

9-1-2005

Justification for Class III Permit Modification September 2005, DSS Site 1079, Operable Unit 1295, Building 6643 Septic System at Technical Area III

Sandia National Laboratories/NM

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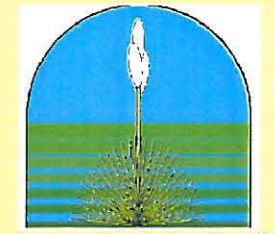


This work supported by the United States Department of Energy under contract DE-AC04-94-185000.



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

^aMaximum value exceeds NMED guidance for specified land-use scenario, therefore, incremental values are shown.

For More Information Contact

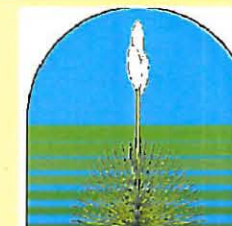
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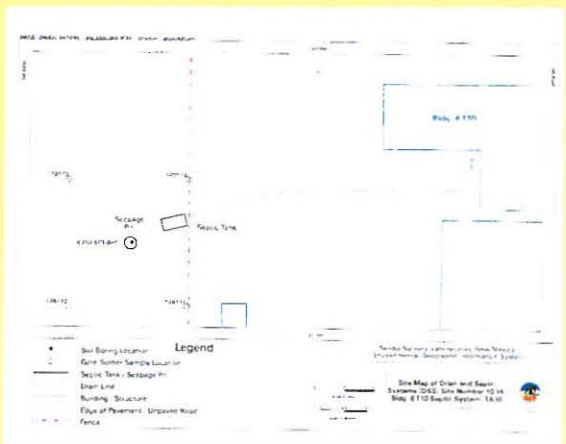
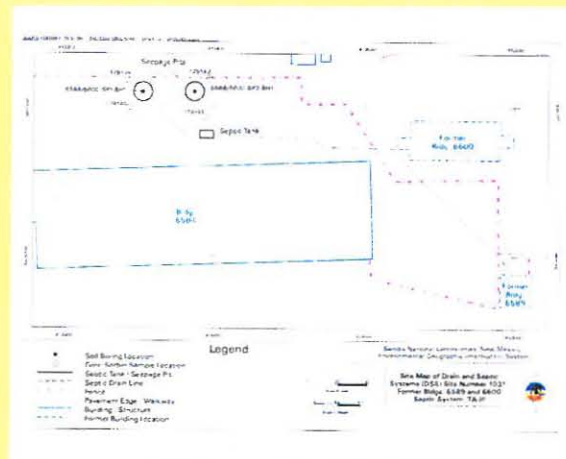
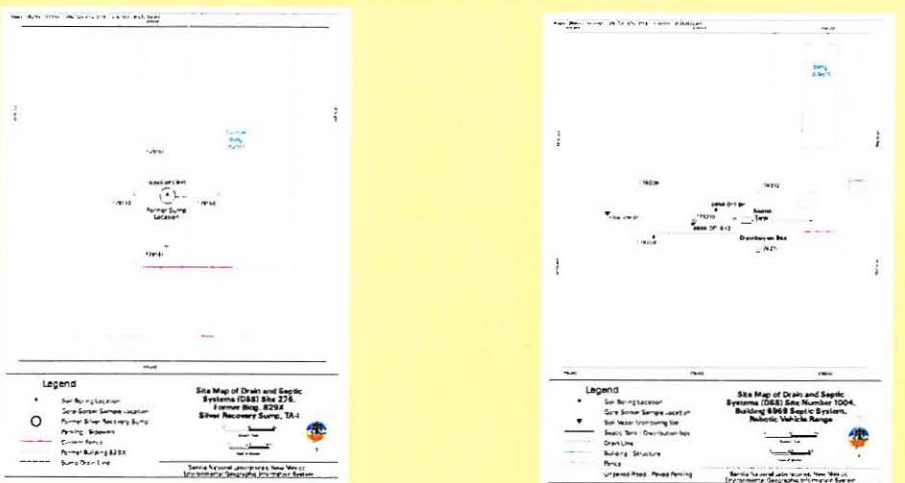


This work supported by the United States Department of Energy under contract DE-AC04-94185000.

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



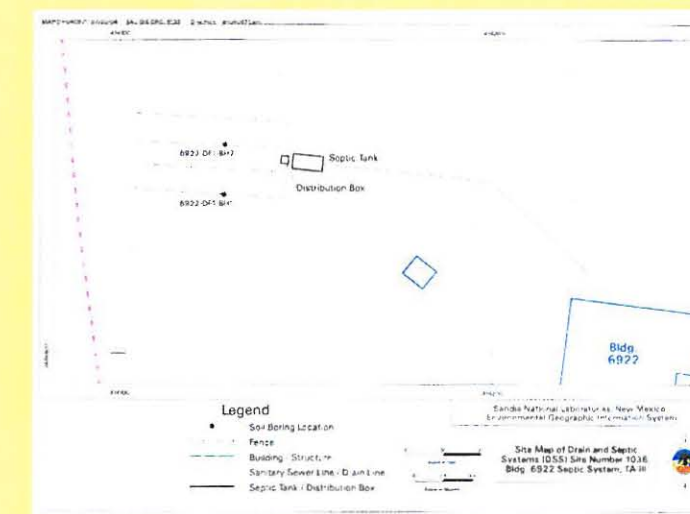
Environmental Restoration Project



Septic system demolition and backfilling.



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



For More Information Contact

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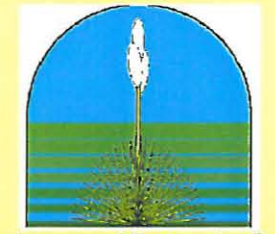


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Drain and Septic Systems - Areas of Concern (AOCs)

276, 1004, 1031, 1034, 1035, 1036, 1052, 1078, 1079, 1080, 1081, 1084, 1087, 1092, 1098, 1102, 1104, 1113, and 1120 (Poster 1/2)



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 pit 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
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
1080	Bldg 6644 Septic System	TA-III	1959	1991	1990-1991, 1992, 1995	1996
1081	Bldg 6650 Septic System	TA-III	1967	1991	1990-1991, 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 2002)
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 2002)
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	2002	No septic tank at this site	NA
1120	Bldg 6643 Drywell	TA-III	1989	1991	No septic tank at this site	NA

Depth to Groundwater

Depth to groundwater at these 19 AOCs is as follows:

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

Constituents of Concern

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

Investigations

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

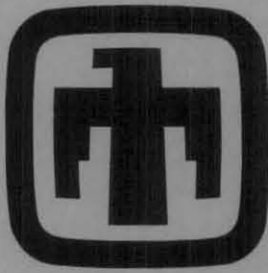
The years that site-specific characterization activities were conducted and soil sampling depths at each of these 19 AOC sites are as follows:

AOC Number	Site Name	Buried Components (Drain Lines, Drywells) Located With a Backhoe	Soil Sampling Beneath Drainlines, Seepage Pits, Drywells	Type(s) of Drain System, and Soil Sampling Depths (ft bgs)	Passive Soil Vapor Sampling	Active Soil Vapor Monitor Well Installation and Sampling
276	Former Bldg 829X Silver Recovery Sump	None	1994, 2002	Silver Recovery Sump 8, 13	2002	None
1004	Bldg 6969 Septic System	2002	2002	Drainfield 8, 13	2002	2003
1031	Former Bldgs 6589 and 6600 Septic System	2002	2002	Seepage Pits 15, 20	2002	None
1034	Bldg 6710 Septic System	None	2002	Seepage Pit 14, 19	2002	None
1035	Bldg 6715 Septic System	None	2002	Seepage Pit 11, 16	2002	None
1036	Bldg 6922 Septic System	1997	1998, 1999	Drainfield 5, 10	None	None
1052	Bldg 803 Seepage Pit	None	2002	Seepage Pit 27, 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 7, 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 Seepage Pit	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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Sandia National Laboratories

Justification for Class III Permit Modification

September 2005

DSS Site 1079

Operable Unit 1295

Building 6643 Septic System at Technical
Area III

CAC (SWMU Assessment Report) Submitted September 2004

RSI Submitted April 2005

Environmental
Restoration
Project



United States Department of Energy
Sandia Site Office



Sandia National Laboratories

Justification for Class III Permit Modification

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DSS Site 1079

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**Building 6643 Septic System at Technical
Area III**

CAC (SWMU Assessment Report) Submitted September 2004

RSI Submitted April 2005

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Restoration
Project**



**United States Department of Energy
Sandia Site Office**

CAC



National Nuclear Security Administration

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SEP 17 2004

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

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

Dear Mr. Bearzi:

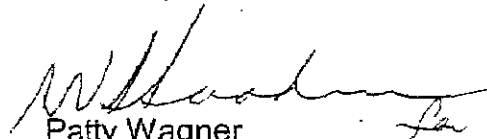
On behalf of the Department of Energy (DOE) and Sandia Corporation, DOE is submitting the enclosed Solid Waste Management Unit (SWMU) Assessment Reports and Proposals for Corrective Action Complete for Drain and Septic Systems (DSS) Sites 1034, 1035, 1036, 1078, 1079, 1084, 1098, 1104, and 1120 at Sandia National Laboratories, New Mexico, EPA ID No. NM5890110518. These documents are compiled as DSS Round 6 and No Further Action (NFA) Batch 24.

This submittal includes descriptions of the site characterization work and risk assessments for the above referenced DSS Sites. The risk assessments conclude that for these sites: (1) there is no significant risk to human health under either the industrial or 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

Mr. J. Bearzi

(2)

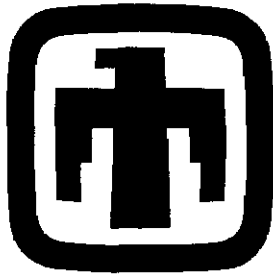
SEP 17 2004

cc w/enclosure:

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Sandia National Laboratories/New Mexico
Environmental Restoration Project

**SWMU ASSESSMENT REPORT
AND PROPOSAL FOR
CORRECTIVE ACTION COMPLETE
DRAIN AND SEPTIC SYSTEMS SITE 1079,
BUILDING 6643 SEPTIC SYSTEM**

September 2004



United States Department of Energy
Sandia Site Office

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- C DSS Site 1079 Risk Assessment

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ACRONYMS AND ABBREVIATIONS

AOP	Administrative Operating Procedure
BA	butyl acetate
bgs	below ground surface
CAC	Corrective Action Complete
COC	constituent of concern
DSS	Drain and Septic Systems
EB	equipment blank
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FIP	Field Implementation Plan
HE	high explosive(s)
HI	hazard index
HWB	Hazardous Waste Bureau
KAFB	Kirtland Air Force Base
MDA	minimum detectable activity
MDL	method detection limit
mrem	millirem
NFA	no further action
NMED	New Mexico Environment Department
OU	Operable Unit
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RPSD	Radiation Protection Sample Diagnostics
SAP	Sampling and Analysis Plan
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TB	trip blank
TEDE	total effective dose equivalent
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 1079: BUILDING 6643 SEPTIC SYSTEM

2.1 Summary

The SNL/NM ER Project conducted an assessment of DSS Site 1079, the Building 6643 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 Building 6643 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. Current operations at the site are conducted in accordance with applicable laws and regulations that are protective of the environment, and septic system discharges are now directed to the City of Albuquerque sewer system.

Review and analysis of all relevant data for DSS Site 1079 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 1079 based upon sampling data demonstrating that COCs released from the site into the environment pose an acceptable level of risk.

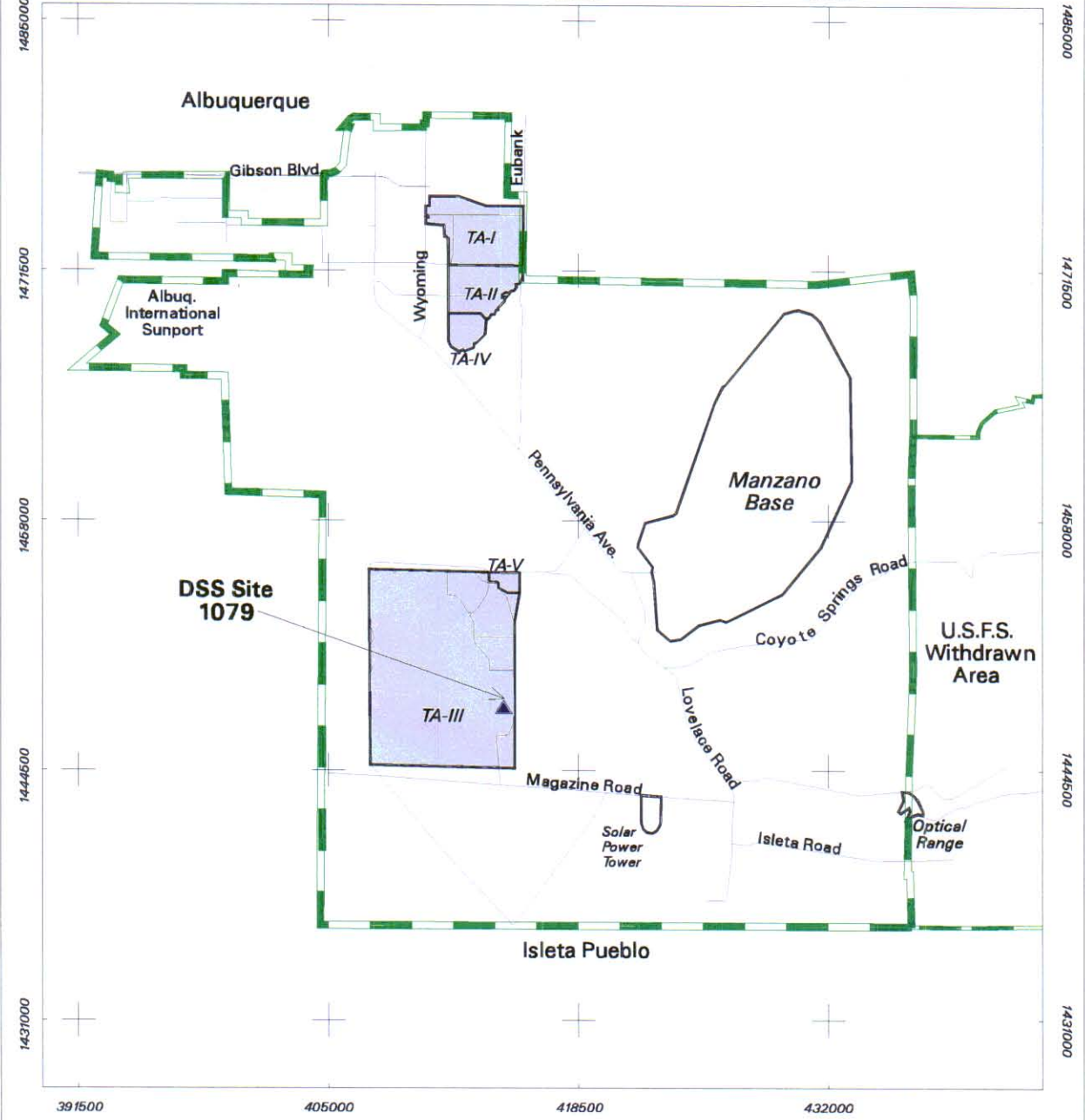
2.2 Site Description and Operational History

2.2.1 Site Description

DSS Site 1079 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 (Figure 2.2.1-1). The site is located approximately 1.4 miles southwest of the entrance to TA-III and is on the northeast side of Building 6643 (Figure 2.2.1-2). The abandoned septic system consisted of a septic tank that emptied to a distribution box 40 feet away, which in turn emptied to three drainfield laterals, each approximately 30 feet long (Figure 2.2.1-2). Construction details are based upon engineering drawings (SNL/NM February 1987), site inspections, and backhoe excavations of the system. The system received discharges from Building 6643, approximately 110 feet to the southwest.

The surface geology at DSS Site 1079 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 1079, 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.

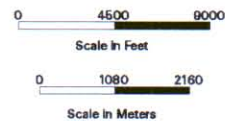
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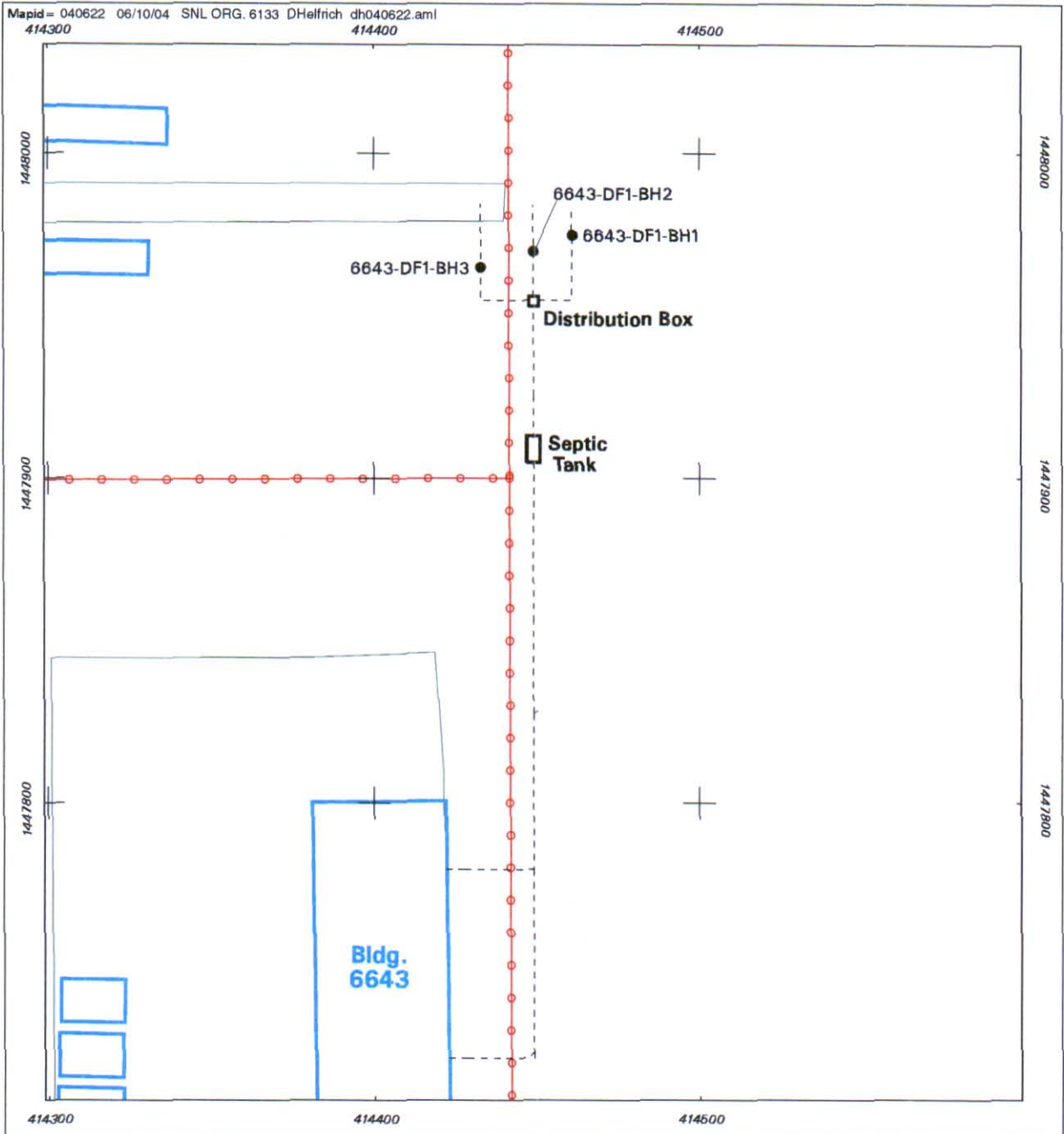
Legend

-  DSS Site 1079
-  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 1079,
Bldg. 6643 Septic System, TA-III**



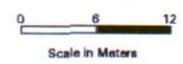
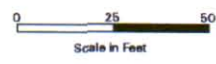
Sandia National Laboratories, New Mexico
Environmental Geographic Information System



Legend

- Soil Boring Location
- Septic Tank / Distribution Box
- - - Drain Line
- Building / Structure
- Fence
- Edge of Pavement / Parking

Figure 2.2.1-2
Site Map of Drain and Septic
Systems (DSS) Site Number 1079,
Bldg. 6643 Septic System, TA-III



Sandia National Laboratories, New Mexico
 Environmental Geographic Information System

The ground surface in the vicinity of the site is flat to very slightly sloping to the southwest. The closest major drainage lies south of the site and terminates in a playa just west of KAFB. 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 5,413 feet above mean sea level (SNL/NM April 2003). Depth to groundwater is approximately 487 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 well to DSS Site 1079 is KAFB-4, approximately 4.1 miles to the northwest. The nearest groundwater monitoring wells are at the Mixed Waste Landfill, approximately 4,700 to 5,500 feet northwest of the site.

2.2.2 Operational History

Available information indicates that Building 6643, currently known as the Laser Optics Test Facility, was constructed in 1989 (SNL/NM March 2003), and it is assumed the septic system was constructed at the same time. 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, Building 6643 was connected to an extension of 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).

2.3 Land Use

2.3.1 Current Land Use

The current land use for DSS Site 1079 is industrial.

2.3.2 Future/Proposed Land Use

The projected future land use for DSS Site 1079 is industrial (DOE et al. September 1995).

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3.0 INVESTIGATORY ACTIVITIES

3.1 Summary

Three assessment investigations have been conducted at this site. In late 1990 or early 1991, 1992, and 1995, waste characterization samples were collected from the septic tank (Investigation 1). In March 2002, a backhoe was used to physically locate the buried drainfield drain lines at the site (Investigation 2). In August 2002, near-surface soil samples were collected from three borings in the drainfield (Investigation 3). Investigations 2 and 3 were required by the NMED/HWB to adequately characterize the site and were conducted in accordance with procedures presented in the SAP (SNL/NM October 1999) and FIP (SNL/NM November 2001) described in Chapter 1.0. These investigations are discussed in the following sections.

3.2 Investigation 1—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.

As part of the SNL/NM Septic System Monitoring Program, aqueous and/or sludge samples for waste characterization were collected from the Building 6643 septic tank in late 1990 or early 1991, 1992, and 1995 (SNL/NM April 1991, SNL/NM June 1993, SNL/NM December 1995). The 1990 or 1991 aqueous sample was analyzed at an off-site laboratory for volatile organic compounds (VOCs), oil and grease, metals, uranium-235, uranium-238, and gross alpha/beta activity. The 1992 sludge sample was analyzed at an off-site laboratory for gross alpha/beta activity, tritium, and radionuclides by gamma spectroscopy. The 1995 aqueous sample was analyzed for VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, formaldehyde, fluoride, nitrate/nitrite, oil and grease, total phenol, radionuclides by gamma spectroscopy, isotopic uranium, tritium, and gross alpha/beta activity. The analytical results for the two sampling events are presented in Annex A. A fraction of each sample was also submitted to the SNL/NM Radiation Protection Sample Diagnostics (RPSD) Laboratory for gamma spectroscopy analysis prior to off-site release.

On January 31, 1996, the residual contents, approximately 220 gallons of waste and added water, were pumped out and managed according to SNL/NM policy (Shain August 1996).

3.3 Investigation 2—Backhoe Excavation

On March 13 and 14, 2002, a backhoe was used to determine the location, dimensions, and average depth of the DSS Site 1079 drainfield system. The drainfield was found to have three 30-foot-long laterals, arranged as shown on Figure 2.2.1-2, with an average drain line trench depth of 11 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.

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 August 22 and 23, 2002, soil samples were collected from three drainfield boreholes. Soil boring locations are shown on Figure 2.2.1-2. Figures 3.4-1 and 3.4-2 show backhoe trenching and soil sampling activities at DSS Site 1079. A summary of the boreholes, sample depths, sample analyses, analytical methods, laboratories, and sample dates 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 drainfields, 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 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 1079 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. Methylene chloride was detected in all six soil samples collected; 2-butanone was detected in two of the soil samples collected. Toluene was detected only in the



Figure 3.4-1

View of trench being excavated to locate the DSS Site 1079 Septic System drainfield laterals at Building 6643. Manhole cover in foreground is the access to the septic system distribution box. View to the north. March 13, 2002



Figure 3.4-2
Collecting soil samples with the Geoprobe™ in the DSS Site 1079 drainfield at
Building 6643. View to the southwest. August 22, 2002

Table 3.4-1
 Summary of Area Sampled, Analytical Methods, and Laboratories Used for
 DSS Site 1079, Building 6643 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	11, 16	6	VOCs EPA Method 8260	GEL	08-22-02 08-23-02
	3	11, 16	6	SVOCs EPA Method 8270	GEL	08-22-02 08-23-02
	3	11, 16	6	PCBs EPA Method 8082	GEL	08-22-02 08-23-02
	3	11, 16	6	HE Compounds EPA Method 8330	GEL	08-22-02 08-23-02
	3	11, 16	6	RCRA Metals EPA Methods 6000/7000	GEL	08-22-02 08-23-02
	3	11, 16	6	Hexavalent Chromium EPA Method 7196A	GEL	08-22-02 08-23-02
	3	11, 16	6	Total Cyanide EPA Method 9012A	GEL	08-22-02 08-23-02
	3	11, 16	6	Gamma Spectroscopy EPA Method 901.1	RPSD	08-22-02 08-23-02
	3	11, 16	6	Gross Alpha/Beta Activity EPA Method 900.0	GEL	08-22-02 08-23-02

^aEPA November 1986.

bgs = Below ground surface.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ft = Foot (feet).

GEL = General Engineering Laboratories, Inc.

HE = High explosive(s).

PCB = Polychlorinated biphenyl.

RCRA = Resource Conservation and Recovery Act.

RPSD = Radiation Protection Sample Diagnostics Laboratory.

SVOC = Semivolatile organic compound.

VOC = Volatile organic compound.

Table 3.4.2-1
Summary of DSS Site 1079, Building 6643 Septic System
Confirmatory Soil Sampling, VOC Analytical Results
August 2002
(Off-Site Laboratory)

Record Number ^b	Sample Attributes		VOCs (EPA Method 8260 ^a) (µg/kg)		
	ER Sample ID	Sample Depth (ft)	2-Butanone	Methylene Chloride	Toluene
605653	6643-DF1-BH1-11-S	11	ND (3.67)	2.06 J (4.9)	ND (0.333)
605653	6643-DF1-BH1-16-S	16	6.85	2.02 J (4.9)	ND (0.333)
605653	6643-DF1-BH2-11-S	11	ND (3.82)	1.79 J (5.1)	ND (0.347)
605653	6643-DF1-BH2-16-S	16	ND (3.74)	1.92 J (5)	ND (0.34)
605653	6643-DF1-BH3-11-S	11	4.76 J (5.1)	2.4 J (5.1)	ND (0.347)
605653	6643-DF1-BH3-16-S	16	ND (3.6)	1.71 J (4.81)	ND (0.327)
Quality Assurance/Quality Control Sample (µg/L)					
605653	6643-DF1-TB	NA	ND (2.31)	ND (3.3)	0.391 J (1)

Note: Values in **bold** represent detected analytes.

^aEPA November 1986.

^bAnalysis 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.

µg/L = Microgram(s) per liter.

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 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, VOC Analytical MDLs
 August 2002
 (Off-Site Laboratory)

Analyte	EPA Method 8260 ^a Detection Limit ($\mu\text{g}/\text{kg}$)
Acetone	3.38–3.59
Benzene	0.433–0.459
Bromodichloromethane	0.471–0.5
Bromoform	0.471–0.5
Bromomethane	0.481–0.51
2-Butanone	3.6–3.82
Carbon disulfide	2.27–2.41
Carbon tetrachloride	0.471–0.5
Chlorobenzene	0.394–0.418
Chloroethane	0.779–0.827
Chloroform	0.5–0.531
Chloromethane	0.356–0.378
Dibromochloromethane	0.481–0.51
1,1-Dichloroethane	0.452–0.48
1,2-Dichloroethane	0.413–0.439
1,1-Dichloroethene	0.481–0.51
cis-1,2-Dichloroethene	0.452–0.48
trans-1,2-Dichloroethene	0.51–0.541
1,2-Dichloropropane	0.462–0.49
cis-1,3-Dichloropropene	0.413–0.439
trans-1,3-Dichloropropene	0.24–0.255
Ethylbenzene	0.365–0.388
2-Hexanone	3.63–3.85
Methylene chloride	1.3–1.38
4-Methyl-2-pentanone	3.88–4.11
Styrene	0.375–0.398
1,1,2,2-Tetrachloroethane	0.875–0.929
Tetrachloroethene	0.365–0.388
Toluene	0.327–0.347
1,1,1-Trichloroethane	0.51–0.541
1,1,2-Trichloroethane	0.519–0.551
Trichloroethene	0.433–0.459
Vinyl acetate	1.71–1.82
Vinyl chloride	0.538–0.571
Xylene	0.375–0.398

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

$\mu\text{g}/\text{kg}$ = Microgram(s) per kilogram.

VOC = Volatile organic compound.

trip blank (TB) associated with these samples. All of these compounds are common laboratory contaminants and 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. Fluorene was detected in the 16-foot-bgs sample from borehole BH3. 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. No PCBs were detected in any of the samples collected.

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 of the samples 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 soil analyses are presented in Table 3.4.2-10. None of the metal concentrations detected in the samples exceed the corresponding NMED-approved background concentrations.

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. Cyanide was detected in the 16-foot-bgs sample from borehole BH2.

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. No activities above NMED-approved background levels were detected in any sample analyzed. However, although not detected, the minimum detectable activities (MDAs) for uranium-235 analyses exceeded the background activity because the standard gamma spectroscopy count time for soil samples

Table 3.4.2-3
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, SVOC Analytical Results
 August 2002
 (Off-Site Laboratory)

Sample Attributes			SVOCs (EPA Method 8270 ^a) (µg/kg)
Record Number ^b	ER Sample ID	Sample Depth (ft)	Fluorene
605653	6643-DF1-BH1-1'-S	11	ND (4)
605653	6643-DF1-BH1-16-S	16	ND (4)
605653	6643-DF1-BH2-11-S	11	ND (4)
605653	6643-DF1-BH2-16-S	16	ND (4)
605653	6643-DF1-BH3-11-S	11	ND (4)
605653	6643-DF1-BH3-16-S	16	ND (4)

Note: Values in **bold** represent detected analytes.

^aEPA November 1986.

^bAnalysis 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.

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

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 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, SVOC Analytical MDLs
 August 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
Diphenyl amine	22.3
bis(2-Ethylhexyl) phthalate	30
Fluoranthene	16.7
Fluorene	4

Refer to footnotes at end of table.

Table 3.4.2-4 (Concluded)
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, SVOC Analytical MDLs
 August 2002
 (Off-Site Laboratory)

Analyte	EPA Method 8270 ^a Detection Limit (µg/kg)
Hexachlorobenzene	20
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

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

SVOC = Semivolatile organic compound.

