57	Not Detected	---------	5.26E-002
RU-103	Not Detected	---------	2.34E-002
RU-106	Not Detected	---------	2.20E-001
SB-122	Not Detected	---------	4.42E-002
SB-124	Not Detected	---------	2.23E-002
SB-125	Not Detected	---------	6.91E-002
SN-113	Not Detected	---------	3.08E-002
SR-85	Not Detected	---------	3.02E-002
TA-182	Not Detected	---------	1.26E-001
TA-183	Not Detected	---------	3.76E-001
TL-201	Not Detected	---------	1.95E-001
Y-88	Not Detected	---------	2.11E-002
ZN-65	Not Detected	---------	8.32E-002
ZR-95	Not Detected	---------	4.34E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/20/02 7:47:15 PM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059816-003
Lab Sample ID : 20131412

Sample Description : 6530/1027-SP2-BH1-20-S
Sample Quantity : 916.300 gram
Sample Date/Time : 9/19/02 9:25:00 AM
Acquire Start Date/Time : 9/20/02 6:06:59 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	---	5.55E-001
RA-226	1.67E+000	4.43E-001	5.60E-001
PB-214	5.59E-001	8.40E-002	5.06E-002
BI-214	5.29E-001	8.52E-002	4.45E-002
PB-210	Not Detected	---	2.18E+001
TH-232	6.52E-001	3.05E-001	1.50E-001
RA-228	5.74E-001	1.10E-001	1.02E-001
AC-228	5.72E-001	1.11E-001	7.69E-002
TH-228	9.86E-001	3.58E-001	4.89E-001
RA-224	6.43E-001	1.44E-001	4.71E-002
PB-212	5.66E-001	8.31E-002	3.13E-002
BI-212	6.47E-001	2.23E-001	2.88E-001
TL-208	5.68E-001	9.36E-002	5.92E-002
U-235	8.13E-002	1.43E-001	1.82E-001
TH-231	Not Detected	---	8.72E+000
PA-231	Not Detected	---	1.04E+000
TH-227	Not Detected	---	2.60E-001
RA-223	Not Detected	---	1.50E-001
RN-219	Not Detected	---	2.70E-001
PB-211	Not Detected	---	5.93E-001
TL-207	Not Detected	---	9.87E+000
AM-241	Not Detected	---	3.39E-001
PU-239	Not Detected	---	3.25E+002
NP-237	Not Detected	---	1.70E+000
PA-233	Not Detected	---	4.43E-002
TH-229	Not Detected	---	1.85E-001

[Summary Report] - Sample ID: : 20131412

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.70E-002
AG-110m	Not Detected	---------	1.99E-002
BA-133	Not Detected	---------	3.71E-002
BE-7	Not Detected	---------	1.73E-001
CD-115	Not Detected	---------	7.41E-002
CE-139	Not Detected	---------	2.20E-002
CE-141	Not Detected	---------	4.03E-002
CE-144	Not Detected	---------	1.80E-001
CM-243	Not Detected	---------	1.29E-001
CO-56	Not Detected	---------	2.33E-002
CO-57	Not Detected	---------	2.32E-002
CO-58	Not Detected	---------	2.23E-002
CO-60	Not Detected	---------	2.84E-002
CR-51	Not Detected	---------	1.76E-001
CS-134	Not Detected	---------	3.12E-002
CS-137	Not Detected	---------	2.25E-002
EU-152	Not Detected	---------	7.01E-002
EU-154	Not Detected	---------	1.24E-001
EU-155	Not Detected	---------	1.06E-001
FE-59	Not Detected	---------	5.22E-002
GD-153	Not Detected	---------	7.51E-002
HG-203	Not Detected	---------	2.38E-002
I-131	Not Detected	---------	2.42E-002
IR-192	Not Detected	---------	1.99E-002
K-40	1.71E+001	2.29E+000	2.20E-001
MN-52	Not Detected	---------	2.60E-002
MN-54	Not Detected	---------	2.45E-002
MO-99	Not Detected	---------	2.23E-001
NA-22	Not Detected	---------	2.99E-002
NA-24	Not Detected	---------	1.03E-001
ND-147	Not Detected	---------	1.49E-001
NI-57	Not Detected	---------	3.93E-002
RU-103	Not Detected	---------	2.05E-002
RU-106	Not Detected	---------	2.00E-001
SB-122	Not Detected	---------	4.09E-002
SB-124	Not Detected	---------	2.16E-002
SB-125	Not Detected	---------	6.30E-002
SN-113	Not Detected	---------	2.67E-002
SR-85	Not Detected	---------	2.58E-002
TA-182	Not Detected	---------	1.15E-001
TA-183	Not Detected	---------	3.51E-001
TL-201	Not Detected	---------	1.60E-001
Y-88	Not Detected	---------	2.09E-002
ZN-65	Not Detected	---------	7.49E-002
ZR-95	Not Detected	---------	3.80E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/23/02 8:59:52 AM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059820-003
Lab Sample ID : 20131413