Table 3.4.2-5
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, PCB Analytical Results
 August 2002
 (Off-Site Laboratory)

Sample Attributes			PCBs (EPA Method 8082 ^a) (µg/kg)
Record Number ^b	ER Sample ID	Sample Depth (ft)	
605653	6643-DF1-BH1-11-S	11	ND
605653	6643-DF1-BH1-16-S	16	ND
605653	6643-DF1-BH2-11-S	11	ND
605653	6643-DF1-BH2-16-S	16	ND
605653	6643-DF1-BH3-11-S	11	ND
605653	6643-DF1-BH3-16-S	16	ND

^aEPA November 1986.

^bAnalysis 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.

µg/kg = Microgram(s) per kilogram.

ND = Not detected.

PCB = Polychlorinated biphenyl.

S = Soil sample.

Table 3.4.2-6
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, PCB Analytical MDLs
 August 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

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

PCB = Polychlorinated biphenyl.

Table 3.4.2-7
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, HE Compound Analytical Results
 August 2000
 (Off-Site Laboratory)

Sample Attributes			HE (EPA Method 8330 ^a) (µg/kg)
Record Number ^b	ER Sample ID	Sample Depth (ft)	
605653	6643-DF1-BH1-11-S	11	ND
605653	6643-DF1-BH1-16-S	16	ND
605653	6643-DF1-BH2-11-S	11	ND
605653	6643-DF1-BH2-16-S	16	ND
605653	6643-DF1-BH3-11-S	11	ND
605653	6643-DF1-BH3-16-S	16	ND

^aEPA November 1986.

^bAnalysis 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.

ND = Not detected.

S = Soil sample.

Table 3.4.2-8
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, HE Compound Analytical MDLs
 August 2002
 (Off-Site Laboratory)

Analyte	EPA Method 8330 ^a Detection Limit (µg/kg)
2-Amino-4,6-dinitrotoluene	18.1–21.5
4-Amino-2,6-dinitrotoluene	34.1–40.5
1,3-Dinitrobenzene	34.1–40.5
2,4-Dinitrotoluene	55–65.4
2,6-Dinitrotoluene	48–57
HMX	48–57
Nitrobenzene	48–57
2-Nitrotoluene	24–28.5
3-Nitrotoluene	24–28.5
4-Nitrotoluene	24–28.5
RDX	48–57
Tetryl	22.1–26.2
1,3,5-Trinitrobenzene	29–34.4
2,4,6-Trinitrotoluene	48–57

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

HE = High explosive(s).

HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.

MDL = Method detection limit.

µg/kg = Microgram(s) per kilogram.

RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.

Tetryl = Methyl-2,4,6-trinitrophenylnitramine.

Table 3.4.2-9
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, Metals Analytical Results
 August 2002
 (Off-Site Laboratory)

Sample Attributes			Metals (EPA Method 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
605653	6643-DF1-BH1-11-S	11	2.89	127	0.0551 J (0.459)	8.37	ND (0.0495)	4.56	0.00455 J (0.00945)	0.164 J (0.459)	0.103 J (0.459 J)
605653	6643-DF1-BH1-16-S	16	2.7	140	0.0674 J (0.472)	7.94	ND (0.0536)	4.31	ND (0.000913 J)	ND (0.153)	ND (0.0851)
605653	6643-DF1-BH2-11-S	11	3.15	102	0.0494 J (0.455)	8.35	ND (0.0553)	4.94	0.00328 J (0.00906)	0.216 J (0.455)	ND (0.082)
605653	6643-DF1-BH2-16-S	16	2.9	180	0.0606 J (0.463)	8.68	ND (0.0523)	5.31	ND (0.000913 J)	ND (0.15)	ND (0.0835)
605653	6643-DF1-BH3-11-S	11	2.67	43.9	0.0582 J (0.476)	7.49	ND (0.0531)	4.61	ND (0.000887 J)	0.447 J (0.476)	ND (0.0859)
605653	6643-DF1-BH3-16-S	16	2.5	51.6	ND (0.0464)	7.31	ND (0.0518)	3.85	ND (0.000972 J)	ND (0.157)	ND (0.0876)
Background Concentration—Southwest Area Supergroup ^c			4.4	214	0.9	15.9	1	11.8	<0.1	<1	<1

^aEPA November 1986.

^bAnalysis request/chain-of-custody record.

^cDinwiddie 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 = Analytical result was qualified as an estimated value.

J () = The reported value is greater than or equal to the MDL but is less than the practical quantitation limit, shown in parentheses.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

ND () = Not detected above the MDL, shown in parentheses.

S = Soil sample.

Table 3.4.2-10
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, Metals Analytical MDLs
 August 2002
 (Off-Site Laboratory)

Analyte	EPA Method 6000/7000/7196A ^a Detection Limit (mg/kg)
Arsenic	0.188-0.2
Barium	0.0606-0.0648
Cadmium	0.0435-0.0464
Chromium	0.145-0.155
Chromium (VI)	0.0495-0.0553
Lead	0.258-0.275
Mercury	0.000887-0.000972
Selenium	0.147-0.157
Silver	0.082-0.0876

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

Table 3.4.2-11
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, Total Cyanide Analytical Results
 August 2002
 (Off-Site Laboratory)

Sample Attributes			Total Cyanide (EPA Method 9012A ^a) (mg/kg)
Record Number ^b	ER Sample ID	Sample Depth (ft)	
605653	6643-DF1-BH1-11-S	11	ND
605653	6643-DF1-BH1-16-S	16	ND
605653	6643-DF1-BH2-11-S	11	ND
605653	6643-DF1-BH2-16-S	16	0.0511 J (0.25)
605653	6643-DF1-BH3-11-S	11	ND
605653	6643-DF1-BH3-16-S	16	ND

Note: Values in **bold** represent detected analytes.

^aEPA November 1986.

^bAnalysis request/chain-of-custody record.

BH = Borehole.

DF = Drainfield.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

ER = Environmental Restoration.

f = 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.

ND = Not detected.

S = Soil sample.

Table 3.4.2-12
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, Total Cyanide Analytical MDLs
 August 2002
 (Off-Site Laboratory)

Analyte	EPA Method 9012A ^a Detection Limit (mg/kg)
Total Cyanide	0.0381-0.0419

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

Table 3.4.2-13
Summary of DSS Site 1079, Building 6643 Septic System
Confirmatory Soil Sampling, Gamma Spectroscopy Analytical Results
August 2002
(On-Site Laboratory)

Sample Attributes			Activity (EPA Method 901.1 ^a) (pCi/g)							
Record Number ^b	ER Sample ID	Sample Depth (ft)	Cesium-137		Thorium-232		Uranium-235		Uranium-238	
			Result	Error ^c	Result	Error ^c	Result	Error ^c	Result	Error ^c
605641	6643-DF1-BH1-11-S	11	ND (0.0323)	--	0.623	0.302	ND (0.18)	--	ND (0.452)	--
605641	6643-DF1-BH1-16-S	16	ND (0.028)	--	0.501	0.243	ND (0.168)	--	ND (0.413)	--
605641	6643-DF1-BH2-11-S	11	ND (0.029)	--	0.705	0.336	ND (0.217)	--	ND (0.708)	--
605641	6643-DF1-BH2-16-S	16	ND (0.0304)	--	0.559	0.278	ND (0.18)	--	ND (0.453)	--
605641	6643-DF1-BH3-11-S	11	ND (0.0367)	--	0.71	0.337	ND (0.203)	--	ND (0.503)	--
605641	6643-DF1-BH3-16-S	16	ND (0.0321)	--	0.634	0.309	ND (0.193)	--	ND (0.489)	--
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.

^aEPA November 1986.

^bAnalysis request/chain-of-custody record.

^cTwo standard deviations about the mean detected activity.

^dDinwiddie 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.

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.

(6,000 seconds) was not sufficient to reach the NMED-approved background activity established for SNL/NM soil. 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. Gross alpha activity slightly above the New Mexico-established background activity (Miller September 2003) was measured in the 11- and 16-foot-bgs samples from borehole BH2 and in the 16-foot-bgs sample from borehole BH3. However, no gross alpha activity greater than an order-of-magnitude above the New Mexico-established background level (Miller September 2003) was detected in any of the samples. None of the gross beta activities were above background. 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. The results were used in the data validation process for all the samples in that batch. Toluene was detected in the TB for DSS Site 1079 (Table 3.4.2-1).

No duplicate soil samples or EBs 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," Administrative Operating Procedure (AOP) 00-03 (SNL/NM December 1999). In addition, SNL/NM Department 7713 (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). Annex B contains the data validation reports for the samples collected at this site. The data are acceptable for use in this request for a determination of CAC without controls.

Table 3.4.2-14
 Summary of DSS Site 1079, Building 6643 Septic System
 Confirmatory Soil Sampling, Gross Alpha/Beta Activity Analytical Results
 August 2002
 (Off-Site Laboratory)

Sample Attributes			Activity (EPA Method 900.0 ^a) (pCi/g)			
Record Number ^b	ER Sample ID	Sample Depth (ft)	Gross Alpha		Gross Beta	
			Result	Error ^c	Result	Error ^c
605653	6643-DF1-BH1-11-S	11	17.1	5.82	22.7	2.21
605653	6643-DF1-BH1-16-S	16	14.7	5.59	21.8	2.1
605653	6643-DF1-BH2-11-S	11	22.6	8.78	21.7	2.05
605653	6643-DF1-BH2-16-S	16	26.8	8.73	20.9	2.26
605653	6643-DF1-BH3-11-S	11	17	5.71	24	2.27
605653	6643-DF1-BH3-16-S	16	21.4	6.47	25.3	2.2
Background Activity ^d			17.4	NA	35.4	NA

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

^aEPA November 1986.

^bAnalysis request/chain-of-custody record.

^cTwo standard deviations about the mean detected activity.

^dMiller 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.

NA = Not applicable.

pCi/g = Picocurie(s) per gram.

S = Soil sample.

3.5 Site Sampling Data Gaps

Analytical data from the site assessment were sufficient for characterizing the nature and extent of possible COC releases. There are no further data gaps regarding characterization of DSS Site 1079.

4.0 CONCEPTUAL SITE MODEL

The conceptual site model for DSS Site 1079, the Building 6643 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 1079 are VOCs, SVOCs, PCBs, HE compounds, cyanide, RCRA metals, hexavalent chromium, and radionuclides. No PCBs, HE compounds, or hexavalent chromium were detected in any of the soil samples collected at this site. None of the eight RCRA metals were detected at concentrations above the approved maximum background concentrations for SNL/NM Southwest Area Supergroup soils (Dinwiddie September 1997). Two VOCs and one SVOC were detected in the soil samples collected at this site. Cyanide was detected in one sample but since it does not have a quantified background screening concentration, it is unknown if this COC exceeds background.

When a metal concentration exceeded its maximum background screening value, it was considered further in the risk assessment process. None of the four representative gamma spectroscopy radionuclides were detected at activities exceeding the corresponding background levels. However, the MDAs for all of the uranium-235 analyses exceeded the corresponding background activity. Gross alpha activity was detected above the New Mexico-established background level. However, no gross alpha activity greater than an order-of-magnitude above the New Mexico-established background level (Miller September 2003) was detected in any of the samples. No elevated gross beta activity was measured in these samples.

4.2 Environmental Fate

Potential COCs may have been released into the vadose zone via aqueous effluent discharged from the septic system and drainfield. 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 487 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 C provides additional discussion on the fate and transport of COCs at DSS Site 1079.

Table 4.2-1 summarizes the potential COCs for DSS Site 1079. All potential COCs were retained in the conceptual model and evaluated in both the human health and ecological risk assessments. The current and future land use for DSS Site 1079 is industrial (DOE et al. September 1995).

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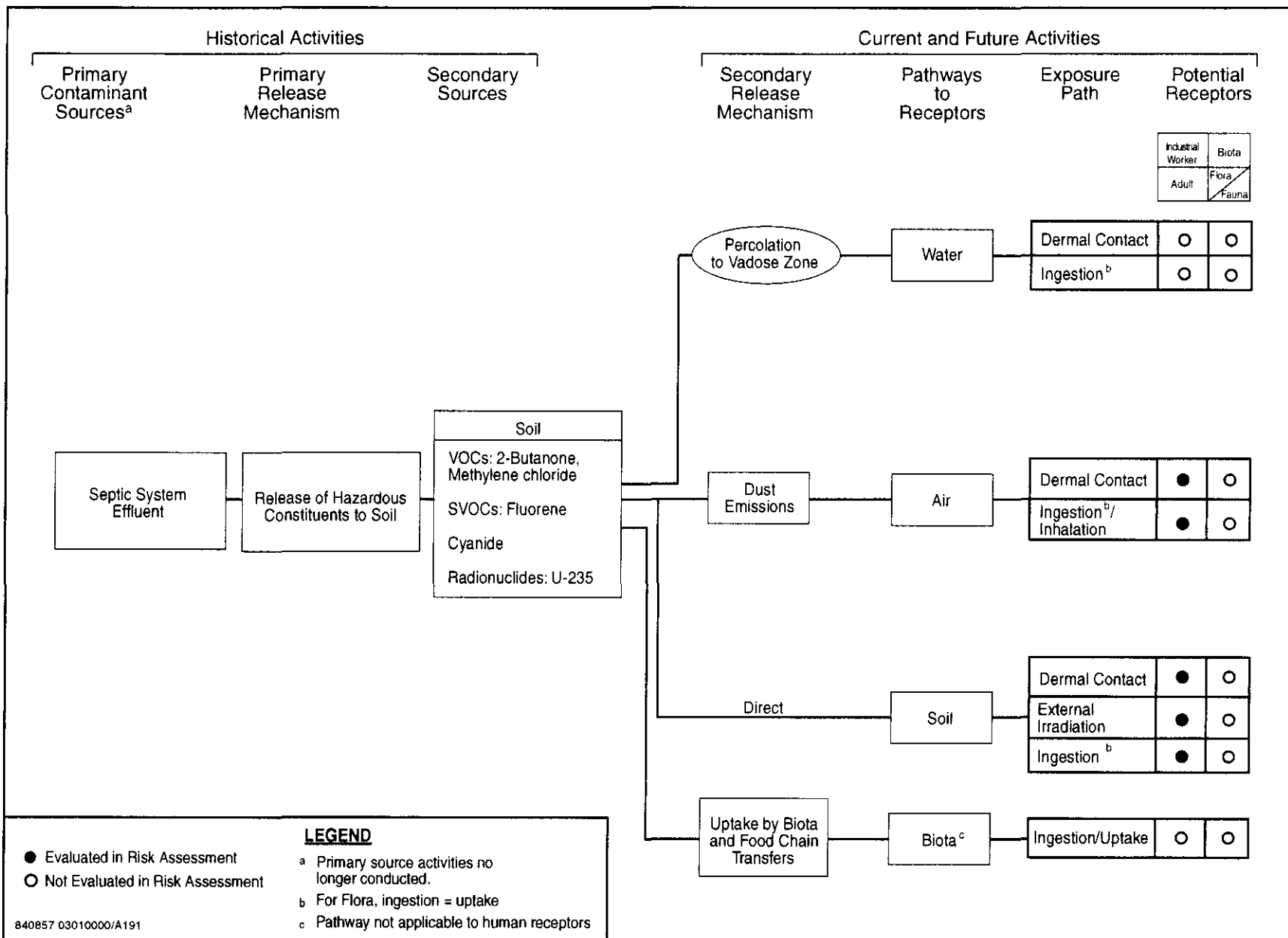


Figure 4.2-1
Conceptual Site Model Flow Diagram for DSS Site 1079, Building 6643 Septic System

Table 4.2-1
Summary of Potential COCs for DSS Site 1079, Building 6643 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 with Concentrations Greater than Background or Nonquantified Background ^e
VOCs		6	2-Butanone	NA	0.00685	0.0032	2
		6	Methylene Chloride	NA	0.0024 J	0.0020	6
SVOCs		6	Fluorene	NA	0.201	0.0352	1
PCBs		6	None	NA	NA	NA	None
HE Compounds		6	None	NA	NA	NA	None
RCRA Metals		6	None	NA	NA	NA	None
Hexavalent Chromium		6	None	NA	NA	NA	None
Cyanide		6	Cyanide	NC	0.0511 J	0.0250	1
Radionuclides (pCi/g)	Gamma Spectroscopy	6	Uranium-235	0.16	ND (0.217)	NC ^f	6
	Gross Alpha	6	Gross Alpha	17.4 ^g	26.8	NA	3
	Gross Beta	6	None	35.4 ^g	25.3	NA	None

^aNumber of samples includes duplicates and splits.

^bDinwiddie September 1997.

^cMaximum concentration is either the maximum amount detected, or for radionuclides, the greater of either the maximum detection or the maximum MDA above background.

^dAverage 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.

^eSee appropriate data table for sample locations.

^fAn average MDA is not calculated because of the variability in instrument counting error and the number of reported nondetect activities for gamma spectroscopy.

^gMiller September 2003.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

HE = High explosive(s).

J = Analytical result was qualified as an estimated value.

MDA = Minimum detectable activity.

MDL = Method detection limit.

mg/kg = Milligram(s) per kilogram.

NA = Not applicable.

NC = Not calculated.

ND () = Not detected above the 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.

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 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 C provides additional discussion of the exposure routes and receptors at DSS Site 1079.

4.3 Site Assessment

Site assessment at DSS Site 1079 included risk assessments for both human health and ecological risk. This section briefly summarizes the site assessment results, and Annex C discusses the risk assessment performed for DSS Site 1079 in more detail.

4.3.1 Summary

The site assessment concluded that DSS Site 1079 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 risks at DSS Site 1079. This section summarizes the results.

4.3.2.1 Human Health

DSS Site 1079 has been recommended for an industrial land-use scenario (DOE et al. September 1995). Because methylene chloride, 2-butanone, fluorene, cyanide, and uranium-235 are present above background levels, have MDAs above background levels, or have nonquantified background levels, it was necessary to perform a human health risk assessment analysis for the site, which included these COCs. Annex C 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 1079 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. The excess cancer risk is 2E-8 for DSS Site 1079 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. The incremental excess cancer risk is 1.56E-8. Both the incremental HI and excess cancer risk are below NMED guidelines.

The HI calculated for the COCs at DSS Site 1079 is 0.00 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 0.00. The excess cancer risk for DSS Site 1079 COCs is 3E-8 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. The incremental excess cancer risk is 3.32E-8. Both the incremental HI and incremental excess cancer risk are below NMED guidelines.

For the radiological COCs, one of the constituents (uranium-235) had MDA values greater than the corresponding background value. The incremental total effective dose equivalent (TEDE) and corresponding estimated cancer risk from radiological COCs are much lower than the U.S. Environmental Protection Agency (EPA) guidance values; the estimated TEDE is 8.2E-3 millirem (mrem)/year (yr) for the industrial land-use scenario. This value is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997a). The corresponding incremental estimated cancer risk value is 9.4E-8 for the industrial land-use scenario. Furthermore, the incremental TEDE for the residential land-use scenario that results from a complete loss of institutional controls is 2.1E-2 mrem/yr with an associated risk of 2.8E-7. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1079 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 Radiological and Nonradiological Risks from
DSS Site 1079, Building 6643 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	1.56E-8	9.4E-8	1.1E-7
Residential	3.32E-8	2.8E-7	3.1E-7

DSS = Drain and Septic Systems.

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

4.3.2.2 Ecological

An ecological assessment that corresponds with the procedures in the EPA's Ecological Risk Assessment Guidance for Superfund (EPA 1997b) also was performed as set forth by the NMED Risk-Based Decision Tree in the "RPMP [RCRA Permits Management Program]

Document Requirement Guide" (NMED March 1998). An early step in the evaluation compared COC concentrations and identified potentially bioaccumulative constituents (see Annex C, 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 1079 are located at depths of 5 feet bgs or greater. Therefore, no complete ecological pathways exist at this site, and a more detailed ecological risk assessment is not necessary.

4.4 Baseline Risk Assessments

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

4.4.1 Human Health

Because the results of the human health risk assessment summarized in Section 4.3.2.1 indicate that DSS Site 1079 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 1079, 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 1079 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 1079. 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 1079
Septic Tank Sampling Results

4-17-91

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

DD Dionne

4-17-91

Nick Durand,

For your information.

David Dionne

TABLE 16

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

BUILDING 6643

SAMPLES NUMBERS SNLA004833, SNLA004855, SNLA004834

Parameter	Results	Units
VOLATILE ORGANICS		
Methylene Chloride	0.001	mg/l
INORGANICS		
Oil and Grease	40	mg/l
METALS		
Barium	0.52	mg/l
Copper	0.30	mg/l
Manganese	0.057	mg/l
Mercury	0.0003	mg/l
Zinc	0.37	mg/l
RADIOLOGICAL		
Gross Alpha	6.5	pCi/l
Gross Beta	50	pCi/l
Uranium 235	1.0	pCi/l
Uranium 238	2.1	pCi/l

Building 6643
Area 3
Sample ID No. SNLA008561
Tank ID No. AD89017R

On November 10, 1992, a sludge sample was collected from the septic tank serving Building 6643. During review of the radiological data, no parameters were detected that exceed U.S. Department of Energy (DOE) derived concentration guideline (DCG) limits. During review of the radiochemistry data, the following items were noted:

- ^{214}Pb was measured at 0.427 pCi/mL, which is above the IL calculated during this monitoring effort. The level of ^{214}Pb was less than 0.1 percent of its DGC limit.
- ^{212}Pb was measured at 0.486 pCi/mL and ^{232}Th was measured at 0.463 pCi/mL. These findings suggest above background levels of ^{232}Th exist at this location. The ^{212}Pb level was within DOE DCG constraints; the ^{232}Th level (0.463 pCi/mL) exceeded the DOE DGC of 0.25 pCi/mL.
- ^{40}K was measured at 7.08 pCi/mL, which is above the IL calculated during this monitoring effort. The ^{40}K level was within DOE DCG constraints.

Results of Septic Tank Analyses (Sludge Sample)			
Building No./Area:	6643 A-3		
Tank ID No.:	AD89017R		
Date Sampled:	11/10/92		
Sample ID No.:	SNLA008561		
Analytical Parameter	Measured Concentration	± 2 Sigma Uncertainty	Units
Gross Alpha	1E+01	1E+01	pCi/g
Gross Beta	3E+01	2E+01	pCi/g
Gross Alpha	2E+01	1E+01	pCi/g
Gross Beta	2E+01	2E+01	pCi/g
Gross Alpha	2E+01	1E+01	pCi/g
Gross Beta	4E+01	2E+01	pCi/g
Tritium	2E-01	2E-01	pCi/L
Actinium-228	0.463	0.109	pCi/mL
Bismuth-214	0.291	0.0684	pCi/mL
Cadmium-109	0.557	0.486	pCi/mL
Cesium-137	0.0496	0.0347	pCi/mL
Potassium-40	7.08	0.583	pCi/mL
Lead-212	0.486	0.0478	pCi/mL
Lead-214	0.427	0.0758	pCi/mL
Radium-226	0.283	0.0664	pCi/mL
Radium-228	0.463	0.109	pCi/mL
Thorium-232	0.463	0.109	pCi/mL
Thorium-234	0.716	0.398	pCi/mL
Thallium-208	0.461	0.0925	pCi/mL
Uranium-238	0.715	0.397	pCi/mL

ND = Not Detected
 NA = Not Applicable

**RESULTS OF SEPTIC TANK SAMPLING
CHEMICAL ANALYSES OF AQUEOUS SAMPLE**

Building ID: Bldg 6643
 Sample ID Number: 024399
 Date Sampled: 6-28-95

Parameter (Method)	Result	Detection Limit (DL)	NM Discharge Limit ^a	COA Discharge Limit ^b	Comments
<i>Volatile Organics (8260)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
None detected above DL	ND	various	various	TTO = 5.0	
<i>Semivolatile Organics (8270)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
bis(2-Ethylhexyl)Phthalate	0.005J	0.010	NR	TTO = 5.0	
<i>Pesticides/PCBs (8080)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
None detected above DL	ND	various	NR / PCBs = 0.001	TTO = 5.0	
<i>Metals (6010/7470)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
Arsenic	ND	0.010	0.1	2.0	
Barium	0.0599J	0.200	1.0	20.0	
Cadmium	ND	0.005	0.01	2.8	
Chromium	ND	0.020	0.05	20.0	
Copper	0.0077J	0.025	1.0	16.5	
Lead	ND	0.003	0.05	3.2	
Manganese	0.0961	0.010	0.2	20.0	
Nickel	ND	0.040	0.2	12.0	
Selenium	ND	0.005	0.05	2.0	
Silver	ND	0.010	0.05	5.0	
Thallium	ND	0.010	NR	NR	
Zinc	0.0113J	0.020	10.0	28.0	
Mercury	ND	0.0002	0.002	0.1	
<i>Miscellaneous Analyses</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
Field pH	7.4 pH units	0 - 14 pH units	6 - 9 pH units	5 - 11 pH units	
Formaldehyde (NIOSH 3500)	0.052	0.050	NR	260.0	
Fluoride (300.0)	0.16	0.10	1.6	180.0	
Nitrate + Nitrite (353.1)	1.47	0.250	10.0	NR	

Refer to footnotes at end of table.

**RESULTS OF SEPTIC TANK SAMPLING
CHEMICAL ANALYSES OF AQUEOUS SAMPLE**

Building ID: _____ Bldg 6643
 Sample ID Number: _____ 024399
 Date Sampled: _____ 6-28-95

Parameter (Method)	Result	Detection Limit (DL)	NM Discharge Limit ^a	COA Discharge Limit ^b	Comments
<i>Miscellaneous Analyses</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	<i>(mg/L)</i>	
Oil + Grease (9070)	1.59	0.94	NR	150.0	
Total Phenol (9066)	ND	0.050	0.005	4.0	

Notes:

^a New Mexico Water Quality Control Commission Regulations (1990), Section 3-103.

^b City of Albuquerque Sewer Use and Wastewater Control Ordinance (1993), Section 8-9-3 M - maximum allowable concentration for grab sample.

B = Analyte detected in method blank.

DL = Detection limit indicated on laboratory report.

IDL = Instrument detection limit.

J = Estimated concentration of analyte, between DL and IDL.

ND = Not detected above DL indicated.

NR = Not regulated.

TTO = Total toxic organics.

**RESULTS OF SEPTIC TANK SAMPLING
RADIOLOGICAL ANALYSES OF AQUEOUS SAMPLE**

Building ID: Bldg 6643
 Sample ID Number: 024399
 Date Sampled: 6-28-95

Parameter (Method)	Result	MDA	Critical Level	NM Discharge Limit*	Comments
<i>Radiological Analyses</i>	<i>(pCi/L ± 2-σ)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	
Gross Alpha (9310)	0.91 ± 0.52	1.10	0.48	NR	
Gross Beta (9310)	11.1 ± 1.3	0.9	0.42	NR	
<i>Isotopic Analyses</i>	<i>(pCi/L ± 2-σ)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	
Tritium (906.0)	-91.9 ± 55.9	96.1	47.5	NR	
Uranium-238 ^b	0.26 ± 0.12	0.051	0.042	NR	sampled 7-13-95
Uranium-235/236 ^b	0.011 ± 0.030	0.076	0.058	NR	sampled 7-13-95
Uranium-234 ^b	0.33 ± 0.14	0.051	0.042	NR	sampled 7-13-95
<i>Gamma Spectroscopy^c</i>	<i>(pCi/mL ± 2-σ)</i>	<i>(pCi/mL)</i>	<i>(pCi/L)</i>	<i>(pCi/L)</i>	
None detected above MDA	ND	various	NL	NR	

Notes:

- * New Mexico Water Quality Control Commission Regulations (1990), Section 3-103.
- ^a Isotopic uranium analyzed by NAS-NS-3050.
- ^b Analyzed in-house by SNL/NM Department 7715.
- MDA = Minimum detectable activity.
- ND = Not detected above MDA indicated.
- NL = Not listed.
- NR = Not regulated.

ANNEX B
DSS Site 1079
Soil Sample Data Validation Results

RECORDS CENTER CODE: ER/1295/DSS/DAT

SMO ANALYTICAL DATA ROUTING FORM

PROJECT NAME: DSS Soil Sampling
SNL TASK LEADER: Collins
SMO PROJECT LEAD: Herrera

PROJECT/TASK: 7223_02.03.02
ORG/MS/CF0#: 6133/1089/CF032-02
SAMPLE SHIP DATE: 8/27/2002

ARCOC	LAB	LAB ID	PRELIM DATE	FINAL DATE	EDD		BY
					EDD	ON Q	
605652	GEL	66189A		10/8/2002	X	X	JAC
605653	GEL	66189B		10/8/2002	X	X	JAC
605654	GEL	66189C		10/8/2002	X	X	JAC
605656	GEL	66189D		10/8/2002	X	X	JAC

	NAME	DATE
REVIEW COMPLETED BY/DATE:	<u>L. Herrera</u>	<u>10-25-02</u>
CORRECTIONS REQUESTED/RECEIVED:	<u>req: 10-25-02</u>	<u>rcc'd 10-29-02</u>
PROBLEM #:	<u>5106</u>	
FINAL TRANSMITTED TO/DATE:	<u>Sanders</u>	<u>10-29-02</u>
SENT TO VALIDATION BY/DATE:	<u>Conn</u>	<u>10/29/02</u>
RUSH VALIDATION REQUIRED EST. TAT:	<input type="checkbox"/>	
VALIDATION COMPLETED BY/DATE:	<u>N</u>	<u>11-19-02</u>
COPY TO WM BY/DATE:		
TO ERDMS OR RECORDS CENTER BY/DATE:	<u>Conn</u>	<u>11/26/02</u>

COMMENTS: _____

Sample Findings Summary

Site: OSS soil sampling

ARCOC: 60562, 63, 64, 66

Data: Organic, Inorganic and Radiochemistry

Sample ID	VOCs (206)	79-01-6 (trichloroethylene)	All SVOCs (827) compounds	95-50-1 (1,2-dichlorobenzene)	97-99-3 (hexachlorobutadiene)	67-72-1 (hexachlorocyclopentadiene)	All PCBs (208)	All HCBs (330) compounds	104-61-0 (4-aminobenzonitrile)	478-45-8 (stry)	Metals	7440-22-4 (silver)	7439-97-6 (mercury)	7440-39-3 (barium)	7440-47-3 (chromium)	7439-92-1 (lead)	General Chemistry	5955-70-0 (total cyanide)	13540-20-0 (hexavalent chromium)	Radiochemistry	
056640-002 6644/1080-DF1-EB			P2			UJA															
056640-003 6644/1080-DF1-EB							UJA1														
056640-006 6644/1080-DF1-EB																				UJHT	
056640-007 6644/1080-DF1-EB												UJ,B3		J,B	J,B,B3	J,B,B3					
056691-002 6640/1078-DF1-BH1-5-S			P2						UJA2,P1				UJ,B3								
056692-002 6640/1078-DF1-BH1-10-S				333U,B	UJA2	UJA2			UJA2,P1				UJ,B3								
056693-002 6640/1078-DF1-BH2-5-S				333U,B	UJA2	UJA2			UJA2,P1				J,B3								
056694-002 6640/1078-DF1-BH2-10-S			P2						UJA2,P1				UJ,B3								
056695-002 6640/1078-DF1-BH3-5-S					UJA2	UJA2			UJA2,P1				J,B3								
056696-002 6640/1078-DF1-BH3-10-S					UJA2	UJA2			UJA2,P1			J,B3	UJ,B3								
056697-002 6640/1078-DF1-BH3-5-DU					UJA2	UJA2			UJA2,P1			J,B3	J,B3								
056698-002 6643/1120-DW1-BH1-8-S					UJA2	UJA2			UJA2,P1				UJ,B3							J,A	
056699-002 6643/1120-DW1-BH1-13-S					UJA2	UJA2			UJA2,P1				UJ,B3							J,A	
056701-002 6643/1079-DF1-BH1-11-S					UJA2	UJA2			UJA2,P1			J,B3	J,B3								
056702-002 6643/1079-DF1-BH1-16-S					UJA2	UJA2			UJA2,P1				UJ,B3								
056703-002 6643/1079-DF1-BH2-11-S					UJA2	UJA2			UJA2,P1				J,B3								
056704-002 6643/1079-DF1-BH2-16-S					UJA2	UJA2			UJA2,P1				UJ,B3							J,A	
056705-002 6643/1079-DF1-BH3-11-S					UJA2	UJA2			UJA2,P1				UJ,B3								
056706-002 6643/1079-DF1-BH3-16-S					UJA2	UJA2			UJA2,P1				UJ,B3								
056705-002 6644/1080-DF1-BH1-5-S					UJA2	UJA2			UJA2,P1				UJ,B3							J,A	
056706-002 6644/1080-DF1-BH1-10-S					UJA2	UJA2			UJA2,P1				UJ,B3							J,A	
056707-002 6644/1080-DF1-BH2-5-S					UJA2	UJA2			UJA2,P1				UJ,B3								
056708-002 6644/1080-DF1-BH2-10-S					UJA2	UJA2			UJA2,P1				UJ,B3							J,A	
056709-002 6644/1080-DF1-BH3-5-S					UJA2	UJA2			UJA2,P1				J,B3								
056710-001 6644/1080-DF1-BH3-11-S		UJ																			
056710-002 6644/1080-DF1-BH3-11-S			P2							UJA			J,B3	J							
056710-002 6644/1080-DF1-BH3-11-S-RE																				UJHT	

All QC acceptance criteria were met. No data will be qualified.

Validated By: *X Neal*

Date: 11/14/02

Analytical Quality Associates, Inc.



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

MEMORANDUM

DATE: 11/12/02
TO: File
FROM: Linda Thal
SUBJECT: Inorganic Data Review and Validation - SNL
Site: DSS soil sampling
ARCO # 605652, -53, -54 and -56
GEL SDG # 66189, 66195 and 66197
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 # 197718 (Samples 66189-021 through -040)

Silver was detected in the ICB/CCB at a value > DL but < RL. Sample 66189-026, -027 and -030 had values > DL but < 5X the blank value and will be qualified "J, B3".

Hg Batch # 197662 (Samples 66189-021 through -040)

Hg was detected in the CCB at a negative value with an absolute value > DL but < RL. Samples 66189-023, -025, -027, -030, -032 and -040 had values > DL but < 5X DL and will be qualified "J, B3". All remaining samples were non-detect and will be qualified "UJ, B3".

ICP-AES-Metals Batch # 199132 (Sample 66195-002)

The replicate RPD (54%) failed QC acceptance criteria (<35%) for barium. The sample had a barium value > 5X RL and will be qualified "J".

Hg Batch # 199386 (Sample 66195-002)

Hg was detected in the ICB/CCB at a negative value with an absolute value > DL but < RL. The sample had a value > DL but < 5X DL and will be qualified "J, B3".

ICP-AES-Metals Batch # 199969 (Sample 66197-011)

Barium was detected in the MB at a value > DL but < RL. The sample result was <5X the blank value and will be qualified "J, B".

Chromium was detected in the CCB and MB at a value > DL but < RL. The sample result was <5X the blank values and will be qualified "J, B, B3".

Silver was detected in the ICB at a negative value with an absolute value > DL but < RL. The sample was non-detect and will be qualified "UJ, B3".

Lead was detected in the CCB and MB at a value > DL but < RL. The sample result was <5X the blank values and will be qualified "J, B, B3".

Total Cyanide - Batch #197853 and 198863

The high concentration LCS's in both batches had %R's (134/139%) > QC acceptance criteria (81-125%). All sample results were non-detect with the exception of samples 66189-028, -029, -033, -036, -037 and -039. These all had values > DL but < RL and will be qualified "J, A".

Hexavalent Chromium – Batch # 197692

Sample 66197-010 was received by the laboratory and analyzed after 2x the holding time had expired. The sample result was non-detect, and using professional judgment will be qualified "UJ, HT".

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

Holding Times/Preservation

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

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 # 197718 (Samples 66189-021 through -040)

Silver was detected in the ICB/CCB at a value > DL but < RL. Samples 66189-021 through -25, -028, -029 and -031 through 040 were non-detect and will not be qualified.

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

ICP-AES-Metals Batch # 199132 (Sample 66195-002)

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

ICP-AES-Metals Batch # 199969 (Sample 66197-011)

Selenium was detected in the CCB at a value > DL but < RL. The sample result was non-detect and will not be qualified.

Silver was detected in the CCB and MB at a value > DL but < RL. The sample result was non-detect and will not be qualified.

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

All Analyses: The LCS 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 # 199969 (Sample 66197-011)

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 # 198713 (Sample 66197-011)

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 # 199969 (Sample 66197-011)

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 # 198713 (Sample 66197-011)

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 # 199969 (Sample 66197-011)

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 ARCOG. There are no "required" validation procedures for assessing a field duplicate.
No field blank was submitted on the ARCOG.

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.



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MEMORANDUM

DATE: 11/08/02
TO: File
FROM: Linda Thai
SUBJECT: Organic Data Review and Validation - SNL
Site: DSS soil sampling
ARGOC # 605652, -53, -54, -56 GEL SDG # 66189, 66195 and 66197
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 # 197964

Trichloroethene had a RF (0.22) < than the specified minimum (0.30) but > 0.01. Sample 66195-001 was non-detect and will be qualified "UJ".

SVOC – Batch 197857 (Sample 66189-022, 023 and 025 though 040)

1,2-Dichlorobenzene was detected in the method blank (MB) at a value > DL but < RL. Samples 66189-022 and -023 had 1,2-dichlorobenzene values > DL, < RL and <5X the MB value and will be qualified "U, B" at the RL.

The MS/MSD had %R < QC acceptance criteria (75-125%) and < 40% for hexachlorobutadiene and hexachloroethane. All associated sample results were non-detect and will be qualified "UJ, A2".

SVOC – Batch 199631 (Sample 66189-021 and -024)

No MS/MSD, LCS/LCSD or replicate was performed with this batch. As there is no measure of precision, both associated sample results will be qualified "P2".

SVOC – Batch 198215 (Sample 66195-002)

Due to laboratory error, the MS failed %R for most spiked compounds and all surrogates. Several of the MSD compounds were < QC acceptance criteria (25-75%) but > 40% (see DV worksheet). The MSD and the sample passed all surrogate recoveries. Using professional judgment, the failing MS recoveries will not be used to qualify data. However, as there is no measure of precision, the sample results will be qualified "P2".

SVOC – Batch 197643 (Sample 66197-006)

The LCS %R for hexachloroethane (41%) was < QC acceptance criteria (75-125%). The sample result was non-detect and will be qualified "UJ, A".

The MS/MSD was performed on a sample from an unknown SDG. As there is no measure of precision for the sample, it will be qualified "P2".

PCB Batch # 197833 (66197-007)

The surrogate (DCB) %R was < QC acceptance criteria (21-122%) but > 10%. The sample results were non-detect and will be qualified "UJ, A1".

HE - Batch # 198039 (Sample 66189-021 through -040)

The MS %R (54%) and RPD (43%) 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".

HE - Batch # 198044 and 203606 (Sample 66195-002)

The sample was re-extracted and re-analyzed after the holding time had expired. Both sets of results appear on the Certificate of Analysis and both sets of data will be validated.

Batch 198044: The LCS %R was < QC acceptance criteria but > 10% for tetryl. The sample result is non-detect and will be qualified "UJ, A".

Batch 203606: The sample was re-extracted after its holding time had expired. Both sets of results, QC summary's and calibration data are provided. All the re-extracted sample results were non-detect and will be qualified "UJ, HT".

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

Holding Times/Preservation

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

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 # 197932, 197964 and 199064

Several compounds had %D > 20% but < 40% (refer to DV worksheet). All associated sample results were non-detect and no data will be qualified.

SVOC – Batch 197857 (Sample 66189-022, 023 and 025 though 040)

The initial calibration had a correlation coefficient > 0.9 but < 0.99 for 2-nitrophenol (MSD 8), 2,4-dinitrophenol (MSD4) and 4,6-dinitro-2methylphenol (MSD4). The associated sample results were non-detect and will not be qualified.

The CCVs (instruments MSD4 and MSD8) 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.

SVOC – Batch 199631 (Sample 66189-021 and -024)

Several compounds had %D > 20% but < 40% (refer to DV worksheet). All associated sample results were non-detect and no data will be qualified.

SVOC – Batch 198215 (Sample 66195-002)

The initial calibration had a correlation coefficient > 0.9 but < 0.99 for 2-nitrophenol. The associated sample result was non-detect and will not be qualified.

Several compounds had %D > 20% but < 40% (refer to DV worksheet). All associated sample results were non-detect and no data will be qualified.

SVOC – Batch 197643 (Sample 66197-006)

Several compounds had %D > 20% but < 40% (refer to DV worksheet). The associated sample results were non-detect and no data will be qualified.

PCB Batch # 197835 (66189-021 through -040)

The CCV preceding samples 66189-037 through -040 had a %D > 20% but < 40% with a positive bias for aroclor 1016. The sample results were non-detect and therefore unaffected by a positive bias; 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

Sample 66197-004 (trip blank) had a toluene value > DL but < RL. All associated samples (66189-008 through -015) were non-detect for toluene and no data will be qualified.

SVOC – Batch 197857, 199631 and 198215

Bis(2-ethylhexyl)phthalate was detected in the equipment blank (EB) (66197-006) at a value > DL but < RL. All associated samples were non detect with the exception of sample 66189-038 which had a bis(2-ethylhexylphthalate) value > DL and > 10X EB value. No data will be qualified.

SVOC – Batch 197857 (Sample 66189-022, 023 and 025 though 040)

1,2-Dichlorobenzene was detected in the method blank (MB) at a value > DL but < RL. Samples 66189-025 through -040 were non-detect and will not be qualified.

HE – Batch 198171 (Sample 66197-008)

Tetryl was detected in the MB at a value >DL but < RL. The sample result was non-detect and will not 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 # 197964

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 197857 (Sample 66189-022, 023 and 025 though 040)

Several compounds (see DV worksheet) had %R < QC acceptance criteria (75 – 125%) but > 40%. Using professional judgment, no data will be qualified.

PCB – Batch 197833 (Sample 66197-007)

Only 500ml of sample was used for the MS/MSD (DF=2X). It is not known what affect this will have on the extraction procedure; no data will be qualified.

HE - Batch 203606

No MS/MSD was extracted with this batch. The sample had already been spiked in Batch # 198044 and all the %Rs were in criteria. No data will be qualified.

HE - Batch 198171

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 except as mentioned above in the summary section and as follows:

VOC – Soils and Waters

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 – Soils and Waters

It should be noted that no compound was associated with internal standard perylene-d12. No data will be qualified as a result.

HE – Batch 198044

The LCS had a %R slightly < QC acceptance criteria (79-123%) for 4-amino-2,6-dinitrotoluene (74%). The MS/MSD %R was in criteria, and using professional judgment, no data will be qualified.

Detection Limits/Dilutions

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

Confirmation Analyses

VOC and SVOC: No confirmation analyses required.

PCB: All confirmation acceptance criteria were met.

HE: 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 ARCOG. 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 ARCOG. There are no "required" criteria for assessing a field dup. No field blank was submitted on the ARCOG.

No raw data was submitted with the package.

No other specific issues were identified which affect data quality.

Analytical Quality Associates, Inc.



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MEMORANDUM

DATE: November 14, 2002
TO: File
FROM: Linda Thal
SUBJECT: Radiochemical Data Review and Validation - SNL
Site: DSS soil sampling
ARCOC 605652, -53, -54, -56
GEL SDG # 66189, 66195, 66197 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/MSD analyses met all QC acceptance criteria with the following exception:

Batch # 198970 Sample 66197-012

It should be noted that the sample used for the MS/MSD was of similar matrix from SNL SDG 65919.

Laboratory Control Sample (LCS) Analysis

The LCS analyses met all QC acceptance criteria.

Replicates

The replicate analyses met all QC acceptance criteria with the following exception:

Batch # 198970 Sample 66197-012

It should be noted that the sample used for the replicate was of similar matrix from SNL SDG 65919.

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 was 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: DSS Soil Sampling Project/Task #: 7223.02.03.02 # of Samples: 12 # 12 Matrix: Soil & Aqueous
 AR/COC #: 605652 - 53, -54, -56 Laboratory Sample IDs: 66195 - 001 thru -002
66189 - 001 thru -010 LT
 Laboratory: REL 66197 - 001 thru -012
 Laboratory Report #: 66189, 66197 (120)

QC Element	Analysis									
	Organics				Inorganics				RAD	Hexavalent Other Chromium
	VOC	SVOC	Pesticide/ PCB	HPLC (HE)	ICP/AES	GFAA/ AA	CVAA (Hg)	CN		
1. Holding Times/Preservation	✓	✓	✓	✓ UJ,AT	✓	NA	✓	✓	✓	✓ UJ,AT
2. Calibrations	✓ J	✓ LT	✓	✓	✓		✓	✓	✓	✓
3. Method Blanks	✓ -	U, B ✓	✓	✓	J, B, B3 J, B3		UJ, J, B3 ✓	✓	✓	✓
4. MS/MSD	✓	UJ, A2 P2	✓	UJ, A2, P1 ✓	✓		✓	✓	✓	✓
5. Laboratory Control Samples	✓	✓ UJ, A	✓	UJ, A ✓	✓		✓	J, A	✓	✓
6. Replicates					✓ J		✓	✓	✓	✓
7. Surrogates	✓	✓	✓ UJ, A1	✓						
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	DUP FB	DUP FB	DUP FB	DUP FB		DUP FB UJ, J, B3	DUP FB	DUP FB	DUP FB

I = Estimated Check (✓) = Acceptable
 U = Not Detected Shaded Cells = Not Applicable (also "NA")
 UJ = Not Detected, Estimated NP = Not Provided
 R = Unusable Other: _____

Reviewed By: A. Wal Date: 11.14.02

Holding Time and Preservation

Site/Project: DSS Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66189 - 001 thru -040
 Laboratory: QFL Laboratory Report #: 66189, 66195, 66197 66195 - 001 & -002
 # of Samples: LT 2142 @ 12 Matrix: Soil & AO 66197 - 001 thru -012

Sample ID	Analytical Method	Holding Time Criteria	Days Holding Time was Exceeded	Preservation Criteria	Preservation Deficiency	Comments
66195-002-RE	SW-846 8330	14 days	14 days	NA	NA	UJ, HT
66197-010	SW-846 7196A	24 hours	27 hours > 2X HT	NA	NA	UJ, HT

Reviewed By: Almal Date: 11-11-02

Volatile Organics (SW 846 Method 8260)

Site/Project: DSS Soil Sampling AR/COC #: 605652, -53, -54, -55 # of Samples: 21 Matrix: Soils
 Laboratory: GFA Laboratory Report #: 66189, 66195 Laboratory Sample IDs: 66189-001 thru -020 66195-001
 Methods: SW-846 8260A Batch #s: 197932 (-001 thru -020) 197944 (66195-001)

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R ²	CCV %	Method Blks	LCS	LCS#	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	66197-001 Equip. Blanks	66197-002 Trip Blanks	-002 thru -005
						>.05	<20%/ 10.992	>20%											
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓			NA				✓	✓	*	
2	79-34-5	1,1,2,2-tetrachloroethane		0.30															
2	79-00-5	1,1,2-trichloroethane		0.10															
1	75-34-3	1,1-dichloroethane		0.10															
1	75-35-4	1,1-dichloroethane		0.20					✓	✓		✓	✓	✓	✓				
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															
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				29											
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											
1	74-87-3	chloromethane		0.10	✓	✓	✓	28											
1	10061-01-5	cis-1,3-dichloropropene		0.20				25											
2	124-48-1	dibromochloromethane		0.10				20											
2	100-41-4	ethylbenzene		0.10															
1	75-09-2	methylene chloride (10xblk)	✓	0.01	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓				
2	100-42-5	styrene		0.30				25											
2	127-18-4	tetrachloroethane		0.20															
2	108-88-3	toluene (10xblk)		0.40					✓	✓		✓	✓	✓	✓				
2	10061-02-6	trans-1,3-dichloropropene		0.10				10	✓	✓		✓	✓	✓	✓				70 LRU for 66197-004
1	79-01-6	trichloroethene		0.30				2	✓	✓		✓	✓	✓	✓				
1	75-01-4	vinyl chloride		0.10				✓	✓	✓		✓	✓	✓	✓				
2	1330-20-7	xylene (total)		0.30															
		cis-1,2-dichloroethane																	
		trans-1,2-dichloroethane																	

Comments: Vinyl Acetate (soils only)

Notes: Shaded rows are RCRA compounds.

Reviewed By: D/val

Date: 11.07.02

Volatile Organics

Site/Project: _____ AR/COC #: 605652, -S3, -S4, -S6 Batch #: _____
 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

SMC 1: 4-Bromofluorobenzene
 SMC 2: Dibromofluoromethane
 SMC 3: Toluene-d8
 IS 1: Fluorobenzene
 IS 2: Chlorobenzene-d5
 IS 3: 1,4-Dichlorobenzene-d4

Comments: Batch # 197964 P0/P50 66163 SYA SD9

COVS Batch 197932 L 8.03 SA 1-10
 2. 21.43 SA 11-20
 3. 8.01 No SA MS/MSD observed not reported.

NS # 2 of 2 Water

Volatile Organics (SW 846 Method 8260)

Site/Project: DSD Soil Sampling AR/COC #: 605652, -53, -54, -56 # of Samples: 5 Matrix: Aqueous
 Laboratory: GFA Laboratory Report #: 66197 Laboratory Sample IDs: 66197 - 001 thru - 005
 Methods: SW-846 8260B Batch #s: 199064

IS	CAS #	Name	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R ²	CCV %D	Method Blks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Trip Blanks
						>.05	<20%/0.99	20%										
1	71-55-6	1,1,1-trichloroethane	✓	0.10		✓	✓	✓	✓				NA					
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	340-59-0	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				-24										
1	67-66-3	chloroform		0.20				✓										
1	74-87-3	chloromethane		0.10	✓	✓	✓	-29										
1	10061-01-5	cis-1,3-dichloropropene		0.20				-29										
2	124-48-1	dibromochloromethane		0.10				✓										
2	100-41-4	ethylbenzene		0.10														
1	75-09-2	ethylene 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				-33										
1	79-01-6	trichloroethene		0.30		27e-3		✓		✓	✓	✓						
1	75-01-4	vinyl chloride		0.10		✓												
2	1330-20-7	xylene (total)		0.30														
		Hand - 1,2-Dichloroethane																
		Hand - 1,2-Dichloroethene																

Comments:

Notes: Shaded rows are RCRA compounds.

Reviewed By: d/hal Date: 11.07.02

Volatile Organics

Site/Project: _____ AR/COC #: 60565d, -53, -54, -56 Batch #: _____
 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
<i>IN CRITERIA</i>									

SMC 1: 4-Bromofluorobenzene IS 1: Fluorobenzene
 SMC 2: Dibromofluoromethane IS 2: Chorobenzene-d5
 SMC 3: Toluene-d8 IS 3: 1,4-Dichlorobenzene-d4

Comments:

Summary : Batch 197932 66189 - 001 thru 020 Soil
 197964 66195 - 001 Soil

199064 66197 - 001 - FB All SA NO
 002 - TB for FB NO
 003 TB SA 66189 - 001 thru - 007 NO
 004 TB SA 66189 - 008 thru - 015 Tol J.
 005 TB SA 66189 - 016 thru - 020 66195 - 001 NO

WS 1 of 2 Soils

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DSD Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66189 - 021 HCV - 040
 Laboratory: GRA Laboratory Report #: 66189, 66195 66195 - 002
 Methods: SW-846 8270C (-22, 49) (-94) (-002)
 # of Samples: 21 Matrix: Soils Batch #s: 197857 199631 198215

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept			Callb. RF	Callb. RSD/R ²	CCV %D	Method Blanks	LCS	LCS#	LCS RPD	MS	MSD	MS RPD	25827 Field Dup. RPD	66197-006 Equip. Blanks	Field Blanks	CCV %D	CCV %D
						1	2	3															
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	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											18	✓	81					
3	A	88-06-2	2,4,6-Trichlorophenol		0.20											55	17	62	113				
2	A	120-83-2	2,4-Dichlorophenol		0.20											40	16	52	107				
2	A	105-67-9	2,4-Dimethylphenol		0.20																	-20.5	
3	A	51-28-5	2,4-dinitrophenol		0.01	✓	✓	✓	✓	✓	✓											✓	
3	BN	121-14-2	2,4-Dinitrotoluene		0.20	✓	✓	✓	✓	✓						19	✓	119					
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											52	19	50	90				
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
 ✓ ✓ ✓ 50 17 51 51 ✓ 100

Reviewed By: Alhal

Date: 11.08.02
 -7.5
 # 2.41512 - 1.52295
 1.52595

* MSD 8 SA 22-36 (exc. 24)
 ** MSD 4 SA 37-40

WS 1 of 2 soils

Semivolatile Organics

Site/Project: _____ AR/COC #: 605652, -53, -54, -56 Batch #: _____
 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	LCSB	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	CCV %D	CCV %D
							>.05	<20%/ 0.99	50% 5	1 2 3	1 2 3	1 3 1 3 1 3	3	3	3	3	3	3	3	3	3
3	BN	100-01-6	4-Nitroaniline		0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓
3	A	100-02-7	4-Nitrophenol		0.01		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA	✓	-20.2
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																-36.6
1	BN	108-60-1	bis(2-chloroisopropyl)ether		0.01																✓
5	BN	117-61-7	bis(2-Ethylhexyl)phthalate		0.01	✓	✓	✓										2.38 J			
5	BN	85-68-7	Butylbenzylphthalate		0.01																
4	BN	86-74-8	Carbazole		0.01																-25
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						✓	✓	✓	59	17	64	62	✓	116		
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓	✓	✓	53	16	21	38	✓	82		
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01	✓	✓	✓	25												
1	BN	67-72-1	Hexachloroethane		0.30		✓	✓	✓		✓	✓	✓	56	19	22	41	✓	70		

Comments:

WS 1 of 2 soils

Semivolatile Organics

Site/Project: _____ AR/COC #: 605652, -53, -54, -56 Batch #: _____
 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 RPB	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	CCV %D	CCV %D
							>.05	<20%/0.99	50% 20%	1 2 3	1	2	3	1 3 1	3	3			2	3	
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓	✓	✓							✓	✓	NA	✓	✓
2	BN	78-59-1	Isophorone		0.40																
2	BN	91-20-3	Naphthalene		0.70																
2	BN	98-95-3	Nitrobenzene		0.20						✓	✓	✓	✓	✓	✓	✓				1.22
4	BN	86-30-6	N-Nitrosodiphenylamine (I)		0.01																✓
1	BN	621-64-7	N-Nitroso-di-propylamine	✓	0.50						✓	✓	✓	✓	✓	✓	✓				
4	A	87-86-5	Pentachlorophenol		0.05	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓				100
4	BN	85-01-8	Phenanthrene		0.70																
1	A	108-95-2	Phenol		0.80						✓	✓	✓	✓	✓	✓	✓				93
5	BN	129-00-0	Pyrene		0.60	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓				120
			Diphenylamine			✓	✓	✓	✓												

Surrogate Recovery Outliers

Batch 198215

Sample	SMC 1	SMC 2	SMC 3	SMC 4	SMC 5	SMC 6	SMC 7	SMC 8
66195-MS 002	18	17	18	18	17	22	NA	NA
Sample # MSO	17	NA	NA	NA	NA	NA	NA	NA

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-Dichlorobenzene-d4 (A) SMC 8: 1,2-Dichlorobenzene-d4 (BN)

① Comments: 197857 : MS 1,2 Dichlorobenzene > 0% LRA
 I Cal: 2-Nitrophenol 23-36 SA-022 -023 > 0% LRA
 ② { 2,4 Dinitrophenol 37-40 MS Hexachlorobutadiene ↓ UJ, A2
 2-methyl 4,6 Dinitro " " Hexachlorocyclohexane ↓ < 40%
 MSD 8 & MSD 4 CCV 9.01 9.22 9/03
 (12.04 → 14.07) 12.50 13.12 9/04
 ③ 199631 : NO MS/MSO / rep. P2
 MSD 8 CCV 13.32 9 13.52 9/09

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)

③ 198215 : All MS ↓ All RPD ↑
 Some I Cal as MSO 8 batch ① 2-Nitrophenol 1982
 198215 - All NO P2, A2, A3
 B-22 The seen and MS failures attributed to lab. error.
 All SWM MS failed (SA & MSO passed)

WS 2012 EB

Semivolatile Organics (SW 846 Method 8270)

Site/Project: DDJ Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66197 - 006 (EB)
 Laboratory: QEL Laboratory Report #: 66197
 Methods: SW-846 8270C
 # of Samples: 1 Matrix: Water Batch #: 197643

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R ²	CCV %D	Method Blanks	LCS	LCS D	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	
							>.05	<20%/0.99	20%											
2	BN	120-82-1	1,2,4-Trichlorobenzene	✓	0.20		✓	✓	✓	✓	✓	NA								
1	BN	95-50-1	1,2-Dichlorobenzene		0.40		✓	✓		✓										
1	BN	541-73-1	1,3-Dichlorobenzene		0.60															
1	BN	106-46-7	1,4-Dichlorobenzene		0.50						✓									
3	A	95-95-4	2,4,5-Trichlorophenol		0.20						✓									
3	A	88-06-2	2,4,6-Trichlorophenol		0.20						✓									
2	A	120-83-2	2,4-Dichlorophenol		0.20															
2	A	105-67-9	2,4-Dimethylphenol		0.20															
3	A	51-28-3	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						✓									
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.

Reviewed By: Almal Date: 11.11.02

WS 2 of 2 EB

Semivolatile Organics

Site/Project: _____ AR/COC #: 605652-53, -54, -56 Batch #: _____
 Laboratory: _____ Laboratory Report #: _____ # of Samples: _____ Matrix: _____

IS	BNA	CAS #	NAME	TCL	Min. RF	Intercept	Calib. RF	Calib. RSD/R ²	CCV %D	Method Blanks	LCS	LCSD	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks
							>.05	<20%/0.99	20%										
3	BN	100-01-6	4-Nitroaniline	✓	0.01		✓	✓	✓	✓		NA							
3	A	100-02-7	4-Nitrophenol		0.01		✓				✓								
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	✓	✓	✓	+21										
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	✓	✓	✓											
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	✓	✓	✓	+25										
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						✓								
2	BN	87-68-3	Hexachlorobutadiene		0.01						✓								
3	BN	77-47-4	Hexachlorocyclopentadiene		0.01						✓								
1	BN	67-72-1	Hexachloromethane		0.30						✓	✓							

Comments:

H/
(47-97%)

Semivolatile Organics

Site/Project: _____ AR/COC #: 605652, -53, -54, -56 Batch #: _____
 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 D	LCS RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks	
							>.05	<20%/ 0.99	20%											
6	BN	193-39-5	Indeno(1,2,3-cd)pyrene	✓	0.50	✓	✓	✓	✓	✓		NA								
2	BN	78-59-1	Isophorone		0.40															
2	BN	91-20-3	Naphthalene		0.70															
2	BN	98-95-3	Nitrobenzene		0.20						✓									
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)

Comments: Pyridine on QC summary - not on TAL
 Hexachloroethane fails LCS, < lower > 10%
 NO "UJ", A

Internal Standard Outliers

Sample	IS 1-area	IS 1-RT	IS 2-area	IS 2-RT	IS 3-area	IS 3-RT	IS 4-area	IS 4-RT	IS 5-area	IS 5-RT	IS 6-area	IS 6-RT
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)

MS/MSD performed on sample from unknown SD4. % R failed due to matrix interference. No results provided. No other measure of precision "P₂"

Note: Case narr. states that LCS passed all. Fails hexachloroethane.

WS 1 of 2 Soil

PCBs (SW 846 - Method 8082)

Site/Project: DSS Soil Sampling AR/COC #: 6DS652-53, -54, -56 Laboratory Sample IDs: 66189-021 HRU-040
 Laboratory: GFL Laboratory Report #: LJ GFL 66189, 66195 66195-002
 Methods: SW-846 8082 ① ②
 # of Samples: 21 Matrix: Soils Batch #: 197835 (-21 HRU-040) 197837 (66195-002)

CAS #	Name	T C L	Intercept	Calib		CCV %	Method Blanks		LCB	LCBB	LCB RPD	MS	MSD	MS RPD	Field Dup. RPD	Equip. Blanks	Field Blanks
				RSD/R ²	%		1	2									
12674-11-2	Aroclor-1016	✓	NA	✓	✓	✓	✓	✓			NA				✓	✓	NA
11104-28-2	Aroclor-1221						✓	✓							✓		
11141-16-5	Aroclor-1232						✓	✓									
53469-21-9	Aroclor-1242			✓	✓		✓	✓									
12672-29-6	Aroclor-1248			✓	✓		✓	✓									
11097-69-1	Aroclor-1254			✓	✓	✓	✓	✓									
11096-82-5	Aroclor-1260			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
IN OUTSIDE					

Comments: ① CCV preceding SA 37-40 1016 ↑

Confirmation

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

Reviewed By: d/hal Date: 11.11.02

WS 2012 EB

PCBs (SW 846 - Method 8082)

Site/Project: DSS Soil Sampling AR/COC #: 605652 - 53 - 54 - 56 Laboratory Sample IDs: 66197-007 (ES)
 Laboratory: GEL Laboratory Report #: 66197
 Methods: SW-846 8082
 # of Samples: 1 Matrix: Aqueous Batch #: 197833

CAS #	Name	T C L	Intercept	Calib	CCV	Method	LCS	LCS D	LCS	MS	MSD	MS	Field	Equip.	Field				
				RBD/R ²	%D				RPD			RPD							RPD
				<20%/0.99	20%				20%			20%							
12674-11-2	Aroclor-1016	✓	NA	✓	✓	✓		NA					NA						
11104-28-2	Aroclor-1221					✓													
11141-16-5	Aroclor-1232					✓													
53469-21-9	Aroclor-1242			✓		✓													
12672-29-6	Aroclor-1248			✓		✓													
11097-69-1	Aroclor-1254			✓		✓													
11096-82-5	Aroclor-1260			✓	✓	✓	✓			✓	✓	✓							

Sample	SMC % REC	SMC RT	Sample	SMC % REC	SMC RT
66197-007	16 (21-22%) >10%	DLB	"UJ, A1"		

Comments:

Confirmation

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

Reviewed By: Dhal Date: 11.11.02

High Explosives (SW 846 Method 8330)

Site/Project: DW Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66189 - 021 HV - 040 ①
 Laboratory: GFA Laboratory Report #: 66189, 66195 66195 - 002 ②
 Methods: SW-846 8330 ① ②
 # of Samples: 21 Matrix: Aqueous Soil Batch #: 198039 198044 re 203606

CAS #	NAME	1	Intercept	Curve	CGV	Method	LCS	LCS#	LCS	MS	MSD	MS	Field	Equip.	Field	
				R ²	%D	Blank										RPD
2691-41-0	HMX	✓	NA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NA
121-82-4	RDX															
99-35-4	1,3,5-Trinitrobenzene															
99-65-0	1,3-dinitrobenzene															
98-95-3	Nitrobenzene							(25-24%)								
479-45-8	Tetryl							38								
118-96-7	2,4,6-trinitrotoluene															
35572-78-2	2-amino-4,6-dinitrotoluene							(71-73)		(71-73)		(42%)				
1946-51-0	4-amino-2,6-dinitrotoluene							78		54		43				
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 001664					

Batch: 203606 No MS/MSD No G
 Comments: 66195 - 002 and batch UJ, HT All.