Sample Description : MO228-230/1092-DF1-BH1-6-S
Sample Quantity : 980.400 gram
Sample Date/Time : 9/09/02 11:40:00 AM
Acquire Start Date/Time : 9/20/02 7:48:58 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	---	5.38E-001
RA-226	1.25E+000	4.05E-001	5.52E-001
PB-214	5.79E-001	8.49E-002	4.60E-002
BI-214	5.02E-001	8.07E-002	4.14E-002
PB-210	Not Detected	---	2.11E+001
TH-232	5.31E-001	2.58E-001	1.64E-001
RA-228	5.98E-001	1.11E-001	9.98E-002
AC-228	5.32E-001	1.06E-001	8.14E-002
TH-228	Not Detected	---	5.32E-001
RA-224	5.37E-001	1.23E-001	4.31E-002
PB-212	5.92E-001	8.64E-002	2.99E-002
BI-212	6.30E-001	2.25E-001	2.99E-001
TL-208	5.26E-001	8.81E-002	5.93E-002
U-235	Not Detected	---	1.76E-001
TH-231	Not Detected	---	8.59E+000
PA-231	Not Detected	---	1.03E+000
TH-227	Not Detected	---	2.56E-001
RA-223	Not Detected	---	2.64E-001
RN-219	Not Detected	---	2.50E-001
PB-211	Not Detected	---	5.68E-001
TL-207	Not Detected	---	9.42E+000
AM-241	Not Detected	---	3.10E-001
PU-239	Not Detected	---	3.20E+002
NP-237	Not Detected	---	1.70E+000
PA-233	Not Detected	---	4.16E-002
TH-229	Not Detected	---	1.72E-001

[Summary Report] - Sample ID: : 20131413

clide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.54E-002
AG-110m	Not Detected	---------	2.03E-002
BA-133	Not Detected	---------	3.61E-002
BE-7	Not Detected	---------	1.88E-001
CD-115	Not Detected	---------	1.62E+000
CE-139	Not Detected	---------	2.28E-002
CE-141	Not Detected	---------	4.89E-002
CE-144	Not Detected	---------	1.72E-001
CM-243	Not Detected	---------	1.29E-001
CO-56	Not Detected	---------	2.39E-002
CO-57	Not Detected	---------	2.36E-002
CO-58	Not Detected	---------	2.41E-002
CO-60	Not Detected	---------	2.65E-002
CR-51	Not Detected	---------	2.21E-001
CS-134	Not Detected	---------	2.87E-002
CS-137	Not Detected	---------	2.23E-002
EU-152	Not Detected	---------	6.92E-002
EU-154	Not Detected	---------	1.17E-001
EU-155	Not Detected	---------	1.01E-001
FE-59	Not Detected	---------	6.03E-002
GD-153	Not Detected	---------	7.33E-002
HG-203	Not Detected	---------	2.73E-002
I-131	Not Detected	---------	5.39E-002
IR-192	Not Detected	---------	2.18E-002
K-40	1.68E+001	2.24E+000	1.99E-001
MN-52	Not Detected	---------	8.49E-002
MN-54	Not Detected	---------	1.25E-002
MO-99	Not Detected	---------	2.71E+000
NA-22	Not Detected	---------	2.93E-002
NA-24	Not Detected	---------	6.84E+003
ND-147	Not Detected	---------	2.73E-001
NI-57	Not Detected	---------	6.77E+000
RU-103	Not Detected	---------	2.25E-002
RU-106	Not Detected	---------	1.87E-001
SB-122	Not Detected	---------	5.07E-001
SB-124	Not Detected	---------	2.20E-002
SB-125	Not Detected	---------	6.03E-002
SN-113	Not Detected	---------	2.80E-002
SR-85	Not Detected	---------	2.71E-002
TA-182	Not Detected	---------	1.13E-001
TA-183	Not Detected	---------	1.24E+000
TL-201	Not Detected	---------	1.58E+000
Y-88	Not Detected	---------	1.71E-002
ZN-65	Not Detected	---------	7.25E-002
ZR-95	Not Detected	---------	3.96E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/20/02 11:11:13 PM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059821-003
Lab Sample ID : 20131414