Confirmation

Sample	CAS #	RPD > 25%	Sample	CAS #	RPD > 25%
TV 66195A					

Batch: 198044 LCS Tetryl UJ, A, ~~HT~~ LCS H amino → No G
 Good w/MSD

Batch: 198039 21 → 040 UJ, A2, P1
 4-amino .54% MS

Solids-to-aqueous conversion:

$\text{ng/kg} = \mu\text{g/g} \cdot [(\mu\text{g/g}) \times (\text{sample mass (g)} / \text{sample vol. (ml)}) \times (1000 \text{ ml} / 1 \text{ liter})] / \text{Dilution Factor} = \mu\text{g/l}$

Reviewed By: A/val Date: 11.11.02

WS 2 of 2 EB

High Explosives (SW 846 Method 8330)

Site/Project: DJS Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66197 -008
 Laboratory: GFL Laboratory Report #: 66197
 Methods: SW-846 8330
 # of Samples: 1 Matrix: Aqueous Batch #: 198171

CAS #	NAME	1 1	Intercept	Curve	CCV	Method	LCS	LCSD	LCS	MS	MSD	MS	Field.	Equip.	Field
				R ²	%D	Blanks			RPD			RPD			
2691-41-0	HMX	✓	NA	✓	✓	✓	✓	✓	✓	NA				U	U
121-82-4	RDX														
99-35-4	1,3,5-Trinitrobenzene														
99-65-0	1,3-dinitrobenzene														
98-95-3	Nitrobenzene														
479-45-8	Tetryl					0.0818 JA									
118-96-7	2,4,6-trinitrotoluene					✓									
35572-78-2	2-amino-4,6-dinitrotoluene														
1946-51-0	4-amino-2,6-dinitrotoluene														
121-14-2	2,4-dinitrotoluene														
606-20-2	2,6-dinitrotoluene														
88-72-2	2-nitrotoluene														
99-99-0	4-nitrotoluene														
99-08-1	3-nitrotoluene														
78-11-5	PETN														

Sample	SMC %REC	SMC RT	Sample	SMC %REC	SMC RT
IN CRATERIA					

Comments: NO MS/MSD LCS/LCSD used to assess precision

Confirmation

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

Solids-to-aqueous conversions:

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

Reviewed By: alwal Date: 11-11-02

WS 1 of 3 Soil

Inorganic Metals

Site/Project: DSS Soil Sampling AR/COC #: 605652, 53, 54, 56 Laboratory Sample IDs: 66189 ⁻⁰²¹ ~~001~~ HVC - 040
 Laboratory: GFA Laboratory Report #: 66189 LT
 Methods: SW-846 6010 (IUP-AES) 7471 (Hg)
 # of Samples: 20 Matrix: Soil Batch #s: 197662 (Hg) 197718 (IUP)

CAS #/ Analyte	QC Element																		
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dup- RPD	66197- 011 Equip. Blanks 11/12	Field Blanks	
7429-90-5 Al																			
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓	NA		NA	NA		✓	✓	✓	✓	✓	NA	
7440-41-7 Be																			
7440-43-9 Cd	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA	✓	✓		
7440-70-2 Ca																			
7440-47-3 Cr	✓	✓	✓	✓	✓	.202 J	✓			✓			✓	✓	✓	✓	✓	918	
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	✓	✓	✓	1.38	1.30	✓	✓			✓			NA	✓	NA	✓	✓		
7440-23-5 Na																			
7440-62-2 V																			
7440-66-6 Zn																			
7439-92-1 Pb	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	NA	✓	✓	1.95	
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓			✓			NA	✓	NA	✓	✓		
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓			✓			✓	✓	✓	✓	✓		
7440-36-0 Sb																			
7440-28-0 Tl																			
7439-97-6 Hg	✓	✓	✓	✓	-.161	✓	✓			✓			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: IUP AES 2x standard for soils
 1g → soil mg/kg → µg/l (x10)

Reviewed By: D/hal Date: 11.12.02

WS 2 of 3 Soil

Inorganic Metals

Site/Project: DSS Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66195 - 002
 Laboratory: CEL Laboratory Report #: 66195
 Methods: SW-846 7471 (Hg) 6010 (ICP-AES)
 # of Samples: 1 Matrix: Soil Batch #: 199386 (Hg) 199132 (ICP-AES)

CAS # Analyte	QC Element																		
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	LS% Rep. RPD	ICS AB	Serial Dilution	Field Dup. RPD	66197-01 Equip. Blanks ug/L	Field Blanks	FB X5ug/L
7429-90-5 Al								NA			NA							NA	
7440-39-3 Ba	✓	✓	✓	✓	✓	✓	✓			NA			54	✓	✓	✓	1.455		2.275 ug/L
7440-41-7 Be																			
7440-43-9 Ca	✓	✓	✓	✓	✓	✓	✓						NA	✓	NA	✓	✓		
7440-70-2 Cd																			
7440-47-3 Cr	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	1.918		11.59 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	✓	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓	1.95		9.75 ug/L
7782-49-2 Se	✓	✓	✓	✓	✓	✓	✓						NA	✓	NA	✓	✓		
7440-38-2 As	✓	✓	✓	✓	✓	✓	✓						✓	✓	NA	✓	✓		
7440-36-0 Sb																			
7440-28-0 Tl																			
7439-97-6 Hg	✓	✓	✓	[0.039]	[0.072]	✓	✓						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 AES 2X SOIL

Soil prep 1g → 50ml
 mg/kg → ug/L (x10)

Reviewed By: α/hal Date: 11.12.02

ICB/CCB -ve sa < 5X DA = "5.83" FB sa > 5X No a B-14
 Our SA value > 5X RA "J"

WS 30+3 EB

Inorganic Metals

Site/Project: DSS Soil Sampling AR/COC #: 605652-53-54-56 Laboratory Sample IDs: 66197-011
 Laboratory: GFL Laboratory Report #: _____
 Methods: SW-846 6010 (ICP-AES) 7470 (Hg)
 # of Samples: 1 Matrix: Aqueous Batch #: 199969 (ILP) 198713 (Hg)

CAS # Analyte	QC Element														mg/L						
	TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dilution	Field Dep. RPD	Equip. Blanks	Field Blanks	ICB XS	MS XS	
7429-90-5 Al								NA			NA					NA					
7440-39-3 Ba	✓	✓	✓	✓	✓	0.00225	✓			✓			✓	✓	✓						0.0015
7440-41-7 Be																					
7440-43-9 Cd	✓	✓	✓	✓	✓		✓			✓			NA	✓	NA						
7440-70-2 Ca																					
7440-47-3 Cr	✓	✓	✓	✓	LOU	0.000847	✓			✓			NA	✓	NA					0.005	0.004
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	✓	✓	✓	[-1.03]	2.61	0.00085	✓			✓			NA	✓	NA			[5x BL]		0.01305	0.0042
7440-23-5 Na																					
7440-82-2 V																					
7440-66-6 Zn																					
7439-92-1 Pb	✓	✓	✓	✓	1.95	0.00259	✓			✓			NA	✓	NA					0.0095	0.01295
7782-49-2 Se	✓	✓	✓	✓	3.17		✓			✓			NA	✓	NA					0.01585	
7440-38-2 Au	✓	✓	✓	✓	✓		✓			✓			✓	✓	NA						
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 AES IX

ICP AES : DUP ms 50 66619 SMH

Hg : DUP ms 66218 SMH

Reviewed By: Alhal Date: 11.12.02

General Chemistry

Site/Project: DJJ Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66189-021 thru -040
 Laboratory: GAK Laboratory Report #: 66189 66195-002
 Methods: SW-846 9012A (TCN) 746A (Cr 6) 66197-009 (EB TCN) 66197-010 (EB Cr 6)
 # of Samples: 21 @ 2 Matrix: Soils & EB Batch #s: 197853 & 198863 } TCN 198031 & 198034 } Cr 6
199201 197692

CAS #	Analyte	QC Element																	
		TAL	ICV	CCV	ICB	CCB	Method Blanks	LCS	LCSD	LCSD RPD	MS	MSD	MSD RPD	Rep. RPD	ICS AB	Serial Dile-tion	Field Dup. RPD	Equip. Blanks	Field Blanks
Batch - EB 199201 ✓ SA 66197-009	Total CN		✓	✓	✓	✓	✓	✓	NA		✓	NA		NA	NA	NA	✓	✓	NA
Batch ✓ 197853 SA -021 → 040	Total CN		✓	✓	✓	✓	✓	LT NA * 134 (81-125%)			✓			NA					
Batch 198863 ✓ SA 66195-002	Total CN		✓	✓	✓	✓	✓	* 139			✓			NA					
Batch ✓ 197692 -EB SA 66197-010	Hx anions Chromium		✓	✓	✓	✓	✓	✓			✓			NA					
198031 ✓ 66189-021 → 035	"		✓	✓	✓	✓	✓	✓			✓			NA					
198034 ✓ 66189-036 → 040	"		✓	✓	✓	✓	✓	✓			74 NA			NA					

66195-002 Comments: 66197-010 → 2HT "LO, HT" 75-125% - Lab notified & accepted (SW)

* According to the cert ref. this is in the manufacturers limit. This was also ok 1:50 due to high vol.

TCN LCS ↑ Detects ^{qual} 90% J. by the lab.
 28, 29, 33, 36, 37, 39. Using prof. judgement
 No further qual ^{LT}
 B-16

Reviewed By: D. Wal Date: 11-12-02

Radiochemistry

Site/Project: DJJ Soil Sampling AR/COC #: 605652, -53, -54, -56 Laboratory Sample IDs: 66189-021 HARU 040 ①
 Laboratory: CEL Laboratory Report #: 66195-002 ②
 Methods: EPA 900.0 66197-012 (88) ③
 # of Samples: 21 Matrix: Soils Batch #: 198986 ① 200142 ② 198970 ③

Batch #
 198986
 200142
 198970

Analyte	QC Element												
	Method Blanks	LCS	MS MSD	Rep RER	Equip. Blanks	Field Dsp. 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
U-238 Gross α	✓	✓	✓✓	✓	✓	✓	NA						
U-238 Nonvolatile β	✓	✓	✓✓	✓	✓	✓	NA						
U-234													
U-235-236 Gross α	✓	✓	✓✓	✓	✓	✓	NA						
Th-232 Nonvolatile β	✓	✓	✓✓	✓	✓	✓	NA						
Th-228													
Th-230													
Pu-239-240													
Gross Alpha	✓	✓	✓✓	✓	NA	NA	NA						
Nonvolatile Beta	✓	✓	✓✓	✓	NA	NA	NA						
Ra-226													
Ra-228													
Ni-63													
Gamma Spec. Am-241													
Gamma Spec. Cs-137													
Gamma Spec. Co-60													

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: Batch 198970 Dup MI/MSD 65919
SRRAS 309

Reviewed By: Almal Date: 11.14.02

Contract Verification Review (CVR)

Project Leader Collins Project Name DSS Soil Sampling Case No. 7237_01.07.02

AR/COC No. 605652, 653, 654, 655 Analytical Lab GEL SDG No. 66189A, B, C, D

In the tables below, mark any information that is missing or incorrect and give an explanation.

1.0 Analysis Request and Chain of Custody Record and Log-In Information

Line No.	Item	Complete?		If no, explain	Resolved?	
		Yes	No		Yes	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?		If no, explain	Resolved?	
		Yes	No		Yes	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	HE re-extraction out of holding time		
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		X	4-amino-2,6-dinitrotoluene and tetryl not within HPLC acceptance limits; re-extracted sample LCS within limits
a) Laboratory control samples accuracy reported and met for all samples		X	Decachlorophenol not within PCB acceptance limits
b) Surrogate data reported and met for all organic samples analyzed by a gas chromatography technique		X	several SVOC (059710-002, 059840-002) recovery failures; 4-amino-2,6-dinitrotoluene HPLC MS recovery low
c) Matrix spike recovery data reported and met		X	
3.4 Precision	X		
a) Replicate sample precision reported and met for all inorganic and radiochemistry samples		X	SVOC (059710-002, 059840-002) RPD not within acceptance limits; 4-amino-2,6-dinitrotoluene HPLC RPD not within acceptance limits
b) Matrix spike duplicate RPD data reported and met for all organic samples		X	
3.5 Blank data		X	
a) Method or reagent blank data reported and met for all samples		X	Toluene detected in VOC method blank ; 1,2-Dichlorobenzene detected in SVOC method blank; Tetryl detected in HE method blank; barium, chromium, lead & silver detected in inorganics method blank
b) Sampling blank (e.g., field, trip, and equipment) data reported and met		X	bis(2-Ethylhexyl)phthalate detected in SVOC equipment blank; barium, chromium, lead detected in inorganic 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		

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**CONTRACT LABORATORY
ANALYSIS REQUEST AND CHAIN OF CUSTODY**

Internal Lab

Batch No. <i>N/A</i>	SMO Use	AR/COC	605653
Dept No./Mail Stop: 6135/1089	Date Samples Shipped: 8-27-02	Project/Task No.: 7223.02.03.02	<input checked="" type="checkbox"/> Waste Characterization
Project/Task Manager: <i>Mike Sanders</i>	Carrier/Waybill No.: 12344	SMO Authorization: <i>[Signature]</i>	-Send preliminary/copy report to:
Project Name: DSS soil sampling	Lab Contact: Edie Kent 803-556-8171	Contract #: PO 21671	<input type="checkbox"/> Released by COC No.:
Record Center Code: ER/1295/DSS/OAT	Lab Destination: GEL	<i>SBE ATTACHED TO THE ORDER</i>	<input type="checkbox"/> Validation Required
Logbook Ref. No.: ER 090	SMO Contact/Phone: Pam Puissant/505-844-3185		Bill To: Sandia National Labs (Accounts Payable)
Service Order No. CF032-02	Send Report to SMO: Wendy Palencia/505-844-3132		P.O. Box 5800 MS 0154
			Albuquerque, NM 87185-0154

Sample No.-Fraction	ER Sample ID or Sample Location Detail	Pump Depth (ft)	ER Site No.	Date/Time(hr) Collected	Sample Matrix	Container		Preservative	Collection Method	Sample Type	Parameter & Method Requested	Lab Sample ID
						Type	Volume					
059698-001	6643/1120-DW1-BH1-8-S	8'	1120	8-22-02/1130	S	AS	4oz	4c	G	SA	VOC (8260B)	
059699-001	6643/1120-DW1-BH1-13-S	13'		1150	S	AS	4oz	4c	G	SA	VOC (8260B)	
059698-002	6643/1120-DW1-BH1-8-S	8'		1135	S	AG	500ml	4c	G	SA	see below for parameter	
059699-002	6643/1120-DW1-BH1-13-S	13'		1200	S	AG	500ml	4c	G	SA	see below for parameter	
059641-001	6643/1079-DF1-BH1-11-S	11'	1029	1400	S	AS	4oz	4c	G	SA	VOC (8260B)	
059642-001	6643/1079-DF1-BH1-16-S	16'		1425	S	AS	4oz	4c	G	SA	VOC (8260B)	
059641-002	6643/1079-DF1-BH1-11-S	11'		1405	S	AG	500ml	4c	G	SA	see below for parameter	
059642-002	6643/1079-DF1-BH1-16-S	16'		1430	S	AG	500ml	4c	G	SA	see below for parameter	
059700-001	6643/1079-DF1-BH2-11-S	11'	1079	8-23-02/0843	S	AS	4oz	4c	G	SA	VOC (8260B)	
059701-001	6643/1079-DF1-BH2-16-S	16'	1079	0845	S	AS	4oz	4c	G	SA	VOC (8260B)	

RMMA <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Ref. No.	Sample Tracking	Smo Use	Special Instructions/QC Requirements	Abnormal Conditions on Receipt
Sample Disposal <input type="checkbox"/> Return to Client <input checked="" type="checkbox"/> Disposal by lab	Date Entered(mm/dd/yy)	09/04/02	EDD <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Turnaround Time <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Rush	Entered by:	JAC	Level C Package <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Return Samples By:	Level of Rush:	QC Inits.	*Send report to:	Lab Use
Sample Team Members	Name	Signature	Mike Sanders	
	W. Gibson	[Signature]	Dept 6135/MS/1089	
	G. Quintana	[Signature]	Phone/505-284/2478	
			SVOC (8270C)	
			PCBs(8082)/Cr6+(7197)	
			HE(8330)	
			Total Cyanide(9010)	
			RCRA Metals(6020,7000,7471)	
			*Please list as separate report. Gross alpha/beta (900)	

1. Relinquished by [Signature]	Org. 6135	Date 8/27/02	Time 0810	4. Relinquished by	Org.	Date	Time
1. Received by [Signature]	Org. 6135	Date 8/27/02	Time 0810	4. Received by	Org.	Date	Time
2. Relinquished by [Signature]	Org. 6135	Date 8/27/02	Time 1015	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

ANNEX C
DSS Site 1079
Risk Assessment

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DSS SITE 1079: RISK ASSESSMENT REPORT

I. Site Description and History

Drain and Septic Systems (DSS) Site 1079, the Building 6643 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 septic tank connected to a distribution box and a drainfield consisting of three 30-foot-long drain lines. Available information indicates that Building 6643 was constructed in 1989 (SNL/NM March 2003), and it is assumed that the septic system was also constructed at that time. By 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).

Environmental concern about DSS Site 1079 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 southwest. The closest drainage lies south of the site and terminates in the playa just west of KAFB. No springs or perennial surface-water bodies are located within 3 miles of the site. Average annual rainfall in the SNL/NM and KAFB area, as measured at Albuquerque International Sunport, is 8.1 inches (NOAA 1990). Surface-water runoff in the vicinity of the site is minor because the surface is flat or slopes gently to the southwest. 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 1079 is unpaved with some native vegetation, and no storm sewers are used to direct surface water away from the site.

DSS Site 1079 lies at an average elevation of approximately 5,413 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 487 feet below ground surface (bgs). Groundwater flow is thought to be west in this area (SNL/NM March 2002). The nearest groundwater monitoring wells are approximately 4,700 feet to 5,500 feet northwest of the site at the Mixed Waste Landfill. The nearest production well, KAFB-4 is northwest of the site, approximately 4.1 miles away.

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 1079 was effluent discharged to the environment from the drainfield at this site.

Table 1
Summary of Sampling Performed to Meet DQOs

DSS Site 1079 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.

The soil samples were collected at three locations across DSS Site 1079 with a Geoprobe™ from two 3- or 4-foot-long sampling intervals at each boring location. Drainfield sampling intervals started at 11 and 16 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.

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

Table 2
Number of Confirmatory Soil and QA/QC Samples Collected from DSS Site 1079

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

^aTBs for VOCs only.

DSS = Drain and Septic Systems.

EB = Equipment blank.

GEL = General Engineering Laboratories, Inc.

HE = High explosive(s).

PCB = Polychlorinated biphenyl.

QA/QC = Quality assurance/quality control.

RCRA = Resource Conservation and Recovery Act.

RPSD = Radiation Protection Sample Diagnostics Laboratory.

SVOC = Semivolatile organic compound.

TB = Trip blank.

VOC = Volatile organic compound.

Table 3
Summary of Data Quality Requirements for DSS Site 1079

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.

^aEPA November 1986.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

GEL = General Engineering Laboratories, Inc.

HE = High explosive(s).

PCB = Polychlorinated biphenyl.

QA/QC = Quality assurance/quality control.

RCRA = Resource Conservation and Recovery Act.

RPSD = Radiation Protection Sample Diagnostics Laboratory.

SVOC = Semivolatile organic compound.

VOC = Volatile organic compound.

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). No significant QA/QC problems were identified in the QA/QC sample.

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 1079 request for a determination of Corrective Action Complete (CAC) without controls. The gamma spectroscopy data from the RPSD Laboratory were reviewed according to "Laboratory Data Review Guidelines," Procedure No. RPSD-02-11, Issue No. 2 (SNL/NM July 1996). The

gamma spectroscopy results are presented in the CAC proposal. The reviews confirmed that the analytical data are defensible and therefore acceptable for use in the request for a determination of CAC without controls. Therefore, the DQOs have been fulfilled.

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

III.1 Introduction

The determination of the nature, migration rate, and extent of contamination at DSS Site 1079 is based upon an initial conceptual model validated with confirmatory sampling at the site. The initial conceptual model was developed from archival site research, site inspections, and soil sampling. The DQOs contained in the 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 model for DSS Site 1079, 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 1079 were evaluated using laboratory analyses of the soil samples. The analytical requirements included analyses for VOCs, SVOCs, HE compounds, PCBs, RCRA metals, hexavalent chromium, cyanide, radionuclides by gamma spectroscopy, and gross alpha/beta activity. The analytes and methods listed in Tables 2 and 3 are appropriate to characterize the COCs and potential degradation products at DSS Site 1079.

III.3 Rate of Contaminant Migration

The septic system at DSS Site 1079 was deactivated in 1991 when Building 6643 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 1079.

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 11 and 16 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 1079 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 1079. 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.

V. Fate and Transport

The primary releases of COCs at DSS Site 1079 were to the subsurface soil resulting from the discharge of effluents from the Building 6643 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 are considered to be of potential significance as transport mechanisms at this site. Because the septic system is no longer active, additional

Table 4
Nonradiological COCs for Human Health Risk Assessment at DSS Site 1079 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	3.15	4.4	Yes	44 ^c	–	Yes
Barium	180	214	Yes	170 ^d	–	Yes
Cadmium	0.0674 J	0.9	Yes	64 ^c	–	Yes
Chromium, total	8.68	15.9	Yes	16 ^c	–	No
Chromium VI	0.0277 ^e	1	Yes	16 ^c	–	No
Cyanide	0.0511 J	NC	Unknown	NC	–	Unknown
Lead	5.31	11.8	Yes	49 ^c	–	Yes
Mercury	0.0046 J	<0.1	Yes	5,500 ^c	–	Yes
Selenium	0.447 J	<1	Yes	800 ^f	–	Yes
Silver	0.103 J	<1	Yes	0.5 ^c	–	No
Organic						
2-Butanone	0.00685	NA	NA	1 ^g	0.29 ^g	No
Fluorene	0.201	NA	NA	2,239 ^h	4.18 ^h	Yes
Methylene chloride	0.0024 J	NA	NA	5 ^g	1.25 ^g	No

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

^aDinwiddie September 1997, Southwest Area Supergroup.

^bNMED March 1998.

^cYanicak March 1997.

^dNeumann 1976.

^eParameter was not detected. Concentration listed is one-half the maximum detection limit.

^fCallahan et al. 1979.

^gHoward 1990.

^hMicromedex, Inc. 1998.

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.

SNL/NM = Sandia National Laboratories/New Mexico.

– = Information not available.

Table 5
Radiological COCs for Human Health Risk Assessment at DSS Site 1079 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 (0.0367)	0.079	Yes	3,000 ^d	Yes
Th-232	0.71	1.01	Yes	3,000 ^e	Yes
U-235	ND (0.217)	0.16	No	900 ^e	Yes
U-238	ND (0.708)	1.4	Yes	900 ^e	Yes

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

^aValue listed is the greater of either the maximum detection or the highest MDA.

^bDinwiddie September 1997, Southwest Area Supergroup.

^cNMED March 1998.

^dWhicker and Schultz 1982.

^eBaker 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.

infiltration of water is not expected. Infiltration of precipitation is essentially nonexistent at DSS Site 1079, as virtually all of the moisture either drains away from the site or evaporates. Because groundwater at this site is approximately 487 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 1079 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 1079 are limited to 2-butanone, fluorene, and methylene chloride. Organic COCs may be degraded through photolysis, hydrolysis, and biotransformation. Photolysis requires light and therefore takes place in the air, at the ground surface, or in surface water. Hydrolysis includes chemical transformations in water and may occur in the soil solution. Biotransformation (i.e., transformation caused by plants, animals, and microorganisms) may occur; however, biological activity may be limited by the arid environment at this site. Because of the depth of the COCs in the soil, the loss of 2-butanone and methylene chloride through volatilization is expected to be minimal.

Table 6 summarizes the fate and transport processes that can occur at DSS Site 1079. 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 1079

Transport and Fate Mechanism	Existence at Site	Significance
Wind	Yes	Low
Surface runoff	Yes	Low
Migration to groundwater	No	None
Food chain uptake	Yes	Low
Transformation/degradation	Yes	Low to moderate

DSS = Drain and Septic Systems.

VI. Human Health Risk Assessment

VI.1 Introduction

The human health risk assessment of this site includes a number of steps that culminate in a quantitative evaluation of the potential adverse human health effects caused by constituents located at the site. The steps to be discussed include the following:

Step 1.	Site data are described that provide information on the potential COCs, as well as the relevant physical characteristics and properties of the site.
Step 2.	Potential pathways are identified by which a representative population might be exposed to the COCs.
Step 3.	The potential intake of these COCs by the representative population is calculated using a tiered approach. The first component of the tiered approach is a screening procedure that compares the maximum concentration of the COC to an SNL/NM maximum background screening value. COCs that are not eliminated during the first screening procedure are carried forward in the risk assessment process.
Step 4.	Toxicological parameters are identified and referenced for COCs that were not eliminated during the screening procedure.
Step 5.	Potential toxicity effects (specified as a hazard index [HI]) and estimated excess cancer risks are calculated for nonradiological COCs and background. For radiological COCs, the incremental total effective dose equivalent (TEDE) and incremental estimated cancer risk are calculated by subtracting applicable background concentrations directly from maximum on-site contaminant values. This background subtraction applies only when a radiological COC occurs as contamination and exists as a natural background radionuclide.
Step 6.	These values are compared with guidelines established by the U.S. Environmental Protection Agency (EPA), NMED, and the DOE to determine whether further evaluation and potential site cleanup are required. Nonradiological COC risk values also are compared to background risk so that an incremental risk can be calculated.
Step 7.	Uncertainties of the above steps are addressed.

VI.2 Step 1. Site Data

Section I of this risk assessment provides the site description and history for DSS Site 1079. 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 1079 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 1079 is approximately 487 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 1079.

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.

VI.4.2 Results

Tables 4 and 5 show the DSS Site 1079 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, one constituent (cyanide) does not have a quantified background screening concentration; therefore it is unknown whether this COC exceeds background. Three constituents are organic compounds that do not have corresponding background screening values.

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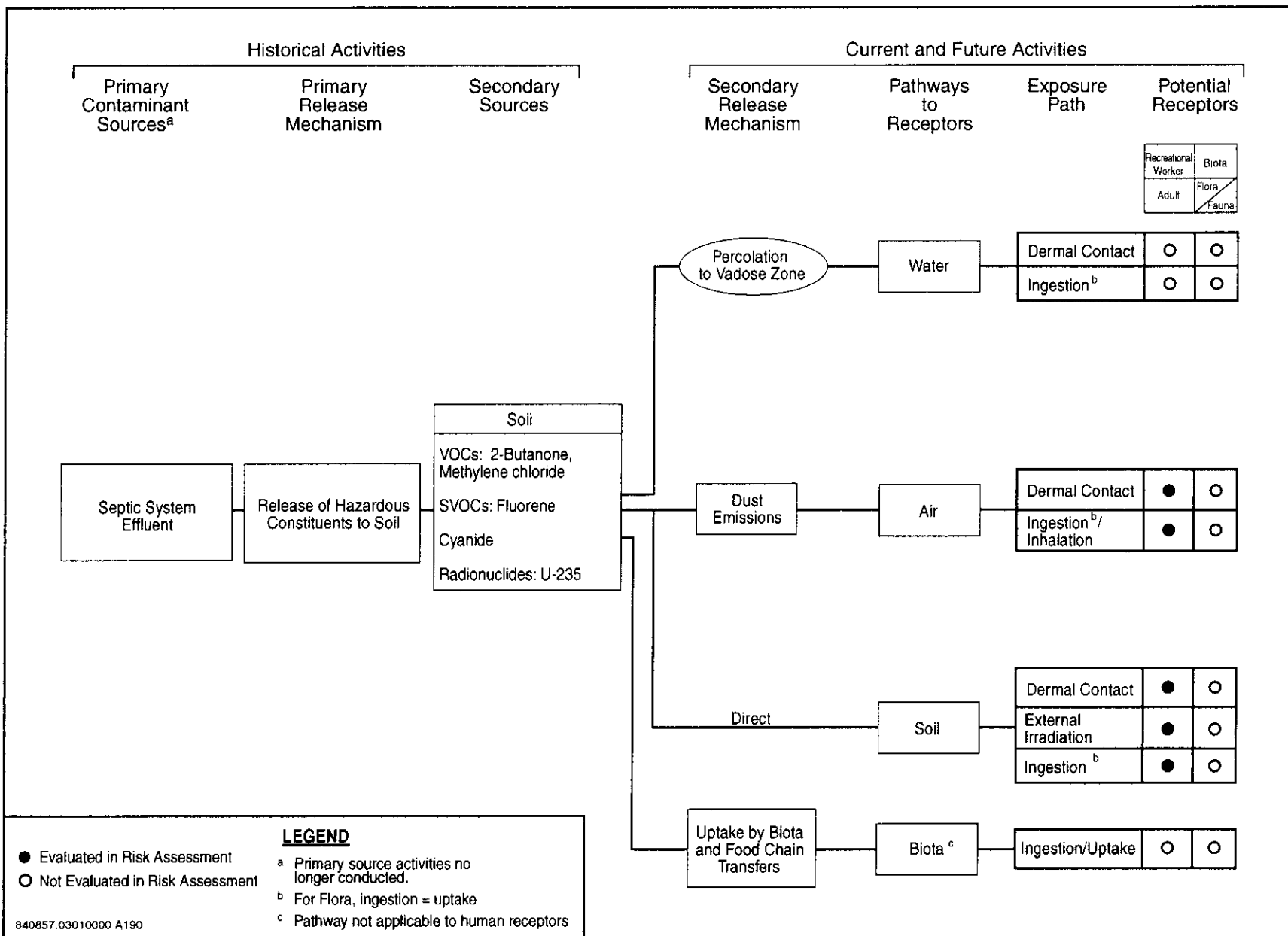


Figure 1
Conceptual Site Model Flow Diagram for DSS Site 1079, Building 6643 Septic System

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

VI.5 Step 4. Identification of Toxicological Parameters

Tables 7 (nonradiological) and 8 (radiological) list the COCs retained in the risk assessment and the values for the available toxicological information. The toxicological values for the nonradiological COCs presented in Table 7 were obtained from the Integrated Risk Information System (IRIS) (EPA 2003), the Health Effects Assessment Summary Tables (HEAST) (EPA 1997a), the Technical Background Document for Development of Soil Screening Levels (NMED December 2000), and the EPA Region 6 electronic database (EPA 2002a). 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).

VI.6 Step 5. Exposure Assessment and Risk Characterization

Section VI.6.1 describes the exposure assessment for this risk assessment. Section VI.6.2 provides the risk characterization, including the HI and excess cancer risk for both the potential nonradiological COCs and associated background for the industrial and residential land-use scenarios. The incremental TEDE and incremental estimated cancer risk are provided for the background-adjusted radiological COC for both the industrial and residential land-use scenarios.

VI.6.1 Exposure Assessment

Appendix 1 provides the equations and parameter input values used in calculating intake values and subsequent HI and excess cancer risk values for the individual exposure pathways. The appendix shows parameters for both industrial and residential land-use scenarios. The equations for nonradiological COCs are based upon the Risk Assessment Guidance for Superfund (RAGS) (EPA 1989). Parameters are based upon information from the RAGS

**Table 7
Toxicological Parameter Values for DSS Site 1079 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								
Cyanide	2E-2 ^c	M	-	-	-	-	D	0.1 ^d
Organic								
2-Butanone	6E-1 ^c	L	2.9E-1 ^c	L	-	-	D	0.1 ^d
Fluorene	4E-2 ^c	L	4E-2 ^e	-	-	-	D	0.1 ^d
Methylene chloride	6E-2 ^c	M	8.6E-1 ^f	-	7.5E-3 ^c	1.6E-3 ^c	B2	0.1 ^d

^aConfidence associated with IRIS (EPA 2003) database values. Confidence: L = low, M = medium.

^bEPA weight-of-evidence classification system for carcinogenicity (EPA 1989) taken from IRIS (EPA 2003):

B2 = Probable human carcinogen. Sufficient evidence in animals and inadequate or no evidence in humans.

D = Not classifiable as to human carcinogenicity.

^cToxicological parameter values from IRIS electronic database (EPA 2003).

^dToxicological parameter values from NMED (December 2000).

^eToxicological parameter values from EPA Region 6 (EPA 2002a).

^fToxicological parameter values from HEAST (EPA 1997a).

ABS = Gastrointestinal absorption coefficient.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

HEAST = Health Effects Assessment Summary Tables.

IRIS = Integrated Risk Information System.

mg/kg-d = Milligram(s) per kilogram-day.

(mg/kg-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 1079 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

^aYu et al. 1993a.

^bEPA 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.

(EPA 1989), the Technical Background Document for Development of Soil Screening Levels (NMED December 2000), 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 1079 nonradiological COCs and an estimated excess cancer risk of 2E-8 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 no quantified HI or estimated excess cancer risk for the DSS Site 1079 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 results in an incremental TEDE of 8.2E-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 1997b), an incremental TEDE of 15 mrem/yr is used for the probable land-use scenario (industrial in this case); the calculated dose value for DSS Site 1079 for the industrial land-use scenario is well below this guideline. The estimated excess cancer risk is 9.4E-8.

Table 9
Risk Assessment Values for DSS Site 1079 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					
Cyanide	0.0511 J	0.00	–	0.00	–
Organic					
2-Butanone	0.00685	0.00	–	0.00	–
Fluorene	0.201	0.00	–	0.00	–
Methylene chloride	0.0024 J	0.00	2E-8	0.00	3E-8
Total		0.00	2E-8	0.00	3E-8

^aEPA 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 1079 Nonradiological Background Constituents

COC	Background Concentration (mg/kg)	Industrial Land-Use Scenario ^a		Residential Land-Use Scenario ^a	
		Hazard Index	Cancer Risk	Hazard Index	Cancer Risk
Cyanide	NC	–	–	–	–
Total		–	–	–	–

^aEPA 1989.

COC = Constituent of concern.

DSS = Drain and Septic Systems.

EPA = U.S. Environmental Protection Agency.

mg/kg = Milligram(s) per kilogram.

NC = Not calculated.

– = Information not available.

For the nonradiological COCs under the residential land-use scenario, the HI is 0.00 with an estimated excess cancer risk of $3E-8$ (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 no quantified HI or estimated excess cancer risk for the DSS Site 1079 associated background constituents under the residential land-use scenario.

For the radiological COC, the incremental TEDE for the residential land-use scenario is $2.1E-2$ 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 1079 for the residential land-use scenario is well below this guideline. Consequently, DSS Site 1079 is eligible for unrestricted radiological release as the residential land-use scenario results in an incremental TEDE of less than 75 mrem/yr to the on-site receptor. The estimated excess cancer risk is $2.8E-7$. The excess cancer risk from the nonradiological and radiological COCs should be summed to provide risk estimates for persons exposed to both types of carcinogenic contaminants, as noted in OSWER Directive No. 9200.4-18 "Establishment of Cleanup Levels for CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Sites with Radioactive Contamination," (EPA 1997b). This summation is tabulated in Section VI.9, Summary.

VI.7 Step 6. Comparison of Risk Values to Numerical Guidelines

The human health risk assessment analysis evaluates the potential for adverse health effects for both the industrial (the designated land-use scenario for this site) and residential land-use scenarios.

For the nonradiological COCs under the industrial land-use scenario, the HI is 0.00 (less than the numerical guideline of 1 suggested in the RAGS [EPA 1989]). The estimated excess cancer risk is $2E-8$. NMED guidance states that cumulative excess lifetime cancer risk must be less than $1E-5$ (Bearzi January 2001); thus the excess cancer risk for this site is below the suggested acceptable risk value. This assessment also determined risks considering background concentrations of the potential nonradiological COCs for both the industrial and residential land-use scenarios. Assuming the industrial land-use scenario, there is neither a quantifiable HI nor an excess cancer risk for the 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 the incremental estimated excess cancer risk is $1.56E-8$ 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 $8.2E-3$ mrem/yr, which is significantly lower than EPA's numerical guideline of 15 mrem/yr. The incremental estimated excess cancer risk is $9.4E-8$.

The calculated HI for the nonradiological COCs under the residential land-use scenario is 0.00, which is below numerical guidance. The estimated excess cancer risk is $3E-8$. 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 0.00 and the estimated incremental cancer risk is $3.32E-8$ 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 components is $2.1E-2$ 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 $2.8E-7$.

VI.8 Step 7. Uncertainty Discussion

The determination of the nature, rate, and extent of contamination at DSS Site 1079 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 screening 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 screening assessment at DSS Site 1079.

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 2003), HEAST (EPA 1997a), EPA Region (EPA 2002a), and Technical Background Document for Development of Soil Screening Levels (NMED December 2000). Where values are not provided, information is not available from the HEAST (EPA 1997a), IRIS (EPA 2003), Technical Background Document for Development of Soil Screening Levels (NMED December 2000), Risk Assessment Information System (ORNL 2003), or the EPA regions (EPA 2002a, EPA 2002b, EPA 2002c). Because of the conservative nature of the RME approach, uncertainties in toxicological values are not expected to change the conclusion from the risk assessment analysis.

Risk assessment values for nonradiological COCs are within the acceptable range for human health under 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 1079 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 significantly lower than the accepted numerical guidance from the EPA. The estimated excess cancer risk is $2\text{E-}8$; thus, excess cancer risk is also below the acceptable risk value provided by the NMED for an industrial land-use scenario (Bearzi January 2001). The incremental HI is 0.00 and the incremental estimated excess cancer risk is $1.56\text{E-}8$ 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 (0.00) is below the accepted numerical guidance from the EPA. The estimated excess cancer risk is $3\text{E-}8$. 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 0.00 and the incremental estimated excess cancer risk is $3.32\text{E-}8$ 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 radiological COCs are much less than EPA guidance values. The estimated TEDE is $8.2\text{E-}3$ mrem/yr for the industrial land-use scenario, which is much lower than the EPA's numerical guidance of 15 mrem/yr (EPA 1997b). The corresponding incremental estimated cancer risk value is $9.4\text{E-}8$ 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 $2.1\text{E-}2$ mrem/yr with an associated risk of $2.8\text{E-}7$. The guideline for this scenario is 75 mrem/yr (SNL/NM February 1998). Therefore, DSS Site 1079 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 1997b). The summation of the nonradiological and radiological carcinogenic risks is tabulated in Table 11.

Table 11
Summation of Radiological and Nonradiological Risks from
DSS Site 1079, Building 6643 Septic System Carcinogens

Scenario	Nonradiological Risk	Radiological Risk	Total Risk
Industrial	1.56E-8	9.4E-8	1.1E-7
Residential	3.32E-8	2.8E-7	3.1E-7

DSS = Drain and Septic Systems.

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

VII. Ecological Risk Assessment

VII.1 Introduction

This section addresses the ecological risks associated with exposure to constituents of potential ecological concern (COPECs) in the soil at DSS Site 1079. 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. The 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 1079 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 BIOMOV5 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:

$$\begin{aligned} \text{Risk (or Dose)} &= \text{Intake} \times \text{Toxicity Effect (either carcinogenic, noncarcinogenic, or radiological)} \\ &= C \times (\text{CR} \times \text{EFD}/\text{BW}/\text{AT}) \times \text{Toxicity Effect} \end{aligned} \quad (1)$$

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):

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

where:

- I_s = Intake of contaminant from soil inhalation (mg/kg-day)
- C_s = Chemical concentration in soil (mg/kg)
- IR = Inhalation rate (cubic meters [m³]/day)
- EF = Exposure frequency (days/year)
- ED = Exposure duration (years)
- VF = soil-to-air volatilization factor (m³/kg)
- PEF = particulate emission factor (m³/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 (cm²/event)
- AF = Soil to skin adherence factor (mg/cm²)
- 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/m³)
 IR_i = Inhalation rate (m³/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 1×10^{-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)	25,550 ^{a,b}	25,550 ^{a,b}	25,550 ^{a,b}
for Noncarcinogenic Compounds (= ED x 365 day/yr)	9,125 ^{a,b}	10,950 ^{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

^aTechnical Background Document for Development of Soil Screening Levels (NMED December 2000).

^bRisk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).

^cExposure 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	1.36E-5 ^d	1.36E-5 ^d	1.36E-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}

^aRisk Assessment Guidance for Superfund, Vol. 1, Part B (EPA 1991).

^bExposure Factors Handbook (EPA August 1997).

^cEPA Region VI guidance (EPA 1996).

^dFor radionuclides, RESRAD (ANL 1993).

^eSNL/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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U.S. Environmental Protection Agency (EPA), 1997. (OSWER No. 9200.4-18) *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination*, U.S. EPA Office of Radiation and Indoor Air, Washington D.C., August 1997.

RSI

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,

A handwritten signature in cursive script that reads "Patty Wagner".

Patty Wagner
Manager

Enclosure

Mr. J. Bearzi

(2)

APR 7 2005

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

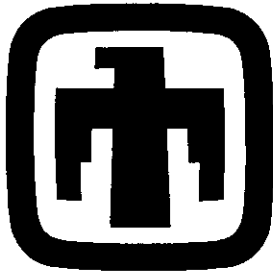
D. Stockham, SNL, MS 1087

~~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

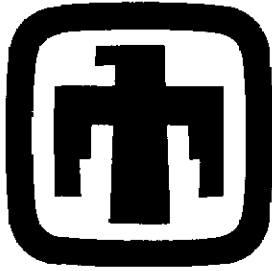
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1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-16-S	059701-002	23-AUG-02	SOIL	BNA-8270	GEL	197857
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-11-S	059702-002	23-AUG-02	SOIL	BNA-8270	GEL	197857
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-16-S	059703-002	23-AUG-02	SOIL	BNA-8270	GEL	197857
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-11-S	059641-001	22-AUG-02	SOIL	VOA-8260	GEL	197932
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-16-S	059642-001	22-AUG-02	SOIL	VOA-8260	GEL	197932
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-11-S	059700-001	23-AUG-02	SOIL	VOA-8260	GEL	197932
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-16-S	059701-001	23-AUG-02	SOIL	VOA-8260	GEL	197932
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-11-S	059702-001	23-AUG-02	SOIL	VOA-8260	GEL	197932
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-16-S	059703-001	23-AUG-02	SOIL	VOA-8260	GEL	197932
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-11-S	059641-002	22-AUG-02	SOIL	Cr+6	GEL	198031
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-16-S	059642-002	22-AUG-02	SOIL	Cr+6	GEL	198031
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-11-S	059700-002	23-AUG-02	SOIL	Cr+6	GEL	198031
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-16-S	059701-002	23-AUG-02	SOIL	Cr+6	GEL	198031
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-11-S	059702-002	23-AUG-02	SOIL	Cr+6	GEL	198031
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-16-S	059703-002	23-AUG-02	SOIL	Cr+6	GEL	198031

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

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Site #	Site Name	Binder #	COC#	ER Sample ID	Sample #	SAMPLE DATE	MATRIX	LAB TEST	Lab	BATCH #
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-11-S	059641-002	22-AUG-02	SOIL	HE-8330	GEL	198039
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-16-S	059642-002	22-AUG-02	SOIL	HE-8330	GEL	198039
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-11-S	059700-002	23-AUG-02	SOIL	HE-8330	GEL	198039
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-16-S	059701-002	23-AUG-02	SOIL	HE-8330	GEL	198039
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-11-S	059702-002	23-AUG-02	SOIL	HE-8330	GEL	198039
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-16-S	059703-002	23-AUG-02	SOIL	HE-8330	GEL	198039
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-11-S	059641-002	22-AUG-02	SOIL	GROSS-A/B	GEL	198986
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-16-S	059642-002	22-AUG-02	SOIL	GROSS-A/B	GEL	198986
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-11-S	059700-002	23-AUG-02	SOIL	GROSS-A/B	GEL	198986
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-16-S	059701-002	23-AUG-02	SOIL	GROSS-A/B	GEL	198986
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-11-S	059702-002	23-AUG-02	SOIL	GROSS-A/B	GEL	198986
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-16-S	059703-002	23-AUG-02	SOIL	GROSS-A/B	GEL	198986
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-TB	059704-001	23-AUG-02	AQUEOUS	VOA-8260	GEL	199064
1079	Bldg. 6643 SS	Volume 7	605641	6643/1079-DF1-BH1-11-S	059641-003	22-AUG-02	SOIL	GAMMA SPEC	RPSD	201191
1079	Bldg. 6643 SS	Volume 7	605641	6643/1079-DF1-BH1-16-S	059642-003	22-AUG-02	SOIL	GAMMA SPEC	RPSD	201191
1079	Bldg. 6643 SS	Volume 7	605641	6643/1079-DF1-BH2-11-S	059700-003	23-AUG-02	SOIL	GAMMA SPEC	RPSD	201191
1079	Bldg. 6643 SS	Volume 7	605641	6643/1079-DF1-BH2-16-S	059701-003	23-AUG-02	SOIL	GAMMA SPEC	RPSD	201191
1079	Bldg. 6643 SS	Volume 7	605641	6643/1079-DF1-BH3-11-S	059702-003	23-AUG-02	SOIL	GAMMA SPEC	RPSD	201191
1079	Bldg. 6643 SS	Volume 7	605641	6643/1079-DF1-BH3-16-S	059703-003	23-AUG-02	SOIL	GAMMA SPEC	RPSD	201191
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-11-S	059641-002	22-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH1-16-S	059642-002	22-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-11-S	059700-002	23-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH2-16-S	059701-002	23-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-11-S	059702-002	23-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1079	Bldg. 6643 SS	Volume 3	605653	6643/1079-DF1-BH3-16-S	059703-002	23-AUG-02	SOIL	RCRA METALS	GEL	197718, 197762
1080	Bldg. 6644 SS	Volume 3	605656	6644/1080-DF1-EB	059640-002	26-AUG-02	AQUEOUS	BNA-8270	GEL	197643
1080	Bldg. 6644 SS	Volume 3	605656	6644/1080-DF1-EB	059640-006	26-AUG-02	AQUEOUS	Cr+6	GEL	197692
1080	Bldg. 6644 SS	Volume 3	605656	6644/1080-DF1-EB	059640-003	26-AUG-02	AQUEOUS	PCB-8082	GEL	197833
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH1-10-S	059706-002	26-AUG-02	SOIL	PCB-8082	GEL	197835
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH1-5-S	059705-002	26-AUG-02	SOIL	PCB-8082	GEL	197835
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-10-S	059708-002	26-AUG-02	SOIL	PCB-8082	GEL	197835
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-5-S	059707-002	26-AUG-02	SOIL	PCB-8082	GEL	197835
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH3-6-S	059709-002	26-AUG-02	SOIL	PCB-8082	GFI	197835
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH3-11-S	059710-002	26-AUG-02	SOIL	PCB-8082	GEL	197837
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH1-10-S	059706-002	26-AUG-02	SOIL	TOTAL-CN	GFI	197853
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH1-5-S	059705-002	26-AUG-02	SOIL	TOTAL-CN	GEL	197853
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-10-S	059708-002	26-AUG-02	SOIL	TOTAL-CN	GFI	197853
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-5-S	059707-002	26-AUG-02	SOIL	TOTAL-CN	GEL	197853
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH3-6-S	059709-002	26-AUG-02	SOIL	TOTAL-CN	GEL	197853
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH1-10-S	059706-002	26-AUG-02	SOIL	BNA-8270	GEL	197857
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH1-5-S	059705-002	26-AUG-02	SOIL	BNA-8270	GEL	197857
1080	Bldg. 6644 SS	Volume 3	605654	6644/1080-DF1-BH2-10-S	059708-002	26-AUG-02	SOIL	BNA-8270	GEL	197857

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



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COC 605653

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1079	Bldg. 6643 SS	059641	001	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	VOA-8260	197932, 197964
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	Cr+6	198031, 198034
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	GROSS-A/B	198986
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	PCB-8082	197835, 197837
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1079	Bldg. 6643 SS	059641	002	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	TOTAL-CN	197853, 198863
1079	Bldg. 6643 SS	059642	001	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	VOA-8260	197932, 197964
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	Cr+6	198031, 198034
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	GROSS-A/B	198986
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	PCB-8082	197835, 197837
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1079	Bldg. 6643 SS	059642	002	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	TOTAL-CN	197853, 198863
1120	Bldg. 6643 DW	059698	001	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	VOA-8260	197932, 197964
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	Cr+6	198031, 198034
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	GROSS-A/B	198986
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606

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Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	PCB-8082	197835, 197837
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1120	Bldg. 6643 DW	059698	002	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	TOTAL-CN	197853, 198863
1120	Bldg. 6643 DW	059699	001	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	VOA-8260	197932, 197964
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	Cr+6	198031, 198034
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	GROSS-A/B	198986
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	PCB-8082	197835, 197837
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1120	Bldg. 6643 DW	059699	002	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	TOTAL-CN	197853, 198863
1079	Bldg. 6643 SS	059700	001	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	VOA-8260	197932, 197964
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	Cr+6	198031, 198034
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	GROSS-A/B	198986
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	PCB-8082	197835, 197837
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1079	Bldg. 6643 SS	059700	002	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	TOTAL-CN	197853, 198863
1079	Bldg. 6643 SS	059701	001	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	VOA-8260	197932, 197964
1079	Bldg. 6643 SS	059701	002	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	BNA-8270	197857, 197631, 198215

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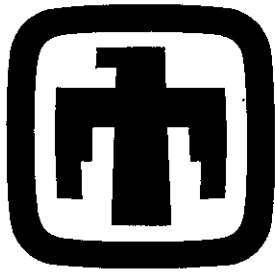
COC 605653

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
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1079	Bldg. 6643 SS	059701	002	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	GROSS-A/B	198986
1079	Bldg. 6643 SS	059701	002	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1079	Bldg. 6643 SS	059701	002	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	PCB-8082	197835, 197837
1079	Bldg. 6643 SS	059701	002	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1079	Bldg. 6643 SS	059701	002	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	TOTAL-CN	197853, 198863
1079	Bldg. 6643 SS	059702	001	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	VOA-8260	197932, 197964
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	Cr+6	198031, 198034
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	GROSS-A/B	198986
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	PCB-8082	197835, 197837
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386
1079	Bldg. 6643 SS	059702	002	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	TOTAL-CN	197853, 198863
1079	Bldg. 6643 SS	059703	001	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	VOA-8260	197932, 197964
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	BNA-8270	197857, 197631, 198215
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	Cr+6	198031, 198034
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	GROSS-A/B	198986
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	HE-8330	198039, 198044, 201462, 203606
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	PCB-8082	197835, 197837
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	RCRA METALS	197718, 197762, 199132, 199386

GEL QC CROSS REFERENCE

COC 605653

Site #	Site Name	SAMPLE#	F#	DISP_ER_SAMP_LOC	SAMPLE DATE	MATRIX	LAB TEST	BATCH #
1079	Bldg. 6643 SS	059703	002	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	TOTAL-CN	197853, 198863
1079	Bldg. 6643 SS	059704	001	6643/1079-DF1-BH3-TB	23-AUG-02	AQUEOUS	VOA-8260	199064



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United States Department of Energy
Sandia Site Office

RPSD QC CROSS REFERENCE

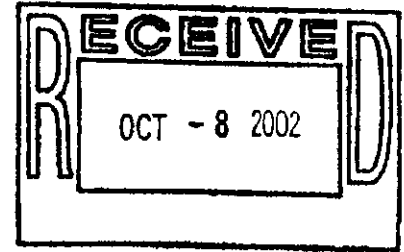
COC 605641
BATCH NO. 201191

Site #	Site Name	SAMPLE#	F#	ER SAMPLE ID	SAMPLE DATE	MATRIX	LAB TEST
1079	Bldg. 6643 SS	059641	003	6643/1079-DF1-BH1-11-S	22-AUG-02	SOIL	GAMMA SPEC
1079	Bldg. 6643 SS	059642	003	6643/1079-DF1-BH1-16-S	22-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059691	003	6640/1078-DF1-BH1-5-S	23-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059692	003	6640/1078-DF1-BH1-10-S	23-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059693	003	6640/1078-DF1-BH2-5-S	23-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059694	003	6640/1078-DF1-BH2-10-S	23-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059695	003	6640/1078-DF1-BH3-5-S	23-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059696	003	6640/1078-DF1-BH3-10-S	26-AUG-02	SOIL	GAMMA SPEC
1078	Bldg. 6640 SS	059697	003	6640/1078-DF1-BH3-5-DU	23-AUG-02	SOIL	GAMMA SPEC
1120	Bldg. 6643 DW	059698	003	6643/1120-DW1-BH1-8-S	22-AUG-02	SOIL	GAMMA SPEC
1120	Bldg. 6643 DW	059699	003	6643/1120-DW1-BH1-13-S	22-AUG-02	SOIL	GAMMA SPEC
1079	Bldg. 6643 SS	059700	003	6643/1079-DF1-BH2-11-S	23-AUG-02	SOIL	GAMMA SPEC
1079	Bldg. 6643 SS	059701	003	6643/1079-DF1-BH2-16-S	23-AUG-02	SOIL	GAMMA SPEC
1079	Bldg. 6643 SS	059702	003	6643/1079-DF1-BH3-11-S	23-AUG-02	SOIL	GAMMA SPEC
1079	Bldg. 6643 SS	059703	003	6643/1079-DF1-BH3-16-S	23-AUG-02	SOIL	GAMMA SPEC
1080	Bldg. 6644 SS	059705	003	6644/1080-DF1-BH1-5-S	26-AUG-02	SOIL	GAMMA SPEC
1080	Bldg. 6644 SS	059706	003	6644/1080-DF1-BH1-10-S	26-AUG-02	SOIL	GAMMA SPEC
1080	Bldg. 6644 SS	059707	003	6644/1080-DF1-BH2-5-S	26-AUG-02	SOIL	GAMMA SPEC
1080	Bldg. 6644 SS	059708	003	6644/1080-DF1-BH2-10-S	26-AUG-02	SOIL	GAMMA SPEC
1080	Bldg. 6644 SS	059709	003	6644/1080-DF1-BH3-6-S	26-AUG-02	SOIL	GAMMA SPEC
1080	Bldg. 6644 SS	059710	003	6644/1080-DF1-BH3-11-S	26-AUG-02	SOIL	GAMMA SPEC

COC# 602761

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CASE NARRATIVE
for
Sandia National Laboratories
ARCOC-605652
SDG#66189A
ARCOC-605653
SDG#66189B
ARCOC-605654
SDG#66189C
ARCOC-605656
SDG#66189D
Case No. 7223.02.03.02



September 24, 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 forty-two soil samples and twelve aqueous samples on August 22nd, 23rd, and 26th, 2002. The samples arrived at General Engineering Laboratories, Inc., (GEL) Charleston, South Carolina on August 28th, 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 2.0, 3.0, and 5.0°C, as measured from the temperature control bottles.

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

On ARCO-605652, sample ID 059698-001 was listed as the trip blank. On ARCO-605653, the same sample ID is listed for a soil sample. A new sample ID was given to the sample ID on ARCO-605652. The new sample ID was 059893-001. The hexavalent chromium matrix spike for the soil samples failed contractual limits at 73.7%, but was within GEL's SPC limits. The LCS passed at 87%. All samples were either "U" or "J" flagged. Client was contacted regarding this issue and instructed GEL to report the data with an NCR.

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:

ARCO	SDG#	#of samples	Collection Date	Date Rec'd by Lab
605652	66189A	15	08/23/02,08/26/02	08/28/02
605653	66189B	17	08/22/02,08/23/02	08/28/02
605654	66189C	13	08/26/02	08/28/02
605656	66189D	9	08/26/02	08/28/02

The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Description</u>
ARCO-605652:	
66189001	059691-001
66189002	059692-001
66189003	059693-001
66189004	059694-001
66189005	059695-001
66189006	059696-001
66189007	059697-001
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66197003	059893-001

Laboratory ID
ARCOC-605653:

Description

66189008	059698-001
66189009	059699-001
66189010	059641-001
66189011	059642-001
66189012	059700-001
66189013	059701-001
66189014	059702-001
66189015	059703-001
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002
66189034	059702-002
66189035	059703-002
66197004	059704-001

ARCOC-605654:

66189016	059705-001
66189017	059706-001
66189018	059707-001
66189019	059708-001
66189020	059709-001
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
66195001	059710-001
66195002	059710-002
66197005	059711-001

ARCOC-605656:

66197001	059640-001
66197002	059712-001
66197006	059640-002
66197007	059640-003
66197008	059640-004
66197009	059640-005
66197010	059640-006
66197011	059640-007
66197012	059640-008

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


Project Manager

**GC/MS
VOLATILE
ANALYSIS**

**GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG 66189**

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8260A
Prep Method: SW846 5030A
Analytical Batch Number: 197932
Prep Batch Number: 197931

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
66189001	059691-001
66189002	059692-001
66189003	059693-001
66189004	059694-001
66189005	059695-001
66189006	059696-001
66189007	059697-001
66189008	059698-001
66189009	059699-001
66189010	059641-001
66189011	059642-001
66189012	059700-001
66189013	059701-001

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66189014	059702-001
66189015	059703-001
66189016	059705-001
66189017	059706-001
66189018	059707-001
66189019	059708-001
66189020	059709-001
1200292492	VBLK01 (Blank)
1200292498	VBLK01LCS (Laboratory Control Sample)
1200292491	VBLK02 (Blank)
1200292497	VBLK02LCS (Laboratory Control Sample)
1200293145	VBLK03 (Blank)
1200293146	VBLK03LCS (Laboratory Control Sample)
1200292494	059691-001MS (Matrix Spike)
1200292496	059691-001MSD (Matrix Spike Duplicate)

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-026 REV.8.

Calibration Information

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

Initial Calibration

All the initial calibration requirements were met.

CCV Requirements

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

Quality Control (QC) Information

SDG#66189 - VOA

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Surrogate Recoveries

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

Blank Acceptance

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

LCS Recovery Statement

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

QC Sample Designation

The following sample was designated for matrix spike analysis:

66189001 059691-001

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 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 present on the original raw data. These hard copies are temporarily 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 and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration

The laboratory utilizes the following GC/MS configurations:

Chromatographic Columns

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

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

Instrument Configuration

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

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

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Comments

* 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: Charles Wilson Date: 09-23-02

Organics Package Creation

This package has been originally reviewed by Richard Bomar (9/4/2002 12:19)

This package has been peer reviewed by Alberto Rodriguez (9/15/2002 16:15)

This package has been packaged by Tamara Carter (9/18/2002 10:55)

This roadmap has been edited by

Package Requirements

Raw Data	TICS	Standards Traceability
N	N	

Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly411.d	66189001	059691-001	29-AUG-2002	14:16	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly420.d	66189010	059641-001	29-AUG-2002	18:47	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly432.d	66189011	059642-001	30-AUG-2002	00:21	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly433.d	66189012	059700-001	30-AUG-2002	00:47	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly434.d	66189013	059701-001	30-AUG-2002	01:13	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly435.d	66189014	059702-001	30-AUG-2002	01:39	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly436.d	66189015	059703-001	30-AUG-2002	02:06	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly437.d	66189015	059705-001	30-AUG-2002	02:32	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly438.d	66189017	059706-001	30-AUG-2002	02:58	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly439.d	66189018	059707-001	30-AUG-2002	03:25	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly440.d	66189019	059708-001	30-AUG-2002	03:51	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly412.d	66189002	059692-001	29-AUG-2002	14:46	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly441.d	66189020	059709-001	30-AUG-2002	04:17	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly413.d	66189003	059693-001	29-AUG-2002	15:16	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly414.d	66189004	059694-001	29-AUG-2002	15:45	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly415.d	66189005	059695-001	29-AUG-2002	16:15	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly416.d	66189006	059696-001	29-AUG-2002	16:45	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly417.d	66189007	059697-001	29-AUG-2002	17:16	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly418.d	66189008	059698-001	29-AUG-2002	17:45	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly419.d	66189009	059699-001	29-AUG-2002	18:15	66189.sub	

QC Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
<input checked="" type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly423.d	1200292494	059691-001.MS	29-AUG-2002	20:18	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/083002v1.b/ly508.d	1200292494	059691-001.MS	30-AUG-2002	11:15	66189.sub	
<input checked="" type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly424.d	1200292496	059691-001.MSD	29-AUG-2002	20:48	66189.sub	

<input type="checkbox"/>	/chem/VOA1.i/083002v1.b/ly509.d	1200292496	059691-001MSD	30-AUG-2002	11:46	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly427A.d	1200292497	VBLK02LCS	29-AUG-2002	22:09	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly403A.d	1200292498	VBLK01LCS	29-AUG-2002	08:37	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/083002v1.b/ly503A.d	1200293146	VBLK03LCS	30-AUG-2002	08:37	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly431A.d	1200292491	VBLK02	29-AUG-2002	23:54	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/082902v1.b/ly406A.d	1200292492	VBLK01	29-AUG-2002	10:10	66189.sub	
<input type="checkbox"/>	/chem/VOA1.i/083002v1.b/ly506A.d	1200293145	VBLK03	30-AUG-2002	10:08	66189.sub	

**GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG# 66195**

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8260A
Prep Method: SW846 5030A
Analytical Batch Number: 197964
Prep Batch Number: 197963

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
66195001	059710-001
1200292570	VBLK01 (Blank)
1200292573	VBLK01LCS (Laboratory Control Sample)

Preparation/Analytical Method Verification

SOP Reference

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

Calibration Information

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

Initial Calibration

All the initial calibration requirements were met.