Sample Description : MO228-230/1092-DF1-BH1-11-S
Sample Quantity : 706.500 gram
Sample Date/Time : 9/09/02 12:10:00 PM
Acquire Start Date/Time : 9/20/02 9:30:58 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	---	7.22E-001
RA-226	1.57E+000	5.26E-001	7.24E-001
PB-214	7.71E-001	1.14E-001	6.40E-002
BI-214	6.85E-001	1.10E-001	5.37E-002
PB-210	Not Detected	---	2.72E+001
TH-232	7.66E-001	3.65E-001	2.06E-001
RA-228	8.48E-001	1.54E-001	1.19E-001
AC-228	8.29E-001	1.56E-001	1.01E-001
TH-228	1.06E+000	4.16E-001	5.79E-001
RA-224	8.96E-001	1.99E-001	6.86E-002
PB-212	8.55E-001	1.24E-001	3.92E-002
BI-212	1.01E+000	2.90E-001	3.40E-001
TL-208	7.82E-001	1.27E-001	7.49E-002
U-235	1.99E-001	1.70E-001	2.18E-001
TH-231	Not Detected	---	1.11E+001
PA-231	Not Detected	---	1.34E+000
TH-227	Not Detected	---	3.53E-001
RA-223	Not Detected	---	3.42E-001
RN-219	Not Detected	---	3.43E-001
PB-211	Not Detected	---	7.79E-001
TL-207	Not Detected	---	1.17E+001
AM-241	Not Detected	---	4.24E-001
PU-239	Not Detected	---	4.07E+002
NP-237	Not Detected	---	2.16E+000
PA-233	Not Detected	---	5.32E-002
TH-229	Not Detected	---	2.33E-001

[Summary Report] - Sample ID: : 20131414

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.27E-002
AG-110m	Not Detected	---------	2.84E-002
BA-133	Not Detected	---------	4.80E-002
BE-7	Not Detected	---------	2.55E-001
CD-115	Not Detected	---------	2.14E+000
CE-139	Not Detected	---------	2.84E-002
CE-141	Not Detected	---------	5.95E-002
CE-144	Not Detected	---------	2.34E-001
CM-243	Not Detected	---------	1.64E-001
CO-56	Not Detected	---------	3.38E-002
CO-57	Not Detected	---------	2.91E-002
CO-58	Not Detected	---------	2.99E-002
CO-60	Not Detected	---------	3.35E-002
CR-51	Not Detected	---------	2.80E-001
CS-134	Not Detected	---------	3.98E-002
CS-137	Not Detected	---------	2.90E-002
EU-152	Not Detected	---------	8.60E-002
EU-154	Not Detected	---------	1.51E-001
EU-155	Not Detected	---------	1.30E-001
FE-59	Not Detected	---------	7.43E-002
GD-153	Not Detected	---------	9.88E-002
HG-203	Not Detected	---------	3.45E-002
I-131	Not Detected	---------	6.91E-002
IR-192	Not Detected	---------	2.71E-002
K-40	1.63E+001	2.21E+000	2.92E-001
MN-52	Not Detected	---------	1.17E-001
MN-54	Not Detected	---------	3.24E-002
MO-99	Not Detected	---------	3.47E+000
NA-22	Not Detected	---------	3.53E-002
NA-24	Not Detected	---------	8.58E+003
ND-147	Not Detected	---------	3.44E-001
NI-57	Not Detected	---------	9.59E+000
RU-103	Not Detected	---------	3.12E-002
RU-106	Not Detected	---------	2.48E-001
SB-122	Not Detected	---------	6.52E-001
SB-124	Not Detected	---------	2.95E-002
SB-125	Not Detected	---------	7.67E-002
SN-113	Not Detected	---------	3.56E-002
SR-85	Not Detected	---------	3.62E-002
TA-182	Not Detected	---------	1.53E-001
TA-183	Not Detected	---------	1.71E+000
TL-201	Not Detected	---------	1.99E+000
Y-88	Not Detected	---------	2.63E-002
ZN-65	Not Detected	---------	9.59E-002
ZR-95	Not Detected	---------	5.44E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/21/02 12:53:18 AM

Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059822-003
Lab Sample ID : 20131415

Sample Description : MO228-230/1092-DF1-BH2-6-S
Sample Quantity : 715.200 gram
Sample Date/Time : 9/09/02 1:40:00 PM
Acquire Start Date/Time : 9/20/02 11:12:56 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	---	6.73E-001
RA-226	2.08E+000	5.43E-001	6.76E-001
PB-214	7.55E-001	1.11E-001	6.00E-002
BI-214	6.39E-001	1.03E-001	5.08E-002
PB-210	Not Detected	---	2.65E+001
TH-232	6.80E-001	3.28E-001	1.96E-001
RA-228	6.75E-001	1.33E-001	1.29E-001
AC-228	7.31E-001	1.40E-001	8.97E-002
TH-228	8.20E-001	3.82E-001	5.52E-001
RA-224	7.87E-001	1.83E-001	9.32E-002
PB-212	7.44E-001	1.09E-001	3.76E-002
BI-212	7.70E-001	2.74E-001	3.56E-001
TL-208	6.40E-001	1.11E-001	8.27E-002
U-235	Not Detected	---	2.22E-001
TH-231	Not Detected	---	1.05E+001
PA-231	Not Detected	---	1.29E+000
TH-227	Not Detected	---	3.36E-001
RA-223	Not Detected	---	3.29E-001
RN-219	Not Detected	---	3.40E-001
PB-211	Not Detected	---	7.72E-001
TL-207	Not Detected	---	1.18E+001
AM-241	Not Detected	---	4.00E-001
PU-239	Not Detected	---	3.89E+002
NP-237	Not Detected	---	2.10E+000
PA-233	Not Detected	---	5.42E-002
TH-229	Not Detected	---	2.22E-001