CCV Requirements

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

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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 spikes were analyzed on a sample of similar matrix in SNLS sample delivery group/work order, # 66163.

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

Sample re-analysis was not required for this sample delivery group/work order.

Miscellaneous Information

Nonconformance (NCR) Documentation

SDG# 66189 –VOA

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A nonconformance report was not required for this sample delivery group/work order.

Manual Integrations

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

Additional Comments

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

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

System Configuration

The laboratory utilizes the following GC/MS configurations:

Chromatographic Columns

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

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

Instrument Configuration

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

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

SDG# 66189 -VOA

VOA8	HP6890/HP5973	J&W1	Trap K
VOA9	HP6890/HP5973	J&W1	Trap C

Comments

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: Charles Wilson Date: 09.23.02

Organics Package Creation

This package has been originally reviewed by Crystal Stacey (9/3/2002 8:08)

This package has been peer reviewed by Michael Penny (9/3/2002 13:25)

This package has been packaged by LySandra Gathers (9/6/2002 13:34)

This roadmap has been edited by

Package Requirements

Raw Data	TICS	Standards Traceability
N	N	

Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
<input type="checkbox"/>	/chem/VOAS.i/082902v5.b/5y426.d	66195001	059710-001	29-AUG-2002	19:25	66189-1.sub	

QC Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
<input type="checkbox"/>	/chem/VOAS.i/082902v5.b/5y403LSA.d	1200292573	VBLK01LCS	29-AUG-2002	08:24	66189-1.sub	
<input checked="" type="checkbox"/>	/chem/VOAS.i/083002v5.b/5y503LSA.d	1200294112	VBLK02LCS	30-AUG-2002	09:03	66189-1.sub	
<input type="checkbox"/>	/chem/VOAS.i/082902v5.b/5y407BSA.d	1200292570	VBLK01	29-AUG-2002	10:19	66189-1.sub	qc w/ 66163
<input checked="" type="checkbox"/>	/chem/VOAS.i/083002v5.b/5y507BSA.d	1200294111	VBLK02	30-AUG-2002	10:58	66189-1.sub	

**GC/MS Volatile Organics
Sandia National Labs (SNLS)
SDG 66189-2**

Method/Analysis Information

Procedure: Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8260B
Prep Method: SW846 5030B
Analytical Batch Number: 199064

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
66197001	059640-001
66197002	059712-001
66197003	059893-001
66197004	059704-001
66197005	059711-001
1200294599	VBLK01 (Blank)
1200294602	VBLK01LCS (Laboratory Control Sample)
1200294625	VBLK01LCSD (Laboratory Control Sample Duplicate)

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

SDG#66189-2 -VOA

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calibration summary form. All calibration files are listed in the calibration history report in the "Standard Data" section.

Initial Calibration

All the initial calibration requirements were met.

CCV Requirements

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

Quality Control (QC) Information

Surrogate Recoveries

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

Blank Acceptance

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

QC Sample Designation

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

LCS Recovery Statement

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

LCSD Recovery Statement

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

LCS/LCSD RPD Statement

The relative percent differences (RPD) between the laboratory control sample and Laboratory Control Sample Duplicate recoveries were within the acceptance limits.

Internal Standard (ISTD) Acceptance

The internal standard responses, in all samples and quality control samples, met the required acceptance criteria.

Technical Information

Holding Time Specifications

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

Sample Preservation and Integrity

All samples met the sample preservation and integrity requirements.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

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

Sample Re-prep/Re-analysis

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

Miscellaneous Information

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 present on the original raw data. These hard copies are temporarily 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 and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration

The laboratory utilizes the following GC/MS configurations:

Chromatographic Columns

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

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

Instrument Configuration

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

Instrument ID	System Configuration	Chromatographic Column	P & T Trap
VOA1	HP6890/HP5973	J&W1	Trap C

SDG#66189-2 -VOA

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

Comments

* 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: Charles Wilson Date: 09.23.02

Organics Package Creation

This package has been originally reviewed by Richard Bomar (9/6/2002 15:00)

This package has been peer reviewed by Alberto Rodriguez (9/15/2002 15:16)

This package has been packaged by Tamara Carter (9/23/2002 12:53)

This roadmap has been edited by

Package Requirements

Raw Data	TICS	Standards Traceability
N	N	

Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z217.d	66197001	059640-001	03-SEP-2002	15:02	66189-2.sub	
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z218.d	66197002	059712-001	03-SEP-2002	15:28	66189-2.sub	
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z219.d	66197003	059698-001	03-SEP-2002	15:55	66189-2.sub	
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z220.d	66197004	059704-001	03-SEP-2002	16:22	66189-2.sub	
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z221.d	66197005	059711-001	03-SEP-2002	16:48	66189-2.sub	

QC Samples

exclude	datafile	sampleno	client-id	injdate	injtime	sublist	comments
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z203A.d	1200294602	VBLK01LCS	03-SEP-2002	08:29	66189-2.sub	
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z214A.d	1200294625	VBLK01LCS.D	03-SEP-2002	13:42	66189-2.sub	
<input type="checkbox"/>	/chem/VOA1.i/090302v1.b/1z206A.d	1200294599	VBLK01	03-SEP-2002	09:58	66189-2.sub	

**GC/MS VOLATILES
QUALITY
CONTROL
SUMMARY**

QC Summary

Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Pussant
 Workorder: 66189

Report Date: September 23, 2002
 Page 1 of 5

Paramname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Analst	Date Time
Volatile-GCMS Federal									
Batch 197932									
QC1200292497 LCS									
1,1-Dichloroethylene	50.0		49.3	ug/kg		99	(75%-134%)	RMB	08/29/02 22:09
Benzene	50.0		51.2	ug/kg		102	(80%-120%)		
Chlorobenzene	50.0		49.7	ug/kg		99	(82%-118%)		
Toluene	50.0		51.8	ug/kg		104	(74%-115%)		
Trichloroethylene	50.0		50.8	ug/kg		102	(80%-119%)		
**Bromofluorobenzene	50.0		47.1	ug/kg		94	(69%-138%)		
**Dibromofluoromethane	50.0		51.0	ug/kg		102	(67%-137%)		
**Toluene-d8	50.0		46.4	ug/kg		93	(67%-139%)		
QC1200292498 LCS									
1,1-Dichloroethylene	50.0		51.0	ug/kg		102	(75%-134%)		08/29/02 08:37
Benzene	50.0		53.6	ug/kg		107	(80%-120%)		
Chlorobenzene	50.0		54.5	ug/kg		109	(82%-118%)		
Toluene	50.0		56.1	ug/kg		112	(74%-115%)		
Trichloroethylene	50.0		53.1	ug/kg		106	(80%-119%)		
**Bromofluorobenzene	50.0		49.3	ug/kg		99	(69%-138%)		
**Dibromofluoromethane	50.0		51.6	ug/kg		103	(67%-137%)		
**Toluene-d8	50.0		48.0	ug/kg		96	(67%-139%)		
QC1200293146 LCS									
1,1-Dichloroethylene	50.0		48.8	ug/kg		98	(75%-134%)		08/30/02 08:37
Benzene	50.0		50.9	ug/kg		102	(80%-120%)		
Chlorobenzene	50.0		52.3	ug/kg		105	(82%-118%)		
Toluene	50.0		54.3	ug/kg		109	(74%-115%)		
Trichloroethylene	50.0		51.0	ug/kg		102	(80%-119%)		
**Bromofluorobenzene	50.0		51.7	ug/kg		103	(69%-138%)		
**Dibromofluoromethane	50.0		50.4	ug/kg		101	(67%-137%)		
**Toluene-d8	50.0		48.6	ug/kg		97	(67%-139%)		
QC1200292491 MB									
1,1,1-Trichloroethane		U	ND	ug/kg					08/29/02 23:54
1,1,2,2-Tetrachloroethane		U	ND	ug/kg					
1,1,2-Trichloroethane		U	ND	ug/kg					
1,1-Dichloroethane		U	ND	ug/kg					
1,1-Dichloroethylene		U	ND	ug/kg					
1,2-Dichloroethane		U	ND	ug/kg					
1,2-Dichloropropane		U	ND	ug/kg					
2-Butanone		U	ND	ug/kg					
2-Hexanone		U	ND	ug/kg					
4-Methyl-2-pentanone		U	ND	ug/kg					
Acetone		U	ND	ug/kg					
Benzene		U	ND	ug/kg					
Bromodichloromethane		U	ND	ug/kg					
Bromoform		U	ND	ug/kg					
Bromomethane		U	ND	ug/kg					

QC Summary

Workorder: 66189

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Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlyt	Date	Time
Volatile-GC/MS Federal											
Batch 197932											
Carbon disulfide			U	ND	ug/kg						
Carbon tetrachloride			U	ND	ug/kg						
Chlorobenzene			U	ND	ug/kg						
Chloroethane			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Chloromethane			U	ND	ug/kg						
Dibromochloromethane			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			52.7	ug/kg		105	(69%-138%)			
**Dibromofluoromethane	50.0			51.1	ug/kg		102	(67%-137%)			
**Toluene-d8	50.0			50.2	ug/kg		100	(67%-139%)			
QC1200392492 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					08/29/02	10:10
1,1,2,2-Tetrachloroethane			U	ND	ug/kg						
1,1,2-Trichloroethane			U	ND	ug/kg						
1,1-Dichloroethane			U	ND	ug/kg						
1,1-Dichloroethylene			U	ND	ug/kg						
1,2-Dichloroethane			U	ND	ug/kg						
1,2-Dichloropropane			U	ND	ug/kg						
2-Butanone			U	ND	ug/kg						
2-Hexanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						
Acetone			U	ND	ug/kg						
Benzene			U	ND	ug/kg						
Bromodichloromethane			U	ND	ug/kg						
Bromoform			U	ND	ug/kg						
Bromomethane			U	ND	ug/kg						
Carbon disulfide			U	ND	ug/kg						
Carbon tetrachloride			U	ND	ug/kg						
Chlorobenzene			U	ND	ug/kg						
Chloroethane			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Chloromethane			U	ND	ug/kg						
Dibromochloromethane			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						

QC Summary

Workorder: 66189

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 197932											
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
** Bromofluorobenzene	50.0			60.7	ug/kg		121	(69%-138%)			
** Dibromofluoromethane	50.0			50.9	ug/kg		102	(67%-137%)			
** Toluene-d8	50.0			50.3	ug/kg		101	(67%-139%)			
QC1200293145 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					08/30/02	10:08
1,1,2,2-Tetrachloroethane			U	ND	ug/kg						
1,1,2-Trichloroethane			U	ND	ug/kg						
1,1-Dichloroethane			U	ND	ug/kg						
1,1-Dichloroethylene			U	ND	ug/kg						
1,2-Dichloroethane			U	ND	ug/kg						
1,2-Dichloropropane			U	ND	ug/kg						
2-Butanone			U	ND	ug/kg						
2-Hexanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						
Acetone			U	ND	ug/kg						
Benzene			U	ND	ug/kg						
Bromodichloromethane			U	ND	ug/kg						
Bromoform			U	ND	ug/kg						
Bromomethane			U	ND	ug/kg						
Carbon disulfide			U	ND	ug/kg						
Carbon tetrachloride			U	ND	ug/kg						
Chlorobenzene			U	ND	ug/kg						
Chloroethane			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Chloromethane			U	ND	ug/kg						
Dibromochloromethane			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						

QC Summary

Workorder: 66189

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Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Batch 157932											
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			54.2	ug/kg		108	(69%-138%)			
**Dibromofluoromethane	50.0			49.3	ug/kg		99	(67%-137%)			
**Toluene-d8	50.0			50.0	ug/kg		100	(67%-139%)			
QC1200292494 66189001 PS											
1,1-Dichloroethylene	50.0	U	ND	44.5	ug/L		89	(55%-128%)		08/30/02	11:15
Benzene	50.0	U	ND	47.8	ug/L		96	(53%-118%)			
Chlorobenzene	50.0	U	ND	49.5	ug/L		99	(53%-116%)			
Toluene	50.0	U	ND	51.4	ug/L		103	(56%-113%)			
Trichloroethylene	50.0	U	ND	47.1	ug/L		94	(54%-119%)			
**Bromofluorobenzene	50.0		51.1	49.9	ug/L		100	(69%-138%)			
**Dibromofluoromethane	50.0		51.4	51.0	ug/L		102	(67%-137%)			
**Toluene-d8	50.0		48.9	49.2	ug/L		98	(67%-139%)			
QC1200292496 66189001 PSD											
1,1-Dichloroethylene	50.0	U	ND	46.0	ug/L	3	92	(0%-21%)		08/30/02	11:46
Benzene	50.0	U	ND	48.5	ug/L	1	97	(0%-17%)			
Chlorobenzene	50.0	U	ND	49.8	ug/L	1	100	(0%-21%)			
Toluene	50.0	U	ND	51.2	ug/L	0	102	(0%-25%)			
Trichloroethylene	50.0	U	ND	48.5	ug/L	3	97	(0%-25%)			
**Bromofluorobenzene	50.0		51.1	52.1	ug/L		104	(69%-138%)			
**Dibromofluoromethane	50.0		51.4	51.8	ug/L		104	(67%-137%)			
**Toluene-d8	50.0		48.9	49.3	ug/L		99	(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 it
- ** 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.

QC Summary

Workorder: 66189

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Puissant
 Workorder: 66197

Report Date: September 18, 2002
 Page 1 of 2

Parameter	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal									
Batch 199064									
QC1200294602 LCS									
1,1-Dichloroethylene	50.0		45.9	ug/L		92	(78%-140%)	RMB	09/03/02 08:29
Benzene	50.0		48.4	ug/L		97	(78%-119%)		
Chlorobenzene	50.0		49.5	ug/L		99	(82%-120%)		
Toluene	50.0		52.3	ug/L		105	(68%-133%)		
Trichloroethylene	50.0		48.7	ug/L		97	(80%-123%)		
**Bromofluorobenzene	50.0		57.3	ug/L		115	(67%-136%)		
**Dibromofluoromethane	50.0		50.6	ug/L		101	(62%-148%)		
**Toluene-d8	50.0		49.5	ug/L		99	(58%-139%)		
QC1200294625 LCSD									
1,1-Dichloroethylene	50.0		46.8	ug/L	2	94	(0%-30%)		09/03/02 13:42
Benzene	50.0		49.2	ug/L	2	98	(0%-30%)		
Chlorobenzene	50.0		50.7	ug/L	2	101	(0%-30%)		
Toluene	50.0		52.4	ug/L	0	105	(0%-30%)		
Trichloroethylene	50.0		49.6	ug/L	2	99	(0%-30%)		
**Bromofluorobenzene	50.0		56.8	ug/L		114	(67%-136%)		
**Dibromofluoromethane	50.0		51.4	ug/L		103	(62%-148%)		
**Toluene-d8	50.0		49.2	ug/L		98	(58%-139%)		
QC1200294590 MB									
1,1,1-Trichloroethane		U	ND	ug/L					09/03/02 09:58
1,1,2,2-Tetrachloroethane		U	ND	ug/L					
1,1,2-Trichloroethane		U	ND	ug/L					
1,1-Dichloroethane		U	ND	ug/L					
1,1-Dichloroethylene		U	ND	ug/L					
1,2-Dichloroethane		U	ND	ug/L					
1,2-Dichloropropane		U	ND	ug/L					
2-Butanone		U	ND	ug/L					
2-Hexanone		U	ND	ug/L					
4-Methyl-2-pentanone		U	ND	ug/L					
Acetone		U	ND	ug/L					
Benzene		U	ND	ug/L					
Bromodichloromethane		U	ND	ug/L					
Bromoform		U	ND	ug/L					
Bromomethane		U	ND	ug/L					
Carbon disulfide		U	ND	ug/L					
Carbon tetrachloride		U	ND	ug/L					
Chlorobenzene		U	ND	ug/L					
Chloroethane		U	ND	ug/L					
Chloroform		U	ND	ug/L					
Chloromethane		U	ND	ug/L					
Dibromochloromethane		U	ND	ug/L					
Ethylbenzene		U	ND	ug/L					
Methylene chloride		U	ND	ug/L					

QC Summary

Workorder: 66197

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Rauge	Aakst	Date	Time
Volatile-CC/MS Federal											
Batch 199074											
Styrene			U	ND	ug/L						
Tetrachloroethylen			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			59.8	ug/L		120	(57%-136%)			
**Dibromofluoromethane	50.0			49.6	ug/L		99	(62%-148%)			
**Toluene-d8	50.0			52.2	ug/L		104	(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 when:
 - ** 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 MEL 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 information.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

* The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: September 23, 2002

Page 1 of 4

Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Pulsant
 Workorder: 66195

Parmaame	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Volatile-GC/MS Federal									
Batch	197964								
QC1200292573	LCS								
1,1-Dichloroethylene	50.0		50.4	ug/kg		101	(75%-134%)	CDS1	08/29/02 08:24
Benzene	50.0		55.3	ug/kg		111	(80%-120%)		
Chlorobenzene	50.0		55.1	ug/kg		110	(82%-118%)		
Toluene	50.0		54.8	ug/kg		110	(74%-115%)		
Trichloroethylene	50.0		55.9	ug/kg		112	(80%-119%)		
**Bromofluorobenzene	50.0		54.7	ug/kg		109	(69%-138%)		
**Dibromofluoromethane	50.0		53.9	ug/kg		108	(67%-137%)		
**Toluene-d8	50.0		53.8	ug/kg		108	(67%-139%)		
QC1200294112	LCS								
1,1-Dichloroethylene	50.0		49.7	ug/kg		100	(75%-134%)		08/30/02 09:03
Benzene	50.0		55.1	ug/kg		110	(80%-120%)		
Chlorobenzene	50.0		54.9	ug/kg		110	(82%-118%)		
Toluene	50.0		54.4	ug/kg		109	(74%-115%)		
Trichloroethylene	50.0		55.1	ug/kg		110	(80%-119%)		
**Bromofluorobenzene	50.0		53.5	ug/kg		107	(69%-138%)		
**Dibromofluoromethane	50.0		55.4	ug/kg		111	(67%-137%)		
**Toluene-d8	50.0		54.7	ug/kg		109	(67%-139%)		
QC1200292570	MB								
1,1,1-Trichloroethane		U	ND	ug/kg					08/29/02 10:19
1,1,2,2-Tetrachloroethane		U	ND	ug/kg					
1,1,2-Trichloroethane		U	ND	ug/kg					
1,1-Dichloroethane		U	ND	ug/kg					
1,1-Dichloroethylene		U	ND	ug/kg					
1,2-Dichloroethane		U	ND	ug/kg					
1,2-Dichloropropane		U	ND	ug/kg					
2-Butanone		U	ND	ug/kg					
2-Hexanone		U	ND	ug/kg					
4-Methyl-2-pentanone		U	ND	ug/kg					
Acetone		U	ND	ug/kg					
Benzene		U	ND	ug/kg					
Bromodichloromethane		U	ND	ug/kg					
Bromoforn		U	ND	ug/kg					
Bromomethane		U	ND	ug/kg					
Carbon disulfide		U	ND	ug/kg					
Carbon tetrachloride		U	ND	ug/kg					
Chlorobenzene		U	ND	ug/kg					
Chloroethane		U	ND	ug/kg					
Chloroform		U	ND	ug/kg					
Chloromethane		U	ND	ug/kg					
Dibromochloromethane		U	ND	ug/kg					
Ethylbenzene		U	ND	ug/kg					
Methylene chloride		U	ND	ug/kg					

QC Summary

Workorder: 66195

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Parname	NOM	Sample	Qual	QC	Units	RPD%	RRC%	Range	Analst	Date	Time
Volatile-GC/MS Federal											
Batch 197964											
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			55.3	ug/kg		111	(69%-138%)			
**Dibromofluoromethane	50.0			52.9	ug/kg		106	(67%-137%)			
**Toluene-d8	50.0			53.8	ug/kg		108	(67%-139%)			
QC1200294111 MB											
1,1,1-Trichloroethane			U	ND	ug/kg					08/30/02	10:58
1,1,2,2-Tetrachloroethane			U	ND	ug/kg						
1,1,2-Trichloroethane			U	ND	ug/kg						
1,1-Dichloroethane			U	ND	ug/kg						
1,1-Dichloroethylene			U	ND	ug/kg						
1,2-Dichloroethane			U	ND	ug/kg						
1,2-Dichloropropane			U	ND	ug/kg						
2-Butanone			U	ND	ug/kg						
2-Hexanone			U	ND	ug/kg						
4-Methyl-2-pentanone			U	ND	ug/kg						
Acetone			U	ND	ug/kg						
Benzene			U	ND	ug/kg						
Bromodichloromethane			U	ND	ug/kg						
Bromoform			U	ND	ug/kg						
Bromomethane			U	ND	ug/kg						
Carbon disulfide			U	ND	ug/kg						
Carbon tetrachloride			U	ND	ug/kg						
Chlorobenzene			U	ND	ug/kg						
Chloroethane			U	ND	ug/kg						
Chloroform			U	ND	ug/kg						
Chloromethane			U	ND	ug/kg						
Dibromochloromethane			U	ND	ug/kg						
Ethylbenzene			U	ND	ug/kg						
Methylene chloride			U	ND	ug/kg						
Styrene			U	ND	ug/kg						
Tetrachloroethylene			U	ND	ug/kg						
Toluene			U	ND	ug/kg						
Trichloroethylene			U	ND	ug/kg						
Vinyl acetate			U	ND	ug/kg						
Vinyl chloride			U	ND	ug/kg						
Xylenes (total)			U	ND	ug/kg						
cis-1,2-Dichloroethylene			U	ND	ug/kg						
cis-1,3-Dichloropropylene			U	ND	ug/kg						

QC Summary

Workorder: 66195

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Volatile-GC/MS Federal											
Bach 197954											
trans-1,2-Dichloroethylene			U	ND	ug/kg						
trans-1,3-Dichloropropylene			U	ND	ug/kg						
**Bromofluorobenzene	50.0			54.7	ug/kg		109	(69%-138%)			
**Dibromofluoromethane	50.0			51.8	ug/kg		104	(67%-137%)			
**Toluene-d8	50.0			53.5	ug/kg		107	(67%-139%)			
QC1200292571 66163003 PS											
1,1-Dichloroethylene	50.0			42.9	ug/L		86	(55%-128%)		08/30/02	11:55
Benzene	50.0			47.6	ug/L		95	(53%-118%)			
Chlorobenzene	50.0			47.2	ug/L		94	(53%-116%)			
Toluene	50.0	J	0.598	48.0	ug/L		95	(56%-113%)			
Trichloroethylene	50.0			47.6	ug/L		95	(54%-119%)			
**Bromofluorobenzene	50.0		53.6	53.0	ug/L		106	(69%-138%)			
**Dibromofluoromethane	50.0		51.6	52.0	ug/L		104	(67%-137%)			
**Toluene-d8	50.0		53.0	52.2	ug/L		104	(67%-139%)			
QC1200292572 66163003 PSD											
1,1-Dichloroethylene	50.0			43.6	ug/L	2	87	(0%-21%)		08/30/02	12:24
Benzene	50.0			47.4	ug/L	0	95	(0%-17%)			
Chlorobenzene	50.0			46.0	ug/L	2	92	(0%-21%)			
Toluene	50.0	J	0.598	47.8	ug/L	0	94	(0%-25%)			
Trichloroethylene	50.0			46.8	ug/L	2	94	(0%-25%)			
**Bromofluorobenzene	50.0		53.6	52.6	ug/L		105	(69%-138%)			
**Dibromofluoromethane	50.0		51.6	53.1	ug/L		106	(67%-137%)			
**Toluene-d8	50.0		53.0	52.1	ug/L		104	(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 U
- ** 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 information.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 66195

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

GC/MS
SEMIVOLATILE
ANALYSIS

**Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 66189**

Method/Analysis Information

Procedure: Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8270C
Prep Method: SW846 3550B
Analytical Batch Number: 197857
Prep Batch Number: 197856

Sample Analysis

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

Sample ID	Client ID
66189022	059692-002
66189023	059693-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002

66189034	059702-002
66189035	059703-002
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
1200292317	SBLK01 (Blank)
1200292318	SBLK01LCS (Laboratory Control Sample)
1200292319	059703-002MS (Matrix Spike)
1200292320	059703-002MSD (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 than 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 were within the established acceptance limits.

QC Sample Designation

The following sample analyzed with this SDG was chosen for matrix spike analysis:
66189035 (059703-002)

MS Recovery Statement

The matrix spike (MS) recoveries were within the established acceptance limits.

MSD Recovery Statement

The matrix spike duplicate (MSD) recoveries were within the established acceptance limits.

MS/MSD RPD Statement

The relative percent differences (RPD) between the MS and MSD were within the required acceptance limits.

Internal Standard (ISTD) Acceptance

The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:**Holding Time Specifications**

All samples in this SDG met the specified holding time requirements.

GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

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

Sample Dilutions
None of the samples analyzed in this SDG required dilution.

Miscellaneous Information:

Nonconformance (NCR) Documentation
No nonconformance report (NCR) was generated for this SDG.

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

Additional Comments
No additional comments are needed for this SDG.

Method/Analysis Information

Procedure: Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8270C
Prep Method: SW846 3550B
Analytical Batch Number: 199631
Prep Batch Number: 199630

Sample Analysis

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

Sample ID	Client ID
66189021	059691-002
66189024	059694-002
1200295903	SBLK02 (Blank)
1200295904	SBLK02LCS (Laboratory Control Sample)

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 than 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

The laboratory control sample (LCS) spike recoveries were within the established acceptance limits.

QC Sample Designation

A matrix spike was not performed with this batch.

Internal Standard (ISTD) Acceptance

The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:**Holding Time Specifications**

All samples in this SDG met the specified holding time requirements.

GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

None of the samples analyzed in this SDG required dilution.

Miscellaneous Information:**Nonconformance (NCR) Documentation**

No nonconformance report (NCR) was generated for this SDG.

Manual Integration

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

Comments

* 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: 9/20/02

**Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 66189-1**

Method/Analysis Information

Procedure: Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8270C
Prep Method: SW846 3550B
Analytical Batch Number: 198215
Prep Batch Number: 198214

Sample Analysis

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

Sample ID	Client ID
66195002	059710-002
1200293055	SBLK01 (Blank)
1200293056	SBLK01LCS (Laboratory Control Sample)
1200293057	059710-002MS (Matrix Spike)
1200293058	059710-002MSD (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 than 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

The matrix spike *I200293057* (059710-002MS) failed surrogate recovery. The associated sample and matrix spike duplicate passed surrogate recovery. This failure is attributed to laboratory error.

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

A matrix spike was performed with this batch on sample *66195002* (059710-002).

MS Recovery Statement

One or more of the required spiking analytes were not within the acceptance limits in the matrix spike. This failure is attributed to laboratory error.

MSD Recovery Statement

The matrix spike duplicate (MSD) recoveries were within the established acceptance limits.

MS/MSD RPD Statement

The relative percent differences (RPD) between the MS and MSD recoveries were not within the acceptance limits.

Internal Standard (ISTD) Acceptance

The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:**Holding Time Specifications**

All samples in this SDG met the specified holding time requirements.

GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

None of the samples analyzed in this SDG required dilution.

Miscellaneous Information:**Nonconformance (NCR) Documentation**

No nonconformance report (NCR) was generated for this SDG.

Manual Integration

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

Comments

* 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: Deborah Mauer Date: 09/20/02

**Semi-Volatile Case Narrative
Sandia National Labs (SNLS)
SDG 66189-2**

Method/Analysis Information

Procedure: Semivolatile Analysis by Gas Chromatograph/Mass Spectrometer
Analytical Method: SW846 8270C
Prep Method: SW846 3510C
Analytical Batch Number: 197643
Prep Batch Number: 197642

Sample Analysis

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

Sample ID	Client ID
66197006	059640-002
1200291779	SBLK01 (Blank)
1200291780	SBLK01LCS (Laboratory Control Sample)

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-Nitrosodiphenylamine 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 than 0.99 then the analyte is quantitated using the response factor. If the analyte is detected then the sample is reanalyzed for that analyte on an instrument that is compliant with the criteria in the method.

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

The laboratory control sample (LCS) spike recoveries were within the established acceptance limits.

QC Sample Designation

A matrix spike was performed on a sample of similar matrix not in this SDG.

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 recoveries were not within the acceptance limits.

Internal Standard (ISTD) Acceptance

The internal standard responses were within the required acceptance criteria for all samples and QC.

Technical Information:**Holding Time Specifications**

All samples in this SDG met the specified holding time requirements.

GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

None of the samples analyzed in this SDG required dilution.

Miscellaneous Information:**Nonconformance (NCR) Documentation**

No nonconformance report (NCR) was generated for this SDG.