[Summary Report] - Sample ID: : 20131415

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.27E-002
AG-110m	Not Detected	---------	2.80E-002
BA-133	Not Detected	---------	4.67E-002
BE-7	Not Detected	---------	2.55E-001
CD-115	Not Detected	---------	2.04E+000
CE-139	Not Detected	---------	2.79E-002
CE-141	Not Detected	---------	6.19E-002
CE-144	Not Detected	---------	2.21E-001
CM-243	Not Detected	---------	1.64E-001
CO-56	Not Detected	---------	3.03E-002
CO-57	Not Detected	---------	2.90E-002
CO-58	Not Detected	---------	2.99E-002
CO-60	Not Detected	---------	3.40E-002
CR-51	Not Detected	---------	2.72E-001
CS-134	Not Detected	---------	3.75E-002
CS-137	Not Detected	---------	3.09E-002
EU-152	Not Detected	---------	8.52E-002
EU-154	Not Detected	---------	1.50E-001
EU-155	Not Detected	---------	1.26E-001
FE-59	Not Detected	---------	7.41E-002
GD-153	Not Detected	---------	9.54E-002
HG-203	Not Detected	---------	3.50E-002
I-131	Not Detected	---------	6.52E-002
IR-192	Not Detected	---------	2.73E-002
K-40	1.70E+001	2.30E+000	2.55E-001
MN-52	Not Detected	---------	1.19E-001
MN-54	Not Detected	---------	3.19E-002
MO-99	Not Detected	---------	3.44E+000
NA-22	Not Detected	---------	3.69E-002
NA-24	Not Detected	---------	9.11E+003
ND-147	Not Detected	---------	3.63E-001
NI-57	Not Detected	---------	9.41E+000
RU-103	Not Detected	---------	2.96E-002
RU-106	Not Detected	---------	2.44E-001
SB-122	Not Detected	---------	6.54E-001
SB-124	Not Detected	---------	2.75E-002
SB-125	Not Detected	---------	7.81E-002
SN-113	Not Detected	---------	3.61E-002
SR-85	Not Detected	---------	3.67E-002
TA-182	Not Detected	---------	1.53E-001
TA-183	Not Detected	---------	1.62E+000
TL-201	Not Detected	---------	2.02E+000
Y-88	Not Detected	---------	2.21E-002
ZN-65	Not Detected	---------	9.63E-002
ZR-95	Not Detected	---------	5.32E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/21/02 2:35:18 AM

* Analyzed by: 9/21/02 Reviewed by: 9/22/02

Customer : SANDERS M (6135)
Customer Sample ID : 059823-003
Lab Sample ID : 20131416

Sample Description : MO228-230/1092-DF1-BH2-11-S
Sample Quantity : 680.500 gram
Sample Date/Time : 9/09/02 1:55:00 PM
Acquire Start Date/Time : 9/21/02 12:55:03 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	---	7.47E-001
RA-226	2.03E+000	5.64E-001	7.25E-001
PB-214	8.75E-001	1.28E-001	6.81E-002
BI-214	7.73E-001	1.21E-001	5.20E-002
PB-210	Not Detected	---	2.84E+001
TH-232	8.42E-001	3.99E-001	2.17E-001
RA-228	8.71E-001	1.59E-001	1.27E-001
AC-228	7.84E-001	1.50E-001	1.01E-001
TH-228	7.17E-001	4.36E-001	6.62E-001
RA-224	1.02E+000	2.24E-001	8.85E-002
PB-212	8.48E-001	1.23E-001	3.83E-002
BI-212	7.62E-001	3.12E-001	4.31E-001
TL-208	7.46E-001	1.24E-001	8.03E-002
U-235	2.20E-001	1.83E-001	2.34E-001
TH-231	Not Detected	---	1.16E+001
PA-231	Not Detected	---	1.36E+000
TH-227	Not Detected	---	3.59E-001
RA-223	Not Detected	---	3.62E-001
RN-219	Not Detected	---	3.55E-001
PB-211	Not Detected	---	7.75E-001
TL-207	Not Detected	---	1.18E+001
AM-241	Not Detected	---	4.28E-001
PU-239	Not Detected	---	4.27E+002
NP-237	Not Detected	---	2.25E+000
PA-233	Not Detected	---	5.50E-002
TH-229	Not Detected	---	2.42E-001

[Summary Report] - Sample ID: : 20131416

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---	3.59E-002
AG-110m	Not Detected	---	2.73E-002
BA-133	Not Detected	---	5.08E-002
BE-7	Not Detected	---	2.65E-001
CD-115	Not Detected	---	2.33E+000
CE-139	Not Detected	---	2.97E-002
CE-141	Not Detected	---	6.43E-002
CE-144	Not Detected	---	2.40E-001
CM-243	Not Detected	---	1.66E-001
CO-56	Not Detected	---	3.27E-002
CO-57	Not Detected	---	3.02E-002
CO-58	Not Detected	---	3.30E-002
CO-60	Not Detected	---	3.32E-002
CR-51	Not Detected	---	2.89E-001
CS-134	Not Detected	---	4.13E-002
CS-137	Not Detected	---	2.88E-002
EU-152	Not Detected	---	8.92E-002
EU-154	Not Detected	---	1.65E-001
EU-155	Not Detected	---	1.34E-001
FE-59	Not Detected	---	7.73E-002
GD-153	Not Detected	---	1.03E-001
HG-203	Not Detected	---	3.53E-002
I-131	Not Detected	---	7.20E-002
IR-192	Not Detected	---	2.84E-002
K-40	1.70E+001	2.30E+000	2.78E-001
MN-52	Not Detected	---	1.10E-001
MN-54	Not Detected	---	3.34E-002
MO-99	Not Detected	---	3.63E+000
NA-22	Not Detected	---	3.87E-002
NA-24	Not Detected	---	9.31E+003
ND-147	Not Detected	---	3.75E-001
NI-57	Not Detected	---	1.01E+001
RU-103	Not Detected	---	3.13E-002
RU-106	Not Detected	---	2.65E-001
SB-122	Not Detected	---	7.00E-001
SB-124	Not Detected	---	2.94E-002
SB-125	Not Detected	---	7.86E-002
SN-113	Not Detected	---	3.68E-002
SR-85	Not Detected	---	3.92E-002
TA-182	Not Detected	---	1.56E-001
TA-183	Not Detected	---	1.75E+000
TL-201	Not Detected	---	2.12E+000
Y-88	Not Detected	---	2.58E-002
ZN-65	Not Detected	---	9.86E-002
ZR-95	Not Detected	---	5.44E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/21/02 4:17:17 AM

Analyzed by: 9/21/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059824-003
Lab Sample ID : 20131417

Sample Description : MO228-230/1092-DF1-BH3-6-S
Sample Quantity : 911.700 gram
Sample Date/Time : 9/09/02 2:10:00 PM
Acquire Start Date/Time : 9/21/02 2:37:01 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	---	5.49E-001
RA-226	1.35E+000	4.25E-001	5.75E-001
PB-214	5.41E-001	8.22E-002	5.11E-002
BI-214	5.50E-001	8.72E-002	4.06E-002
PB-210	Not Detected	---	2.18E+001
TH-232	5.92E-001	2.85E-001	1.73E-001
RA-228	6.09E-001	1.14E-001	9.80E-002
AC-228	6.14E-001	1.17E-001	7.75E-002
TH-228	5.94E-001	2.90E-001	4.23E-001
RA-224	7.12E-001	1.59E-001	6.91E-002
PB-212	6.03E-001	8.81E-002	3.15E-002
BI-212	5.80E-001	2.09E-001	2.72E-001
TL-208	5.07E-001	8.82E-002	6.53E-002
U-235	Not Detected	---	1.79E-001
TH-231	Not Detected	---	8.71E+000
PA-231	Not Detected	---	1.05E+000
TH-227	Not Detected	---	2.70E-001
RA-223	Not Detected	---	2.76E-001
RN-219	Not Detected	---	2.81E-001
PB-211	Not Detected	---	6.27E-001
TL-207	Not Detected	---	9.55E+000
AM-241	Not Detected	---	3.29E-001
PU-239	Not Detected	---	3.28E+002
NP-237	Not Detected	---	1.75E+000
PA-233	Not Detected	---	4.31E-002
TH-229	Not Detected	---	1.87E-001