Manual Integration

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

Comments

* 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. Maier Date: 09/20/12

**GC/MS
SEMI- VOLATILES
QUALITY CONTROL
SUMMARY**

QC Summary

Report Date: September 19, 2002

Page 1 of 6

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

Contact: Pamela M. Prissant

Workorder: 66189

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 197837											
QC1200292318 LCS											
1,2,4-Trichlorobenzene	1670			740	ug/kg		44	(27%-91%)	EHI	09/03/02	13:57
1,4-Dichlorobenzene	1670			643	ug/kg		39	(25%-85%)			
2,4,5-Trichlorophenol	3330			2430	ug/kg		73	(42%-96%)			
2,4,6-Trichlorophenol	3330			2120	ug/kg		64	(32%-91%)			
2,4-Dinitrotoluene	1670			1350	ug/kg		81	(50%-109%)			
2-Chlorophenol	3330			1670	ug/kg		50	(31%-85%)			
4-Chloro-3-methylphenol	3330			2330	ug/kg		70	(34%-97%)			
4-Nitrophenol	3330			3410	ug/kg		102	(22%-128%)			
Acenaphthene	1670			977	ug/kg		59	(39%-98%)			
Hexachlorobenzene	1670			1060	ug/kg		64	(41%-105%)			
Hexachlorobutadiene	1670			601	ug/kg		36	(21%-94%)			
Hexachloroethane	1670			621	ug/kg		37	(25%-86%)			
N-Nitrosodipropylamine	1670			897	ug/kg		54	(34%-90%)			
Nitrobenzene	1670			834	ug/kg		50	(30%-84%)			
Pentachlorophenol	3330			2000	ug/kg		60	(27%-109%)			
Phenol	3330			1910	ug/kg		57	(31%-83%)			
Pyrene	1670			1270	ug/kg		76	(37%-110%)			
m,p-Cresols	3330			1860	ug/kg		56	(40%-83%)			
o-Cresol	3330			1920	ug/kg		58	(34%-86%)			
**2,4,6-Tribromophenol	3330			2250	ug/kg		68	(23%-111%)			
**2-Fluorobiphenyl	1670			901	ug/kg		54	(21%-104%)			
**2-Fluorophenol	3330			1570	ug/kg		47	(22%-93%)			
**Nitrobenzene-d5	1670			774	ug/kg		47	(24%-97%)			
**Phenol-d5	3330			1930	ug/kg		58	(22%-99%)			
**p-Terphenyl-d14	1670			1370	ug/kg		82	(30%-133%)			
QC1200292317 MB											
1,2,4-Trichlorobenzene			U	ND	ug/kg					09/03/02	13:36
1,2-Dichlorobenzene			J	71.4	ug/kg						
1,3-Dichlorobenzene			U	ND	ug/kg						
1,4-Dichlorobenzene			U	ND	ug/kg						
2,4,5-Trichlorophenol			U	ND	ug/kg						
2,4,6-Trichlorophenol			U	ND	ug/kg						
2,4-Dichlorophenol			U	ND	ug/kg						
2,4-Dimethylphenol			U	ND	ug/kg						
2,4-Dinitrophenol			U	ND	ug/kg						
2,4-Dinitrotoluene			U	ND	ug/kg						
2,6-Dinitrotoluene			U	ND	ug/kg						
2-Chloronaphthalene			U	ND	ug/kg						
2-Chlorophenol			U	ND	ug/kg						
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg						
2-Methylnaphthalene			U	ND	ug/kg						
2-Nitrophenol			U	ND	ug/kg						

QC Summary

Workorder: 66189

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 197837											
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			U	ND	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						

QC Summary

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 197857											
**2,4,6-Tribromophenol	3330			1640	ug/kg		49	(23%-111%)			
**2-Fluorobiphenyl	1670			654	ug/kg		39	(21%-104%)			
**2-Fluorophenol	3330			1570	ug/kg		47	(22%-93%)			
**Nitrobenzene-d5	1670			683	ug/kg		41	(24%-97%)			
**Phenol-d5	3330			1780	ug/kg		53	(22%-99%)			
**p-Terphenyl-d14	1670			1420	ug/kg		86	(30%-133%)			
QC1200292319 66189035 MS											
1,2,4-Trichlorobenzene	1670	U	ND	647	ug/kg		39	(15%-112%)		09/03/02	19:36
1,4-Dichlorobenzene	1670	U	ND	629	ug/kg		38	(19%-89%)			
2,4,5-Trichlorophenol	3330	U	ND	1830	ug/kg		55				
2,4,6-Trichlorophenol	3330	U	ND	1340	ug/kg		40				
2,4-Dinitrotoluene	1670	U	ND	1220	ug/kg		73	(32%-117%)			
2-Chlorophenol	3330	U	ND	1480	ug/kg		45	(13%-101%)			
4-Chloro-3-methylphenol	3330	U	ND	1930	ug/kg		58	(23%-114%)			
4-Nitrophenol	3330	U	ND	1200	ug/kg		36	(20%-126%)			
Acenaphthene	1670	U	ND	782	ug/kg		47	(15%-114%)			
Hexachlorobenzene	1670	U	ND	986	ug/kg		59				
Hexachlorobutadiene	1670	U	ND	546	ug/kg		33				
Hexachloroethane	1670	U	ND	605	ug/kg		36				
N-Nitrosodipropylamine	1670	U	ND	777	ug/kg		47	(18%-106%)			
Nitrobenzene	1670	U	ND	867	ug/kg		52				
Pentachlorophenol	3330	U	ND	1520	ug/kg		46	(34%-110%)			
Phenol	3330	U	ND	1660	ug/kg		50	(17%-104%)			
Pyrene	1670	U	ND	1170	ug/kg		70	(26%-130%)			
m,p-Cresols	3330	U	ND	1670	ug/kg		50				
o-Cresol	3330	U	ND	1730	ug/kg		52				
**2,4,6-Tribromophenol	3330			1700	ug/kg		51	(23%-111%)			
**2-Fluorobiphenyl	1670			671	ug/kg		40	(21%-104%)			
**2-Fluorophenol	3330			1400	ug/kg		42	(22%-93%)			
**Nitrobenzene-d5	1670			717	ug/kg		43	(24%-97%)			
**Phenol-d5	3330			1660	ug/kg		50	(22%-99%)			
**p-Terphenyl-d14	1670			1260	ug/kg		76	(30%-133%)			
QC1200292320 66189035 MSD											
1,2,4-Trichlorobenzene	1670	U	ND	629	ug/kg	3	38	(0%-31%)		09/03/02	19:57
1,4-Dichlorobenzene	1670	U	ND	567	ug/kg	10	34	(0%-36%)			
2,4,5-Trichlorophenol	3330	U	ND	1860	ug/kg	2	56				
2,4,6-Trichlorophenol	3330	U	ND	1380	ug/kg	3	41				
2,4-Dinitrotoluene	1670	U	ND	1190	ug/kg	2	72	(0%-37%)			
2-Chlorophenol	3330	U	ND	1420	ug/kg	4	43	(0%-34%)			
4-Chloro-3-methylphenol	3330	U	ND	1970	ug/kg	2	59	(0%-34%)			
4-Nitrophenol	3330	U	ND	1010	ug/kg	18	30	(0%-35%)			
Acenaphthene	1670	U	ND	812	ug/kg	4	49	(0%-33%)			
Hexachlorobenzene	1670	U	ND	939	ug/kg	5	56				
Hexachlorobutadiene	1670	U	ND	518	ug/kg	5	31				
Hexachloroethane	1670	U	ND	538	ug/kg	12	32				
N-Nitrosodipropylamine	1670	U	ND	749	ug/kg	4	45	(0%-29%)			
Nitrobenzene	1670	U	ND	751	ug/kg	14	45				
Pentachlorophenol	3330	U	ND	1220	ug/kg	22	37	(0%-40%)			

QC Summary

Workorder: 66189

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 197857											
Phenol	3330	U	ND	1670	ug/kg	1	50	(0%-37%)			
Pyrene	1670	U	ND	1150	ug/kg	2	69	(0%-39%)			
m,p-Cresols	3330	U	ND	1710	ug/kg	2	51				
o-Cresol	3330	U	ND	1670	ug/kg	4	50				
**2,4,6-Tribromophenol	3330			1710	ug/kg		51	(23%-111%)			
**2-Fluorobiphenyl	1670			694	ug/kg		42	(21%-104%)			
**2-Fluorophenol	3330			1500	ug/kg		45	(22%-93%)			
**Nitrobenzene-d5	1670			705	ug/kg		42	(24%-97%)			
**Phenol-d5	3330			1670	ug/kg		50	(22%-99%)			
**p-Terphenyl-d14	1670			1170	ug/kg		70	(30%-133%)			
Batch 199631											
QC1200295904 LCS											
1,2,4-Trichlorobenzene	1670			922	ug/kg		55	(27%-91%)	EHI	09/09/02	15:13
1,4-Dichlorobenzene	1670			789	ug/kg		47	(25%-85%)			
2,4,5-Trichlorophenol	3330			2360	ug/kg		71	(42%-96%)			
2,4,6-Trichlorophenol	3330			2120	ug/kg		64	(32%-91%)			
2,4-Dinitrotoluene	1670			1370	ug/kg		82	(50%-109%)			
2-Chlorophenol	3330			1680	ug/kg		50	(31%-85%)			
4-Chloro-3-methylphenol	3330			2380	ug/kg		71	(34%-97%)			
4-Nitrophenol	3330			2790	ug/kg		84	(22%-128%)			
Acenaphthene	1670			1070	ug/kg		64	(39%-98%)			
Hexachlorobenzene	1670			1260	ug/kg		76	(41%-105%)			
Hexachlorobutadiene	1670			917	ug/kg		55	(21%-94%)			
Hexachloroethane	1670			811	ug/kg		49	(25%-86%)			
N-Nitrosodipropylamine	1670			981	ug/kg		59	(34%-90%)			
Nitrobenzene	1670			851	ug/kg		51	(30%-84%)			
Pentachlorophenol	3330			2620	ug/kg		79	(27%-109%)			
Phenol	3330			1810	ug/kg		54	(31%-83%)			
Pyrene	1670			1230	ug/kg		74	(37%-110%)			
m,p-Cresols	3330			2090	ug/kg		62	(40%-83%)			
o-Cresol	3330			1890	ug/kg		57	(34%-86%)			
**2,4,6-Tribromophenol	3330			2710	ug/kg		81	(23%-111%)			
**2-Fluorobiphenyl	1670			883	ug/kg		53	(21%-104%)			
**2-Fluorophenol	3330			1540	ug/kg		46	(22%-93%)			
**Nitrobenzene-d5	1670			794	ug/kg		48	(24%-97%)			
**Phenol-d5	3330			1730	ug/kg		52	(22%-99%)			
**p-Terphenyl-d14	1670			1310	ug/kg		78	(30%-133%)			
QC1200295903 MB											
1,2,4-Trichlorobenzene			U	ND	ug/kg					09/09/02	14:53
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						

QC Summary

Workorder: 66189

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anal	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 199631											
2,6-Dinitrotoluene			U	ND	ug/kg						
2-Chloronaphthalene			U	ND	ug/kg						
2-Chlorophenol			U	ND	ug/kg						
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg						
2-Methylnaphthalene			U	ND	ug/kg						
2-Nitrophenol			U	ND	ug/kg						
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						

QC Summary

Workorder: 66189

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Bach	199631										
bis(2-Ethylhexyl)phthalate			U	ND	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						
**2,4,6-Tribromophenol	3330			1710	ug/kg		51	(23%-111%)			
**2-Fluorobiphenyl	1670			720	ug/kg		43	(21%-104%)			
**2-Fluorophenol	3330			1480	ug/kg		44	(22%-93%)			
**Nitrobenzene-d5	1670			666	ug/kg		40	(24%-97%)			
**Phenol-d5	3330			1560	ug/kg		47	(22%-99%)			
**p-Terphenyl-d14	1670			1220	ug/kg		73	(30%-133%)			

Notes:

RER is calculated at the 95% confidence level (2-sigma).

The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: September 19, 2002
Page 1 of 3

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant
Workorder: 66197

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-VolatRes-GCMS Federal										
Batch 197643										
QCI200291780 LCS										
Pyridine	50.0			15.9	ug/L		32		CAK	08/29/02 11:40
1,2,4-Trichlorobenzene	50.0			29.9	ug/L		60	(53%-104%)		
1,4-Dichlorobenzene	50.0			25.4	ug/L		51	(47%-102%)		
2,4,5-Trichlorophenol	100			89.0	ug/L		89	(67%-106%)		
2,4,6-Trichlorophenol	100			84.9	ug/L		85	(45%-111%)		
2,4-Dinitrotoluene	50.0			44.3	ug/L		89	(55%-121%)		
2-Chlorophenol	100			71.4	ug/L		71	(47%-87%)		
4-Chloro-3-methylphenol	100			82.5	ug/L		83	(51%-100%)		
4-Nitrophenol	100			26.7	ug/L		27	(10%-55%)		
Acenaphthene	50.0			42.9	ug/L		86	(63%-111%)		
Hexachlorobenzene	50.0			50.7	ug/L		101	(67%-114%)		
Hexachlorobutadiene	50.0			24.0	ug/L		48	(44%-106%)		
Hexachlorocyclohexane	50.0			20.6	ug/L		41	(47%-97%)		
N-Nitrosodipropylamine	50.0			40.6	ug/L		81	(52%-118%)		
Nitrobenzene	50.0			39.3	ug/L		79	(49%-110%)		
Pentachlorophenol	100			91.1	ug/L		91	(31%-110%)		
Phenol	100			28.0	ug/L		28	(16%-44%)		
Pyrene	50.0			48.0	ug/L		96	(68%-117%)		
m,p-Cresols	100			57.7	ug/L		58	(43%-100%)		
o-Cresol	100			65.5	ug/L		66	(47%-87%)		
**2,4,6-Tribromophenol	100			99.3	ug/L		99	(27%-126%)		
**2-Fluorobiphenyl	50.0			37.4	ug/L		75	(32%-109%)		
**2-Fluorophenol	100			45.5	ug/L		46	(13%-73%)		
**Nitrobenzene-d5	50.0			35.3	ug/L		71	(33%-107%)		
**Phenol-d5	100			27.6	ug/L		28	(14%-66%)		
**p-Terphenyl-d14	50.0			48.5	ug/L		97	(36%-130%)		
QCI200291779 MB										
1,2,4-Trichlorobenzene			U	ND	ug/L					08/29/02 16:13
1,2-Dichlorobenzene			U	ND	ug/L					
1,3-Dichlorobenzene			U	ND	ug/L					
1,4-Dichlorobenzene			U	ND	ug/L					
2,4,5-Trichlorophenol			U	ND	ug/L					
2,4,6-Trichlorophenol			U	ND	ug/L					
2,4-Dichlorophenol			U	ND	ug/L					
2,4-Dimethylphenol			U	ND	ug/L					
2,4-Dinitrophenol			U	ND	ug/L					
2,4-Dinitrotoluene			U	ND	ug/L					
2,6-Dinitrotoluene			U	ND	ug/L					
2-Chloronaphthalene			U	ND	ug/L					
2-Chlorophenol			U	ND	ug/L					
2-Methyl-4,6-dinitrophenol			U	ND	ug/L					
2-Methylnaphthalene			U	ND	ug/L					

QC Summary

Workorder: 66197

Page 2 of 3

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlsl	Date	Time
Semi-Volatiles-GC/MS Federal										
Batch 197643										
2-Nitrophenol		U	ND	ug/L						
3,3'-Dichlorobenzidine		U	ND	ug/L						
4-Bromophenylphenylether		U	ND	ug/L						
4-Chloro-3-methylphenol		U	ND	ug/L						
4-Chloroaniline		U	ND	ug/L						
4-Chlorophenylphenylether		U	ND	ug/L						
4-Nitrophenol		U	ND	ug/L						
Acenaphthene		U	ND	ug/L						
Acenaphthylene		U	ND	ug/L						
Anthracene		U	ND	ug/L						
Benzo(a)anthracene		U	ND	ug/L						
Benzo(a)pyrene		U	ND	ug/L						
Benzo(b)fluoranthene		U	ND	ug/L						
Benzo(ghi)perylene		U	ND	ug/L						
Benzo(k)fluoranthene		U	ND	ug/L						
Butylbenzylphthalate		U	ND	ug/L						
Carbazole		U	ND	ug/L						
Chrysene		U	ND	ug/L						
Di-n-butylphthalate		U	ND	ug/L						
Di-n-octylphthalate		U	ND	ug/L						
Dibenzo(a,h)anthracene		U	ND	ug/L						
Dibenzofuran		U	ND	ug/L						
Diethylphthalate		U	ND	ug/L						
Dimethylphthalate		U	ND	ug/L						
Diphenylamine		U	ND	ug/L						
Fluoranthene		U	ND	ug/L						
Fluorene		U	ND	ug/L						
Hexachlorobenzene		U	ND	ug/L						
Hexachlorobutadiene		U	ND	ug/L						
Hexachlorocyclopentadiene		U	ND	ug/L						
Hexachloroethane		U	ND	ug/L						
Indeno(1,2,3-cd)pyrene		U	ND	ug/L						
Isophorone		U	ND	ug/L						
N-Nitrosodipropylamine		U	ND	ug/L						
Naphthalene		U	ND	ug/L						
Nitrobenzene		U	ND	ug/L						
Pentachlorophenol		U	ND	ug/L						
Phenanthrene		U	ND	ug/L						
Phenol		U	ND	ug/L						
Pyrene		U	ND	ug/L						
bis(2-Chloroethoxy)methane		U	ND	ug/L						
bis(2-Chloroethyl) ether		U	ND	ug/L						
bis(2-Chloroisopropyl)ether		U	ND	ug/L						
bis(2-Ethylhexyl)phthalate		U	ND	ug/L						
m,p-Cresols		U	ND	ug/L						
m-Nitroaniline		U	ND	ug/L						
o-Cresol		U	ND	ug/L						
o-Nitroaniline		U	ND	ug/L						

QC Summary

Workorder: 66197

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Paramname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal										
Batch 197643										
p-Nitroaniline		U	ND	ug/L						
**2,4,6-Tribromophenol	100		87.4	ug/L	87	(27%-126%)				
**2-Fluorobiphenyl	50.0		36.9	ug/L	74	(32%-109%)				
**2-Fluorophenol	100		49.0	ug/L	49	(13%-73%)				
**Nitrobenzene-d5	50.0		37.7	ug/L	75	(33%-107%)				
**Phenol-d5	100		30.5	ug/L	31	(14%-66%)				
**p-Terphenyl-d14	50.0		50.5	ug/L	101	(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 0
- ** 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 acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: September 20, 2002

Page 1 of 4

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

Contact: Pamela M. Puissant

Workorder: 66195

Partname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 198215											
QC1200293056 LCS											
1,2,4-Trichlorobenzene	1670			960	ug/kg		58	(27%-91%)	EH1	08/30/02	13:34
1,4-Dichlorobenzene	1670			894	ug/kg		54	(25%-85%)			
2,4,5-Trichlorophenol	3330			2110	ug/kg		63	(42%-96%)			
2,4,6-Trichlorophenol	3330			2020	ug/kg		61	(32%-91%)			
2,4-Dinitrotoluene	1670			1230	ug/kg		74	(50%-109%)			
2-Chlorophenol	3330			1880	ug/kg		56	(31%-85%)			
4-Chloro-3-methylphenol	3330			2290	ug/kg		69	(34%-97%)			
4-Nitrophenol	3330			1970	ug/kg		59	(22%-128%)			
Acenaphthene	1670			981	ug/kg		59	(39%-98%)			
Hexachlorobenzene	1670			1020	ug/kg		61	(41%-105%)			
Hexachlorobutadiene	1670			817	ug/kg		49	(21%-94%)			
Hexachloroethane	1670			924	ug/kg		55	(25%-86%)			
N-Nitrosodiisopropylamine	1670			970	ug/kg		58	(34%-90%)			
Nitrobenzene	1670			1080	ug/kg		65	(30%-84%)			
Pentachlorophenol	3330			2050	ug/kg		61	(27%-109%)			
Phenol	3330			2020	ug/kg		61	(31%-83%)			
Pyrene	1670			1090	ug/kg		65	(37%-110%)			
m,p-Cresols	3330			1980	ug/kg		60	(40%-83%)			
o-Cresol	3330			1930	ug/kg		58	(34%-86%)			
**2,4,6-Tribromophenol	3330			1950	ug/kg		59	(23%-111%)			
**2-Fluorobiphenyl	1670			936	ug/kg		56	(21%-104%)			
**2-Fluorophenol	3330			1860	ug/kg		56	(22%-93%)			
**Nitrobenzene-d5	1670			998	ug/kg		60	(24%-97%)			
**Phenol-d5	3330			2090	ug/kg		63	(22%-99%)			
**p-Terphenyl-d14	1670			1170	ug/kg		70	(30%-133%)			
QC1200293055 MB											
1,2,4-Trichlorobenzene			U	ND	ug/kg					08/30/02	13:14
1,2-Dichlorobenzene			U	ND	ug/kg						
1,3-Dichlorobenzene			U	ND	ug/kg						
1,4-Dichlorobenzene			U	ND	ug/kg						
2,4,5-Trichlorophenol			U	ND	ug/kg						
2,4,6-Trichlorophenol			U	ND	ug/kg						
2,4-Dichlorophenol			U	ND	ug/kg						
2,4-Dimethylphenol			U	ND	ug/kg						
2,4-Dinitrophenol			U	ND	ug/kg						
2,4-Dinitrotoluene			U	ND	ug/kg						
2,6-Dinitrotoluene			U	ND	ug/kg						
2-Chloronaphthalene			U	ND	ug/kg						
2-Chlorophenol			U	ND	ug/kg						
2-Methyl-4,6-dinitrophenol			U	ND	ug/kg						
2-Methylnaphthalene			U	ND	ug/kg						
2-Nitrophenol			U	ND	ug/kg						

QC Summary

Workorder: 66195

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Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Semi-Volatiles-GC/MS Federal											
Bach	198215										
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			U	ND	ug/kg						
m,p-Cresols			U	ND	ug/kg						
m-Nitroaniline			U	ND	ug/kg						
o-Cresol			U	ND	ug/kg						
o-Nitroaniline			U	ND	ug/kg						
p-Nitroaniline			U	ND	ug/kg						

QC Summary

Workorder: 66195

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Ankt	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 198215											
**2,4,6-Tribromophenol	3330			1890	ug/kg		57	(23%-111%)			
**2-Fluorobiphenyl	1670			938	ug/kg		56	(21%-104%)			
**2-Fluorophenol	3330			1910	ug/kg		57	(22%-93%)			
**Nitrobenzene-d5	1670			974	ug/kg		59	(24%-97%)			
**Phenol-d5	3330			2130	ug/kg		64	(22%-99%)			
**p-Terphenyl-d14	1670			1360	ug/kg		82	(30%-133%)			
QC1200293057 66195002 MSD											
1,2,4-Trichlorobenzene	1670	U	ND	J	299	ug/kg	18	(15%-112%)		08/30/02	14:37
1,4-Dichlorobenzene	1670	U	ND	I	305	ug/kg	18*	(19%-89%)			
2,4,5-Trichlorophenol	3330	U	ND		576	ug/kg	17				
2,4,6-Trichlorophenol	3330	U	ND		524	ug/kg	16				
2,4-Dinitrotoluene	1670	U	ND	J	315	ug/kg	19*	(32%-117%)			
2-Chlorophenol	3330	U	ND		590	ug/kg	18	(13%-101%)			
4-Chloro-3-methylphenol	3330	U	ND		615	ug/kg	18*	(23%-114%)			
4-Nitrophenol	3330	U	ND	J	312	ug/kg	9*	(20%-126%)			
Acenaphthene	1670	U	ND		286	ug/kg	17	(15%-114%)			
Hexachlorobenzene	1670	U	ND	J	276	ug/kg	17				
Hexachlorobutadiene	1670	U	ND	J	263	ug/kg	16				
Hexachloroethane	1670	U	ND	J	309	ug/kg	19				
N-Nitrosodipropylamine	1670	U	ND	J	303	ug/kg	18	(18%-106%)			
Nitrobenzene	1670	U	ND	J	323	ug/kg	19				
Pentachlorophenol	3330	U	ND		628	ug/kg	19*	(34%-110%)			
Phenol	3330	U	ND		612	ug/kg	18	(17%-104%)			
Pyrene	1670	U	ND		273	ug/kg	16*	(26%-130%)			
m,p-Cresols	3330	U	ND		564	ug/kg	17				
o-Cresol	3330	U	ND		642	ug/kg	19				
**2,4,6-Tribromophenol	3330		1740		716	ug/kg	22*	(23%-111%)			
**2-Fluorobiphenyl	1670		821		279	ug/kg	17*	(21%-104%)			
**2-Fluorophenol	3330		1840		550	ug/kg	17*	(22%-93%)			
**Nitrobenzene-d5	1670				307	ug/kg	18*	(24%-97%)			
**Phenol-d5	3330				586	ug/kg	18*	(22%-99%)			
**p-Terphenyl-d14	1670				292	ug/kg	18*	(30%-133%)			
QC1200293058 66195002 MSD											
1,2,4-Trichlorobenzene	1670	U	ND		755	ug/kg	86*	(0%-31%)		08/30/02	14:58
1,4-Dichlorobenzene	1670	U	ND		718	ug/kg	81*	(0%-36%)			
2,4,5-Trichlorophenol	3330	U	ND		2060	ug/kg	113				
2,4,6-Trichlorophenol	3330	U	ND		1740	ug/kg	107				
2,4-Dinitrotoluene	1670	U	ND		1240	ug/kg	119*	(0%-37%)			
2-Chlorophenol	3330	U	ND		1470	ug/kg	85*	(0%-34%)			
4-Chloro-3-methylphenol	3330	U	ND		2240	ug/kg	114*	(0%-34%)			
4-Nitrophenol	3330	U	ND		1900	ug/kg	144*	(0%-35%)			
Acenaphthene	1670	U	ND		917	ug/kg	105*	(0%-33%)			
Hexachlorobenzene	1670	U	ND		1030	ug/kg	116				
Hexachlorobutadiene	1670	U	ND		627	ug/kg	82				
Hexachloroethane	1670	U	ND		689	ug/kg	76				
N-Nitrosodipropylamine	1670	U	ND		816	ug/kg	92*	(0%-29%)			
Nitrobenzene	1670	U	ND		885	ug/kg	93				
Pentachlorophenol	3330	U	ND		1890	ug/kg	100*	(0%-40%)			

QC Summary

Workorder: 66195

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Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-GC/MS Federal											
Batch 198215											
Phenol	3330	U	ND	1680	ug/kg	93*	50	(0%-37%)			
Pyrene	1670	U	ND	1090	ug/kg	120*	66	(0%-39%)			
m,p-Cresols	3330	U	ND	1690	ug/kg	100	51				
o-Cresol	3330	U	ND	1690	ug/kg	90	51				
**2,4,6-Tribromophenol	3330		1740	1870	ug/kg		56	(23%-111%)			
**2-Fluorobiphenyl	1670		821	802	ug/kg		48	(21%-104%)			
**2-Fluorophenol	3330		1840	1480	ug/kg		45	(22%-93%)			
**Nitrobenzene-d5	1670			780	ug/kg		47	(24%-97%)			
**Phenol-d5	3330			1670	ug/kg		50	(22%-99%)			
**p-Terphenyl-d14	1670			1120	ug/kg		67	(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 it
- ** 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.

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.

HPLC EXPLOSIVES ANALYSIS

**HPLC Narrative
Sandia National Labs (SNLS)
SDG 66189**

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: 198039
Prep Batch Number: 198038

Sample Analysis

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

Sample ID	Client ID
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002

66189032	059700-002
66189033	059701-002
66189034	059702-002
66189035	059703-002
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
1200292731	XBLK01 (Blank)
1200292732	XBLK01LCS (Laboratory Control Sample)
1200292733	059691-002MS (Matrix Spike)
1200292734	059691-002MSD (Matrix Spike Duplicate)

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC or HP Model 1100 HPLC with programmable gradient pumping and a 100 ul loop injector for the primary system and a 100 ul loop injector for the confirmation system. The HPLC 1050 is coupled to a HP Model G1306A Diode Array UV detector, and the HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitor absorbance at the following five wavelengths: 1) 214 nm; 2) 224 nm; 3) 235 nm; 4) 254 nm; 5) 264 nm.

The primary HPLC system is usually identified with either a designation of HPLC #2, or hplcb in the raw data printouts. The confirmation HPLC system is usually identified with a designation of HPLC #1, or hplca in the raw data printouts. The HP 1100 HPLC system is identified as HPLC #3, or hplcc in the raw data printouts. The HP 1100 HPLC has a Column Switching Valve which enables this system to be used for primary analysis or confirmation analysis.

Chromatographic Columns

Chromatographic separation of nitroaromatic and nitramine components is accomplished through analysis on the following reversed phase columns:

HP: Hypersil BDS-C18, 250 mm x 4 mm O.D. containing 5 um particle size.

Confirmation of nitroaromatic and nitramine components, initially identified on one of the above

columns, is accomplished through analysis on the following column:

PH: Develosil CN-UG5-5, 250 mm x 4.6 mm I.D.

The primary column is used for quantitation while the confirmation column is for qualitative purposes only.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

All the LCS spike recoveries were within the established acceptance limits.

QC Sample Designation

The following sample analyzed with this SDG was chosen for matrix spike analysis:
66189021 (059691-002)

MS Recovery Statement

4-amino-2,6-dinitrotoluene fails recovery low in the matrix spike (MS). The analyte meets acceptance criteria in the LCS and MSD. The failure is attributed to random laboratory error.

MSD Recovery Statement

The matrix spike duplicate recoveries were within the established acceptance limits.

MS/MSD RPD Statement

The relative percent differences (RPD) between the MS and MSD were not within the required acceptance limits. For 4-amino-2,6-dinitrotoluene.

Technical Information

Holding Time Specifications

All samples in this SDG met the specified holding time requirements.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

None of the samples in this SDG required dilutions.

Miscellaneous Information

Nonconformance (NCR) Documentation

No nonconformance report (NCR) has been 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 sample group.

The FORM 8 uses the retention time of the surrogate as a measure of how close the retention times 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.

Comments

* 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: Jan Berh Date: 9-15-02

**HPLC Narrative
Sandia National Labs (SNLS)
SDG 66189-1**

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: 198044

Prep Batch Number: 198043

Sample Analysis

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

Sample ID	Client ID
66195002	059710-002
1200292738	XBLK01 (Blank)
1200292739	XBLK01LCS (Laboratory Control Sample)
1200292740	059710-002MS (Matrix Spike)
1200292741	059710-002MSD (Matrix Spike Duplicate)

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC or HP Model 1100 HPLC with programmable gradient pumping and a 100 ul loop injector for the primary system and a 100 ul loop injector for the confirmation system. The HPLC 1050 is coupled to a HP Model G1306A Diode Array UV detector, and the HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitor absorbance at the following five wavelengths: 1) 214 nm; 2) 224 nm; 3) 235 nm; 4) 254 nm; 5) 264 nm.

The primary HPLC system is usually identified with either a designation of HPLC #2, or hplcb in the raw data printouts. The confirmation HPLC system is usually identified with a designation of HPLC #1, or hplca in the raw data printouts. The HP 1100 HPLC system is identified as HPLC #3, or hplcc in the raw data printouts. The HP 1100 HPLC has a Column Switching Valve which enables this system to be used for primary analysis or confirmation analysis.

Chromatographic Columns

Chromatographic separation of nitroaromatic and nitramine components is accomplished through analysis on the following reversed phase columns:

HP: Hypersil BDS-C18, 250 mm x 4 mm O.D. containing 5 um particle size.

Confirmation of nitroaromatic and nitramine components, initially identified on one of the above columns, is accomplished through analysis on the following column:

PH: Develosil CN-UG5-5, 250 mm x 4.6 mm I.D.

The primary column is used for quantitation while the confirmation column is for qualitative purposes only.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

One or more of the required spiking analytes were outside of the SNLS and GEL acceptance limits in the laboratory control sample (LCS). Due to QC failure the associated sample was reextracted. See NCR 4645

QC Sample Designation

The following sample analyzed with this SDG was chosen for matrix spike analysis:
66195002 (059710-002)

MS Recovery Statement

One or more of the required spiking analytes were not within the SNLS acceptance limits in the matrix spike (MS). The matrix spike duplicate (MSD) also failed recoveries. The failing recoveries are attributed to matrix interference. All of the recoveries were within GEL's SPC recovery limits.

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. All of the recoveries were within GEL's SPC recovery 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**

All samples in this SDG met the specified holding time requirements for the initial extraction. 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.

Sample Reextract/Reanalysis

The following sample was reextracted due to failing spike recoveries in the LCS, MS, and MSD.
66195002 (059710-002)

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

The samples were concentrated prior to analysis to achieve the required detection limit. For GEL, the following analytes coelute on the cyano column: a.) 2,4,6-Trinitrotoluene, 2,4-Dinitrotoluene, and 2,6-Dinitrotoluene b.) 1,3,5-Trinitrobenzene and 1,3-Dinitrobenzene c.) m-, p-, and o-Nitrotoluene.