[Summary Report] - Sample ID: : 20131417

clide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	2.59E-002
AG-110m	Not Detected	---------	2.25E-002
BA-133	Not Detected	---------	3.71E-002
BE-7	Not Detected	---------	1.97E-001
CD-115	Not Detected	---------	1.82E+000
CE-139	Not Detected	---------	2.27E-002
CE-141	Not Detected	---------	4.97E-002
CE-144	Not Detected	---------	1.85E-001
CM-243	Not Detected	---------	1.28E-001
CO-56	Not Detected	---------	2.54E-002
CO-57	Not Detected	---------	2.36E-002
CO-58	Not Detected	---------	2.58E-002
CO-60	Not Detected	---------	2.80E-002
CR-51	Not Detected	---------	2.35E-001
CS-134	Not Detected	---------	3.05E-002
CS-137	Not Detected	---------	2.39E-002
EU-152	Not Detected	---------	6.94E-002
EU-154	Not Detected	---------	1.19E-001
EU-155	Not Detected	---------	1.06E-001
FE-59	Not Detected	---------	5.94E-002
GD-153	Not Detected	---------	7.90E-002
HG-203	Not Detected	---------	2.70E-002
I-131	Not Detected	---------	5.76E-002
IR-192	Not Detected	---------	2.25E-002
K-40	1.72E+001	2.29E+000	1.87E-001
MN-52	Not Detected	---------	9.29E-002
MN-54	Not Detected	---------	2.54E-002
MO-99	Not Detected	---------	3.05E+000
NA-22	Not Detected	---------	3.04E-002
NA-24	Not Detected	---------	8.27E+003
ND-147	Not Detected	---------	2.73E-001
NI-57	Not Detected	---------	7.32E+000
RU-103	Not Detected	---------	2.49E-002
RU-106	Not Detected	---------	2.03E-001
SB-122	Not Detected	---------	5.24E-001
SB-124	Not Detected	---------	2.37E-002
SB-125	Not Detected	---------	6.30E-002
SN-113	Not Detected	---------	2.82E-002
SR-85	Not Detected	---------	2.86E-002
TA-182	Not Detected	---------	1.20E-001
TA-183	Not Detected	---------	1.35E+000
TL-201	Not Detected	---------	1.75E+000
Y-88	Not Detected	---------	1.97E-002
ZN-65	Not Detected	---------	7.77E-002
ZR-95	Not Detected	---------	4.51E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/21/02 5:59:15 AM

* Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : 059825-003
Lab Sample ID : 20131418

Sample Description : MO228-230/1092-DF1-BH3-11-S
Sample Quantity : 696.400 gram
Sample Date/Time : 9/09/02 2:30:00 PM
Acquire Start Date/Time : 9/21/02 4:19:00 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	---	7.13E-001
RA-226	1.90E+000	5.40E-001	6.98E-001
PB-214	7.71E-001	1.15E-001	6.58E-002
I-214	7.08E-001	1.13E-001	5.41E-002
B-210	Not Detected	---	2.76E+001
TH-232	7.30E-001	3.55E-001	2.24E-001
RA-228	8.79E-001	1.59E-001	1.21E-001
AC-228	8.53E-001	1.59E-001	9.67E-002
TH-228	8.95E-001	3.87E-001	5.49E-001
RA-224	9.29E-001	2.07E-001	8.66E-002
PB-212	8.26E-001	1.20E-001	3.95E-002
BI-212	8.69E-001	2.99E-001	3.86E-001
TL-208	7.46E-001	1.19E-001	6.10E-002
U-235	Not Detected	---	2.28E-001
TH-231	Not Detected	---	1.10E+001
PA-231	Not Detected	---	1.33E+000
TH-227	Not Detected	---	3.52E-001
RA-223	Not Detected	---	3.47E-001
RN-219	Not Detected	---	3.39E-001
PB-211	Not Detected	---	7.92E-001
TL-207	Not Detected	---	1.23E+001
AM-241	Not Detected	---	4.14E-001
PU-239	Not Detected	---	4.04E+002
NP-237	Not Detected	---	2.15E+000
PA-233	Not Detected	---	5.29E-002
TH-229	Not Detected	---	2.24E-001

[Summary Report] - Sample ID: : 20131418

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	---------	3.28E-002
AG-110m	Not Detected	---------	2.68E-002
BA-133	Not Detected	---------	4.87E-002
BE-7	Not Detected	---------	2.35E-001
CD-115	Not Detected	---------	2.34E+000
CE-139	Not Detected	---------	2.91E-002
CE-141	Not Detected	---------	6.26E-002
CE-144	Not Detected	---------	2.26E-001
CM-243	Not Detected	---------	1.65E-001
CO-56	Not Detected	---------	3.25E-002
CO-57	Not Detected	---------	2.99E-002
CO-58	Not Detected	---------	3.05E-002
CO-60	Not Detected	---------	3.50E-002
CR-51	Not Detected	---------	2.76E-001
CS-134	Not Detected	---------	4.01E-002
CS-137	Not Detected	---------	2.83E-002
EU-152	Not Detected	---------	8.70E-002
EU-154	Not Detected	---------	1.51E-001
EU-155	Not Detected	---------	1.30E-001
FE-59	Not Detected	---------	7.44E-002
GD-153	Not Detected	---------	9.59E-002
HG-203	Not Detected	---------	3.53E-002
I-131	Not Detected	---------	7.31E-002
IR-192	Not Detected	---------	2.70E-002
K-40	1.65E+001	2.23E+000	2.92E-001
MN-52	Not Detected	---------	1.14E-001
MN-54	Not Detected	---------	3.18E-002
MO-99	Not Detected	---------	3.66E+000
NA-22	Not Detected	---------	3.68E-002
NA-24	Not Detected	---------	1.11E+004
ND-147	Not Detected	---------	3.52E-001
NI-57	Not Detected	---------	1.02E+001
RU-103	Not Detected	---------	3.18E-002
RU-106	Not Detected	---------	2.65E-001
SB-122	Not Detected	---------	6.69E-001
SB-124	Not Detected	---------	3.03E-002
SB-125	Not Detected	---------	7.96E-002
SN-113	Not Detected	---------	3.55E-002
SR-85	Not Detected	---------	3.74E-002
TA-182	Not Detected	---------	1.45E-001
TA-183	Not Detected	---------	1.72E+000
TL-201	Not Detected	---------	2.07E+000
Y-88	Not Detected	---------	2.81E-002
ZN-65	Not Detected	---------	9.22E-002
ZR-95	Not Detected	---------	5.09E-002

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/21/02 10:37:27 AM

[redacted]

Analyzed by: 9/23/02 Reviewed by: 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
Lab Sample ID : 20131419

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 : 9/21/02 10:27:14 AM
Detector Name : LAB01
Elapsed Live/Real Time : 600 / 604 seconds

Comments:

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
U-238	Not Detected	---	2.53E+003
RA-226	Not Detected	---	5.35E+003
PB-214	Not Detected	---	6.55E+002
BI-214	Not Detected	---	6.05E+002
[redacted]3-210	Not Detected	---	9.94E+004
[redacted]H-232	1.14E+003	1.08E+003	1.53E+003
RA-228	Not Detected	---	2.40E+003
AC-228	Not Detected	---	1.43E+003
TH-228	Not Detected	---	4.78E+005
RA-224	Not Detected	---	1.85E+004
PB-212	Not Detected	---	3.39E+004
BI-212	Not Detected	---	3.15E+005
TL-208	Not Detected	---	6.57E+004
U-235	Not Detected	---	1.36E+003
TH-231	Not Detected	---	4.19E+004
PA-231	Not Detected	---	1.39E+004
TH-227	Not Detected	---	2.62E+003
RA-223	Not Detected	---	1.00E+026
RN-219	Not Detected	---	6.82E+003
PB-211	Not Detected	---	1.52E+004
TL-207	Not Detected	---	2.38E+005
AM-241	8.84E+004	1.28E+004	1.93E+003
PU-239	Not Detected	---	2.40E+006
NP-237	Not Detected	---	1.21E+004
PA-233	Not Detected	---	5.88E+002
TH-229	Not Detected	---	1.28E+003

[Summary Report] - Sample ID: : 20131419

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	---	3.11E+002
AG-110m	Not Detected	---	2.72E+008
BA-133	Not Detected	---	8.89E+002
BE-7	Not Detected	---	1.00E+026
CD-115	Not Detected	---	1.00E+026
CE-139	Not Detected	---	5.75E+011
CE-141	Not Detected	---	1.00E+026
CE-144	Not Detected	---	5.12E+007
CM-243	Not Detected	---	2.02E+003
CO-56	Not Detected	---	2.89E+019
CO-57	Not Detected	---	1.08E+007
CO-58	Not Detected	---	8.61E+020
CO-60	7.78E+004	1.03E+004	9.46E+002
CR-51	Not Detected	---	1.00E+026
CS-134	Not Detected	---	1.52E+004
CS-137	6.83E+004	8.68E+003	4.04E+002
EU-152	Not Detected	---	9.29E+002
EU-154	Not Detected	---	3.48E+003
EU-155	Not Detected	---	4.17E+003
FE-59	Not Detected	---	1.00E+026
GD-153	Not Detected	---	1.11E+008
HG-203	Not Detected	---	1.00E+026
I-131	Not Detected	---	1.00E+026
IR-192	Not Detected	---	1.40E+020
K-40	Not Detected	---	1.31E+003
MN-52	Not Detected	---	1.00E+026
MN-54	Not Detected	---	5.01E+006
MO-99	Not Detected	---	1.00E+026
NA-22	Not Detected	---	5.39E+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	---	9.69E+006
SB-122	Not Detected	---	1.00E+026
SB-124	Not Detected	---	1.00E+026
SB-125	Not Detected	---	2.38E+004
SN-113	Not Detected	---	1.03E+014
SR-85	Not Detected	---	1.00E+026
TA-182	Not Detected	---	2.47E+014
TA-183	Not Detected	---	1.00E+026
TL-201	Not Detected	---	1.00E+026
Y-88	Not Detected	---	2.93E+014
ZN-65	Not Detected	---	1.89E+008
ZR-95	Not Detected	---	1.00E+026

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*
Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report
*
****

Report Date : 9/21/02 10:37:32 AM
QA File : C:\GENIE2K\CAMFILES\LCS1.QAF
Analyst : KICHAVE
Sample ID : 20131419
Sample Quantity : 1.00 Each
Sample Date : 11/1/90 12:00:00 PM
Measurement Date : 9/21/02 10:27:14 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	SD	UD	BS >
AM-241 ACTIVITY	8.573E-002	3.464E-003	8.840E-002	<			>
CS-137 Activity	6.836E-002	1.363E-003	6.833E-002	<			>
CO-60 Activity	7.658E-002	3.467E-003	7.764E-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: _____ 9/23/02

Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
9/21/02 10:32:49 AM

Analyzed by: [redacted] 9/21/02 Reviewed by: [redacted] 9/23/02

Customer : SANDERS M (6135)
Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
Lab Sample ID : 20131420

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 : 9/21/02 10:22:33 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	---	5.80E+003
PB-214	Not Detected	---	5.88E+002
BI-214	Not Detected	---	4.59E+002
PB-210	Not Detected	---	2.65E+005
TH-232	Not Detected	---	1.82E+003
RA-228	Not Detected	---	1.79E+003
AC-228	Not Detected	---	1.01E+003
TH-228	Not Detected	---	4.28E+005
RA-224	Not Detected	---	1.16E+004
PB-212	Not Detected	---	3.35E+004
BI-212	Not Detected	---	2.11E+005
TL-208	Not Detected	---	5.33E+004
U-235	Not Detected	---	1.52E+003
TH-231	Not Detected	---	6.88E+004
PA-231	Not Detected	---	1.25E+004
TH-227	Not Detected	---	2.57E+003
RA-223	Not Detected	---	1.00E+026
RN-219	Not Detected	---	5.66E+003
PB-211	Not Detected	---	1.28E+004
TL-207	Not Detected	---	1.64E+005
AM-241	8.08E+004	1.20E+004	4.03E+003
PU-239	Not Detected	---	2.61E+006
NP-237	Not Detected	---	1.38E+004
PA-233	Not Detected	---	5.30E+002
TH-229	Not Detected	---	1.50E+003

[Summary Report] - Sample ID: : 20131420

lide ame	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	---	2.13E+002
AG-110m	Not Detected	---	2.22E+008
BA-133	Not Detected	---	7.94E+002
BE-7	Not Detected	---	1.00E+026
CD-115	Not Detected	---	1.00E+026
CE-139	Not Detected	---	6.00E+011
CE-141	Not Detected	---	1.00E+026
CE-144	Not Detected	---	5.71E+007
CM-243	Not Detected	---	1.86E+003
CO-56	Not Detected	---	2.28E+019
CO-57	Not Detected	---	1.25E+007
CO-58	Not Detected	---	6.14E+020
CO-60	7.94E+004	1.03E+004	6.65E+002
CR-51	Not Detected	---	1.00E+026
CS-134	Not Detected	---	1.19E+004
CS-137	7.06E+004	8.93E+003	3.03E+002
EU-152	Not Detected	---	1.08E+003
EU-154	Not Detected	---	2.39E+003
EU-155	Not Detected	---	4.88E+003
FE-59	Not Detected	---	1.00E+026
GD-153	Not Detected	---	1.58E+008
HG-203	Not Detected	---	1.00E+026
I-131	Not Detected	---	1.00E+026
IR-192	Not Detected	---	1.28E+020
-40	Not Detected	---	1.14E+003
MN-52	Not Detected	---	1.00E+026
MN-54	Not Detected	---	3.70E+006
MO-99	Not Detected	---	1.00E+026
NA-22	Not Detected	---	3.52E+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	---	8.05E+006
SB-122	Not Detected	---	1.00E+026
SB-124	Not Detected	---	1.00E+026
SB-125	Not Detected	---	1.93E+004
SN-113	Not Detected	---	8.53E+013
SR-85	Not Detected	---	1.00E+026
TA-182	Not Detected	---	1.83E+014
TA-183	Not Detected	---	1.00E+026
TL-201	Not Detected	---	1.00E+026
Y-88	Not Detected	---	2.19E+014
ZN-65	Not Detected	---	1.39E+008
ZR-95	Not Detected	---	1.00E+026

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Sandia National Laboratories
Radiation Protection Sample Diagnostics Program
Quality Assurance Report

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Report Date : 9/21/02 10:32:56 AM
QA File : C:\GENIE2K\CAMFILES\LCS2.QAF
Analyst : KICHAVE
Sample ID : 20131420
Sample Quantity : 1.00 Each
Sample Date : 11/01/90 12:00:00 PM
Measurement Date : 9/21/02 10:22:33 AM
Elapsed Live Time : 600 seconds
Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU	SD	UD	BS >
AM-241 Activity	8.241E-002	3.924E-003	8.084E-002	<			>
CS-137 Activity	7.182E-002	3.736E-003	7.063E-002	<			>
CO-60 Activity	8.001E-002	5.097E-003	7.971E-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: 9/23/02