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: 203606
Prep Batch Number: 203605

Sample Analysis

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

Sample ID	Client ID
66195002	059710-002RE
1200305569	XBLK02 (Blank)
1200305570	XBLK02LCS (Laboratory Control Sample)

System Configuration

The laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for explosives analyses. The chromatographic hardware system consists of an HP Model 1050 HPLC or HP Model 1100 HPLC with programmable gradient pumping and a 100 ul loop injector for the primary system and a 100 ul loop injector for the confirmation system. The HPLC 1050 is coupled to a HP Model G1306A Diode Array UV detector, and the HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitor absorbance at the

following five wavelengths: 1) 214 nm; 2) 224 nm; 3) 235 nm; 4) 254 nm; 5) 264 nm.

The primary HPLC system is usually identified with either a designation of HPLC #2, or hplcb in the raw data printouts. The confirmation HPLC system is usually identified with a designation of HPLC #1, or hplca in the raw data printouts. The HP 1100 HPLC system is identified as HPLC #3, or hplcc in the raw data printouts. The HP 1100 HPLC has a Column Switching Valve which enables this system to be used for primary analysis or confirmation analysis.

Chromatographic Columns

Chromatographic separation of nitroaromatic and nitramine components is accomplished through analysis on the following reversed phase columns:

HP: Hypersil BDS-C18, 250 mm x 4 mm O.D. containing 5 um particle size.

Confirmation of nitroaromatic and nitramine components, initially identified on one of the above columns, is accomplished through analysis on the following column:

PH: Develosil CN-UG5-5, 250 mm x 4.6 mm I.D.

The primary column is used for quantitation while the confirmation column is for qualitative purposes only.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Blank Acceptance

The blank(s) analyzed with this SDG met the established acceptance criteria.

LCS Recovery Statement

All the LCS spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

A matrix spike/matrix spike duplicate was not performed with this batch.

Technical Information

Holding Time Specifications

Not all samples in this SDG met the specified holding time requirements. The following samples were originally extracted within holding, but were reextracted out of holding due to failing spike recoveries in the LCS.

66195002 See NCR 4645

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

The following non-conformance report (NCR) was submitted with this SDG. See NCR 4645. The sample was reextracted out of holding due to low spike recoveries in the LCS.

Manual Integration

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

Additional Comments

The samples were concentrated prior to analysis to achieve the required detection limit. For GEL, the following analytes coelute on the cyano column: a.) 2,4,6-Trinitrotoluene, 2,4-Dinitrotoluene, and 2,6-Dinitrotoluene b.) 1,3,5-Trinitrobenzene and 1,3-Dinitrobenzene c.) m-, p-, and o-Nitrotoluene.

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: *Joan Baul* Date: 9-26-02

**HPLC Narrative
Sandia National Labs (SNLS)
SDG 66189-2**

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: 198171

Prep Batch Number: 198170

Sample Analysis

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

Sample ID	Client ID
66197008	059640-004
1200292964	XBLK01 (Blank)
1200292965	XBLK01LCS (Laboratory Control Sample)
1200292966	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

One or more of the required spiking analytes were not within the SNLS 80-120% static acceptance limits. However, the LCS was within the acceptance limits according to the GEL SPC limits. The client has been notified and requested that the data are used. Please see the enclosed e-mail in the Miscellaneous Section. The enclosed Certificate of Analysis has the GEL SPC limits on it.

LCSD Recovery Statement

All of the required spiking analytes were within the acceptance limits in the laboratory control sample duplicate (LCSD).

LCS/LCSD RPD Statement

All of the relative percent differences (RPDs) between the LCS and the LCSD were within the acceptance limits for this SDG.

QC Sample Designation

A matrix spike/matrix spike duplicate was not performed with this batch.

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.

Sample 1200292964 had a response for some target analytes whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference). Because both columns or detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference between the two columns, it is indicated as such on the appropriate Certificate of Analysis with a P qualifier. Those analytes reported with a percent difference greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material. Analytes reported with a percent difference greater than 70% should be considered undetected.

Sample 66197008 extract was a thick emulsion.

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.

Confirmation analysis was performed on some of the samples in this batch. The values reported are from the primary analysis. The confirmation analysis is used for qualitative purposes only.

The following analytes coelute on the cyano column: a.) 2,4,6-Trinitrotoluene, 2,4-Dinitrotoluene, and 2,6-Dinitrotoluene b.) 1,3,5-Trinitrotoluene and 1,3-Dinitrobenzene c.) m-Nitrotoluene, p-Nitrotoluene and o-Nitrotoluene. As a result some of these analytes may be flagged with a P qualifier. The coelution from the cyano column should be considered and the values as suspect to the sample.

Certification Statement

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

Review Validation:

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

Reviewer: Deborah K. Maurer Date: 10/23/02

HPLC
QUALITY
CONTROL
SUMMARY

QC Summary

Report Date: September 14, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant
Workorder: 66189

ParmaName	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC Explosives Federal										
Batch 198039										
QC1200292732 LCS										
1,3,5-Trinitrobenzene	800			726	ug/kg		91	(77%-124%)	JLW	09/05/02 19:38
2,4,6-Trinitrotoluene	800			748	ug/kg		94	(80%-120%)		
2,4-Dinitrotoluene	800			713	ug/kg		85	(77%-122%)		
2,6-Dinitrotoluene	800			754	ug/kg		94	(74%-121%)		
2-Amino-4,6-dinitrotoluene	800			754	ug/kg		94	(81%-125%)		
4-Amino-2,6-dinitrotoluene	800			701	ug/kg		88	(79%-123%)		
HMX	800			759	ug/kg		95	(84%-131%)		
Nitrobenzene	800			721	ug/kg		90	(75%-125%)		
RDX	800			758	ug/kg		95	(80%-123%)		
Tetryl	800			576	ug/kg		72	(65%-124%)		
m-Dinitrobenzene	800			732	ug/kg		92	(77%-124%)		
m-Nitrotoluene	800			722	ug/kg		90	(77%-117%)		
o-Nitrotoluene	800			716	ug/kg		90	(75%-119%)		
p-Nitrotoluene	800			732	ug/kg		91	(76%-121%)		
**1,2-dinitrobenzene	400			373	ug/kg		93	(71%-118%)		
QC1200292731 MS										
1,3,5-Trinitrobenzene			U	ND	ug/kg					09/05/02 18:56
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			380	ug/kg		95	(71%-118%)		
QC1200292733 66189021 MS										
1,3,5-Trinitrobenzene	800	U	ND	677	ug/kg		85	(66%-133%)		09/05/02 20:19
2,4,6-Trinitrotoluene	800	U	ND	717	ug/kg		90	(77%-132%)		
2,4-Dinitrotoluene	800	U	ND	720	ug/kg		90	(61%-134%)		
2,6-Dinitrotoluene	800	U	ND	786	ug/kg		98	(70%-121%)		
2-Amino-4,6-dinitrotoluene	800	U	ND	635	ug/kg		79	(79%-124%)		
4-Amino-2,6-dinitrotoluene	800	U	ND	433	ug/kg		54*	(71%-120%)		
HMX	800	U	ND	760	ug/kg		95	(75%-138%)		
Nitrobenzene	800	U	ND	708	ug/kg		89	(72%-120%)		
RDX	800	U	ND	720	ug/kg		90	(61%-135%)		
Tetryl	800	U	ND	575	ug/kg		72	(65%-135%)		

QC Summary

Workorder: 66189

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
BPLC Explosives Federal											
Batch 198039											
m-Dinitrobenzene	800	U	ND	737	ug/kg		92	(75%-125%)			
m-Nitrotoluene	800	U	ND	716	ug/kg		90	(73%-116%)			
o-Nitrotoluene	800	U	ND	711	ug/kg		89	(68%-122%)			
p-Nitrotoluene	800	U	ND	726	ug/kg		91	(67%-125%)			
**1,2-dinitrobenzene	400		407	365	ug/kg		91	(71%-118%)			
QC1200292734 66189021 MSD											
1,3,5-Trinitrobenzene	800	U	ND	725	ug/kg	7	91	(0%-20%)		09/05/02	21:01
2,4,6-Trinitrotoluene	800	U	ND	752	ug/kg	5	94	(0%-20%)			
2,4-Dinitrotoluene	800	U	ND	737	ug/kg	2	92	(0%-24%)			
2,6-Dinitrotoluene	800	U	ND	783	ug/kg	0	98	(0%-21%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	756	ug/kg	17	94	(0%-20%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	672	ug/kg	43*	84	(0%-20%)			
HMX	800	U	ND	784	ug/kg	3	98	(0%-38%)			
Nitrobenzene	800	U	ND	731	ug/kg	3	91	(0%-21%)			
RDX	800	U	ND	735	ug/kg	2	92	(0%-35%)			
Tetryl	800	U	ND	659	ug/kg	14	82	(0%-30%)			
m-Dinitrobenzene	800	U	ND	756	ug/kg	3	95	(0%-23%)			
m-Nitrotoluene	800	U	ND	744	ug/kg	4	93	(0%-20%)			
o-Nitrotoluene	800	U	ND	734	ug/kg	3	92	(0%-23%)			
p-Nitrotoluene	800	U	ND	749	ug/kg	3	94	(0%-22%)			
**1,2-dinitrobenzene	400		407	383	ug/kg		96	(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 I
- ** 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 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 SDLT 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: September 26, 2002

Page 1 of 4

Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Pulsant
 Workorder: 66195

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal											
Batch	198044										
QC1200292739	LCS										
1,3,5-Trinitrobenzene	800			755	ug/kg		94	(77%-124%)	JLW	09/11/02	09:23
2,4,6-Trinitrotoluene	800			820	ug/kg		103	(80%-120%)			
2,4-Dinitrotoluene	800			700	ug/kg		88	(77%-122%)			
2,6-Dinitrotoluene	800			732	ug/kg		92	(74%-121%)			
2-Amino-4,6-dinitrotoluene	800			737	ug/kg		92	(81%-125%)			
4-Amino-2,6-dinitrotoluene	800			625	ug/kg		78*	(79%-123%)			
HMX	800			968	ug/kg		121	(84%-131%)			
Nitrobenzene	800			657	ug/kg		82	(75%-125%)			
RDX	800			813	ug/kg		102	(80%-123%)			
Tetryl	800			308	ug/kg		38*	(65%-124%)			
m-Dinitrobenzene	800			719	ug/kg		90	(77%-124%)			
m-Nitrotoluene	800			657	ug/kg		82	(77%-117%)			
o-Nitrotoluene	800			659	ug/kg		82	(75%-119%)			
p-Nitrotoluene	800			668	ug/kg		84	(76%-121%)			
**1,2-dinitrobenzene	400			368	ug/kg		92	(71%-118%)			
QC1200292738	MB										
1,3,5-Trinitrobenzene			U	ND	ug/kg					09/11/02	08:41
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			382	ug/kg		96	(71%-118%)			
QC1200292740	66195002	MS									
1,3,5-Trinitrobenzene	800	U	ND	739	ug/kg		92	(66%-133%)		09/11/02	10:04
2,4,6-Trinitrotoluene	800	U	ND	720	ug/kg		90	(77%-132%)			
2,4-Dinitrotoluene	800	U	ND	727	ug/kg		91	(61%-134%)			
2,6-Dinitrotoluene	800	U	ND	808	ug/kg		101	(70%-121%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	702	ug/kg		88	(79%-124%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	574	ug/kg		72	(71%-120%)			
HMX	800	U	ND	760	ug/kg		95	(75%-138%)			
Nitrobenzene	800	U	ND	724	ug/kg		91	(72%-120%)			
RDX	800	U	ND	729	ug/kg		91	(61%-136%)			
Tetryl	800	U	ND	700	ug/kg		88	(65%-135%)			

QC Summary

Workorder: 66195

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal											
Batch 198044											
m-Dinitrobenzene	800	U	ND	740	ug/kg		93	(75%-125%)			
m-Nitrotoluene	800	U	ND	717	ug/kg		90	(73%-116%)			
o-Nitrotoluene	800	U	ND	721	ug/kg		90	(68%-122%)			
p-Nitrotoluene	800	U	ND	727	ug/kg		91	(67%-125%)			
**1,2-dinitrobenzene	400		374	397	ug/kg		99	(71%-118%)			
QC1200292741 66195002 MSD											
1,3,5-Trinitrobenzene	800	U	ND	739	ug/kg	0	92	(0%-20%)		09/11/02	10:46
2,4,6-Trinitrotoluene	800	U	ND	719	ug/kg	0	90	(0%-20%)			
2,4-Dinitrotoluene	800	U	ND	735	ug/kg	1	92	(0%-24%)			
2,6-Dinitrotoluene	800	U	ND	852	ug/kg	5	106	(0%-21%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	670	ug/kg	5	84	(0%-20%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	503	ug/kg	13	63	(0%-20%)			
HMX	800	U	ND	764	ug/kg	1	96	(0%-38%)			
Nitrobenzene	800	U	ND	721	ug/kg	0	90	(0%-21%)			
RDX	800	U	ND	729	ug/kg	0	91	(0%-35%)			
Tetryl	800	U	ND	694	ug/kg	1	87	(0%-30%)			
m-Dinitrobenzene	800	U	ND	746	ug/kg	1	93	(0%-23%)			
m-Nitrotoluene	800	U	ND	758	ug/kg	6	95	(0%-20%)			
o-Nitrotoluene	800	U	ND	715	ug/kg	1	89	(0%-23%)			
p-Nitrotoluene	800	U	ND	724	ug/kg	0	91	(0%-22%)			
**1,2-dinitrobenzene	400		374	393	ug/kg		98	(71%-118%)			
Batch 201462											
QC1200300281 LCS											
1,3,5-Trinitrobenzene	800			691	ug/kg		86	(77%-124%)	JLW	09/17/02	21:02
2,4,6-Trinitrotoluene	800			693	ug/kg		87	(80%-120%)			
2,4-Dinitrotoluene	800			641	ug/kg		80	(77%-122%)			
2,6-Dinitrotoluene	800			679	ug/kg		85	(74%-121%)			
2-Amino-4,6-dinitrotoluene	800			683	ug/kg		85	(81%-125%)			
4-Amino-2,6-dinitrotoluene	800			595	ug/kg		74 *	(79%-123%)			
HMX	800			723	ug/kg		90	(84%-131%)			
Nitrobenzene	800			627	ug/kg		78	(75%-125%)			
RDX	800			713	ug/kg		89	(80%-123%)			
Tetryl	800			603	ug/kg		75	(65%-124%)			
m-Dinitrobenzene	800			664	ug/kg		83	(77%-124%)			
m-Nitrotoluene	800			632	ug/kg		79	(77%-117%)			
o-Nitrotoluene	800			632	ug/kg		79	(75%-119%)			
p-Nitrotoluene	800			640	ug/kg		80	(76%-121%)			
**1,2-dinitrobenzene	400			346	ug/kg		86	(71%-118%)			
QC1200300280 MB											
1,3,5-Trinitrobenzene			U	ND	ug/kg					09/17/02	20:19
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						

QC Summary

Workorder: 66195

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Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Arist	Date	Time
HPLC Explosives Federal											
Batch 201462											
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			354	ug/kg		88	(71%-118%)			
QC1200300293 65745005 MSD											
1,3,5-Trinitrobenzene	800	U	ND	H	760	ug/kg	95	(66%-133%)		09/17/02	21:44
2,4,6-Trinitrotoluene	800	U	ND	H	767	ug/kg	96	(77%-132%)			
2,4-Dinitrotoluene	800	U	ND	H	754	ug/kg	94	(61%-134%)			
2,6-Dinitrotoluene	800	U	ND	H	807	ug/kg	101	(70%-121%)			
2-Amino-4,6-dinitrotoluene	800	U	ND	H	761	ug/kg	95	(79%-124%)			
4-Amino-2,6-dinitrotoluene	800	U	ND	H	701	ug/kg	88	(71%-120%)			
HMX	800	U	ND	H	757	ug/kg	100	(75%-138%)			
Nitrobenzene	800	U	ND	H	737	ug/kg	92	(72%-120%)			
RDX	800	U	ND	H	750	ug/kg	94	(61%-136%)			
Tetryl	800	U	ND	H	671	ug/kg	84	(65%-135%)			
m-Dinitrobenzene	800	U	ND	H	778	ug/kg	97	(75%-125%)			
m-Nitrotoluene	800	U	ND	H	742	ug/kg	93	(73%-116%)			
o-Nitrotoluene	800	U	ND	H	737	ug/kg	92	(68%-122%)			
p-Nitrotoluene	800	U	ND	H	753	ug/kg	94	(67%-125%)			
**1,2-dinitrobenzene	400		370	H	401	ug/kg	100	(71%-118%)			
QC1200300294 65745005 MSD											
1,3,5-Trinitrobenzene	800	U	ND	H	761	ug/kg	0	95	(0%-20%)		09/17/02 22:27
2,4,6-Trinitrotoluene	800	U	ND	H	767	ug/kg	0	96	(0%-20%)		
2,4-Dinitrotoluene	800	U	ND	H	755	ug/kg	0	94	(0%-24%)		
2,6-Dinitrotoluene	800	U	ND	H	804	ug/kg	0	100	(0%-21%)		
2-Amino-4,6-dinitrotoluene	800	U	ND	H	752	ug/kg	1	94	(0%-20%)		
4-Amino-2,6-dinitrotoluene	800	U	ND	H	650	ug/kg	8	81	(0%-20%)		
HMX	800	U	ND	H	794	ug/kg	0	99	(0%-38%)		
Nitrobenzene	800	U	ND	H	733	ug/kg	1	92	(0%-21%)		
RDX	800	U	ND	H	747	ug/kg	0	93	(0%-35%)		
Tetryl	800	U	ND	H	667	ug/kg	1	83	(0%-30%)		
m-Dinitrobenzene	800	U	ND	H	778	ug/kg	0	97	(0%-23%)		
m-Nitrotoluene	800	U	ND	H	743	ug/kg	0	93	(0%-20%)		
o-Nitrotoluene	800	U	ND	H	738	ug/kg	0	92	(0%-23%)		
p-Nitrotoluene	800	U	ND	H	751	ug/kg	0	94	(0%-22%)		
**1,2-dinitrobenzene	400		370	H	402	ug/kg	101	(71%-118%)			
Batch 203606											
QC1200302570 LCS											
1,3,5-Trinitrobenzene	800			776	ug/kg		97	(77%-124%)	ILW	09/24/02	13:54
2,4,6-Trinitrotoluene	800			735	ug/kg		94	(80%-120%)			
2,4-Dinitrotoluene	800			715	ug/kg		89	(77%-122%)			
2,6-Dinitrotoluene	800			760	ug/kg		95	(74%-121%)			
2-Amino-4,6-dinitrotoluene	800			797	ug/kg		100	(81%-125%)			
4-Amino-2,6-dinitrotoluene	800			773	ug/kg		97	(79%-123%)			
HMX	800			782	ug/kg		98	(84%-131%)			
Nitrobenzene	800			704	ug/kg		88	(75%-125%)			

REVISED

QC Summary

Workorder: 66195

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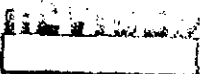
Partname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anst	Date Time
HPLC Explosives Federal									
Batch	203606								
RDX	800		795	ug/kg		99	(80%-123%)		
Tetryl	800		782	ug/kg		98	(65%-124%)		
m-Dinitrobenzene	800		741	ug/kg		93	(77%-124%)		
m-Nitrotoluene	800		709	ug/kg		89	(77%-117%)		
o-Nitrotoluene	800		711	ug/kg		89	(75%-119%)		
p-Nitrotoluene	800		721	ug/kg		90	(76%-121%)		
**1,2-dinitrobenzene	400		358	ug/kg		90	(71%-118%)		
QC1 200105569 MB									
1,2,5-Trinitrobenzene		U	ND	ug/kg					09/24/02 13:11
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		363	ug/kg		91	(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 it
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- U 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 >10%.
- 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.



QC Summary

Workorder: 66195

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Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: October 4, 2002

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Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Puissant
 Workorder: 66197

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlt	Date Time
HPLC Explosives Federal									
Batch 198171									
QC1200292965 LCS									
1,3,5-Trinitrobenzene	1.04		0.936	ug/L		90	(84%-110%)	JLW	09/01/02 12:54
2,4,6-Trinitrotoluene	1.04		0.982	ug/L		95	(85%-110%)		
2,4-Dinitrotoluene	1.04		0.833	ug/L		80	(78%-110%)		
2,6-Dinitrotoluene	1.04		0.862	ug/L		83	(79%-110%)		
2-Amino-4,6-dinitrotoluene	1.04		0.980	ug/L		94	(77%-110%)		
4-Amino-2,6-dinitrotoluene	1.04		0.792	ug/L		76	(59%-110%)		
HMX	1.04		1.02	ug/L		99	(86%-110%)		
Nitrobenzene	1.04		0.716	ug/L		69	(68%-110%)		
RDX	1.04		0.948	ug/L		91	(76%-110%)		
Tetryl	1.04	B	0.940	ug/L		91	(73%-110%)		
m-Dinitrobenzene	1.04		0.795	ug/L		77	(76%-110%)		
m-Nitrotoluene	1.04		0.774	ug/L		75	(73%-110%)		
o-Nitrotoluene	1.04		0.784	ug/L		76	(69%-110%)		
p-Nitrotoluene	1.04		0.827	ug/L		80	(73%-110%)		
**1,2-dinitrobenzene	0.519		0.423	ug/L		82	(59%-118%)		
QC1200292966 LCSD									
1,3,5-Trinitrobenzene	1.04		0.912	ug/L	3	38	(0%-20%)		09/01/02 13:36
2,4,6-Trinitrotoluene	1.04		0.967	ug/L	2	93	(0%-20%)		
2,4-Dinitrotoluene	1.04		0.895	ug/L	7	86	(0%-20%)		
2,6-Dinitrotoluene	1.04		0.542	ug/L	9	91	(0%-20%)		
2-Amino-4,6-dinitrotoluene	1.04		0.992	ug/L	1	95	(0%-20%)		
4-Amino-2,6-dinitrotoluene	1.04		0.903	ug/L	13	87	(0%-24%)		
HMX	1.04		0.992	ug/L	3	95	(0%-20%)		
Nitrobenzene	1.04		0.805	ug/L	12	78	(0%-20%)		
RDX	1.04		0.928	ug/L	2	89	(0%-20%)		
Tetryl	1.04	B	0.940	ug/L	0	91	(0%-20%)		
m-Dinitrobenzene	1.04		0.873	ug/L	9	84	(0%-20%)		
m-Nitrotoluene	1.04		0.863	ug/L	11	83	(0%-20%)		
o-Nitrotoluene	1.04		0.864	ug/L	10	83	(0%-23%)		
p-Nitrotoluene	1.04		0.903	ug/L	9	87	(0%-20%)		
**1,2-dinitrobenzene	0.519		0.453	ug/L		87	(59%-118%)		
QC1200292964 MB									
1,3,5-Trinitrobenzene		U	ND	ug/L					09/01/02 12:12
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		JP	0.0818	ug/L					

QC Summary

Workorder: 66197

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC Explosives Federal											
Batch 198171											
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			0.375	ug/L		72	(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 it
- ** 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.

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.

GC
SEMIVOLATILE
PCB
ANALYSIS

**PCB Case Narrative
Sandia National Labs (SNLS)
SDG#66189**

Method/Analysis Information

Procedure: Polychlorinated Biphenyls by Method 8082
Analytical Method: SW846 8082
Prep Method: SW846 3550B
Analytical Batch Number: 197835
Prep Batch Number: 197834

Sample Analysis

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

Sample ID	Client ID
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002
66189034	059702-002
66189035	059703-002
66189036	059705-002
66189037	059706-002
66189038	059707-002

66189039	059708-002
66189040	059709-002
1200292263	PBLK01 (Method Blank)
1200292264	PBLK01LCS (Laboratory Control Sample)
1200292265	059691-002MS (Matrix Spike)
1200292266	059691-002MSD (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

* 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

SNLS SDG#66189-PCB

*The columns were changed to RTX-CLPEST1 and RTX-CLPEST2.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have not been met for this SDG.

Aroclor-1016 failed acceptance criteria with a positive bias on both analytical columns in the standard bracketing the samples in this SDG. The positive bias for the analytical data is the result of instrument response increasing after the initial calibration. All samples were bracketed by acceptable calibration verification standards for the compounds identified positive in the samples. Therefore, the non-compliance has no adverse effects on the data.

Some surrogates failed high in the standards bracketing the samples in this SDG. However, this non-compliance has no adverse effects on the data.

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 samples were selected for the PCB method QC:

<u>Client Sample ID#</u>	<u>Laboratory Sample ID#</u>
059691-002	66189021

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.

Sample Dilutions

None of the samples in this SDG required any dilutions.

Sample Re-prep/Re-analysis

None of the samples in this sample group were reprepared or reanalyzed.

Miscellaneous Information

Nonconformance (NCR) Documentation

No nonconformance reports (NCRs) have been generated for this SDG.

Manual Integrations

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:

Aroclors quantitated on the raw data report by the Target data system do not necessarily represent a positive aroclor identification. In order for positive identification to be made, the aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the aroclor is reported as a non-detect on the data report. These situations will be noted on the raw data as DMP, representing "does not match pattern", or DNC "does not confirm".

* 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: Juni Cao Date: 9/23/02

.PCB Case Narrative
Sandia National Labs (SNLS)
SDG#66189-1

Method/Analysis Information

Procedure: Polychlorinated Biphenyls by Method 8082
Analytical Method: SW846 8082
Prep Method: SW846 3550B
Analytical Batch Number: 197837
Prep Batch Number: 197836

Sample Analysis

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

Sample ID	Client ID
66195002	059710-002
1200292267	PBLK01 (Method Blank)
1200292268	PBLK01LCS (Laboratory Control Sample)
1200292269	059710-002MS (Matrix Spike)
1200292270	059710-002MSD (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

* 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&WS
ECD5	HP 6890 Series GC ECD/ECD	J&WS
ECD7	HP 6890 Series GC ECD/ECD	J&WS
ECD8	HP 6890 Series GC ECD/ECD	RESTEK*

*The columns were changed to RTX-CLPEST1 and RTX-CLPEST2.

Preparation/Analytical Method Verification

Procedures for preparation, analysis, and reporting of analytical data are documented by General Engineering Laboratories, Inc. (GEL) as Standard Operating Procedures (SOP).

Calibration Information

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have not been met for this SDG.

Aroclor-1016 failed acceptance criteria with a positive bias on one analytical column in the standard bracketing the samples in this SDG. The positive bias for the analytical data is the result of instrument response increasing after the initial calibration. No target analytes were detected in the sample. Therefore, the non-compliance has no adverse effects on the data.

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 samples were selected for the PCB method QC:

<u>Client Sample ID#</u>	<u>Laboratory Sample ID#</u>
059710-002	66195002

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 sample extracts were cleaned using alumina. Additionally, elemental mercury was added to field sample extracts to remove high concentrations of sulfur.

Sample Dilutions

None of the samples in this SDG required any dilutions.

Sample Re-prep/Re-analysis

None of the samples in this sample group were re-prepped or reanalyzed.

Miscellaneous Information

Nonconformance (NCR) Documentation

No nonconformance reports (NCRs) have been generated for this SDG.

Manual Integrations

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:

Aroclors quantitated on the raw data report by the Target data system do not necessarily represent a positive aroclor identification. In order for positive identification to be made, the aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the aroclor is reported as a non-detect on the data report. These situations will be noted on the raw data as DMP, representing "does not match pattern", or DNC "does not confirm".

* 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: Juni Cao Date: 7/23/02

**PCB Case Narrative
Sandia National Labs (SNLS)
SDG# 66189-2**

Method/Analysis Information

Procedure: Polychlorinated Biphenyls by Method 8082
Analytical Method: SW846 8082
Prep Method: SW846 3510C
Analytical Batch Number: 197833
Prep Batch Number: 197832

Sample Analysis

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

Sample ID	Client ID
66197007	059640-003
1200292257	PBLK01(Method Blank)
1200292258	PBLk01LCS(laboratory control Sample)
1200292261	059640-003MS(Matrix Spike)
1200292262	059640-003MSD(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

SNLS SDG#66189-2 - PCB

	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.

CVS Requirements

All calibration verification standard(s) (CVS, ICV or CCV) requirements have been met for this SDG.

Quality Control (QC) Information

Surrogate Recoveries

All the surrogate recoveries were not within the established acceptance criteria for this SDG. The surrogate recovery for sample 66197007 failed the recovery criteria. There was no more sample left to re-extract.

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:

<u>Client Sample ID#</u>	<u>Laboratory Sample ID#</u>
059640-003	66197007

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.

Holding Time Specifications

GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time requirements.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP. All samples underwent sulfur cleanup procedure.

Sample Dilutions

None of the samples in this SDG were required dilutions.

Sample Re-prep/Re-analysis

None of the samples in this sample group were repped or reanalyzed.

Miscellaneous Information

Nonconformance (NCR) Documentation

No nonconformance reports (NCRs) have been generated for this SDG.

Manual Integrations

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".

* 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: *June Cao* Date: *9/15/02*

GC/ECD
PCB
QUALITY CONTROL
SUMMARY

QC Summary

Report Date: September 23, 2002

Page 1 of 2

Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Puissant
 Workorder: 66189

Partname	NOM	Sample	Qual	QC	Units	RPD%	RER%	Range	Anlyt	Date Time
Semi-Volatile PCB Federal										
Batch 197835										
QC1200292264	1CS									
Aroclor-1260	33.3			29.3	ug/kg		88	(48%-116%)	MM	09/11/02 16:16
**4cmx	6.67			5.38	ug/kg		81	(31%-120%)		
**Decachlorobiphenyl	6.67			5.74	ug/kg		86	(34%-115%)		
QC1200292263	MB									
Aroclor-1016			U	ND	ug/kg					09/11/02 16:04
Aroclor-1221			U	ND	ug/kg					
Aroclor-1232			U	ND	ug/kg					
Aroclor-1242			U	ND	ug/kg					
Aroclor-1248			U	ND	ug/kg					
Aroclor-1254			U	ND	ug/kg					
Aroclor-1260			U	ND	ug/kg					
**4cmx	6.67			5.51	ug/kg		83	(31%-120%)		
**Decachlorobiphenyl	6.67			5.72	ug/kg		86	(34%-115%)		
QC1200292265	66189021	MS								
Aroclor-1260	33.3	U	ND	29.7	ug/kg		89	(36%-134%)		09/11/02 16:27
**4cmx	6.67			5.38	ug/kg		81	(31%-120%)		
**Decachlorobiphenyl	6.67			5.63	ug/kg		84	(34%-115%)		
QC1200292266	66189021	MSD								
Aroclor-1260	33.3	U	ND	28.6	ug/kg	4	86	(0%-30%)		09/11/02 16:39
**4cmx	6.67			5.32	ug/kg		80	(31%-120%)		
**Decachlorobiphenyl	6.67			5.56	ug/kg		84	(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 it
- ** 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 information.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 66189

Page 2 of 2

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anist	Date Time
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Client : Sandia National Laboratories
 MS-0756
 P.O. Box 5800
 Albuquerque, New Mexico
 Contact: Pamela M. Puissant
 Workorder: 66197

Report Date: September 18, 2002
 Page 1 of 2

Param name	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Stand-Volatiles-PCB Federal Batch 197833											
QC1200292258 LCS											
Aroclor-1260	1.00			0.760	ug/L		76	(47%-131%)	GH1	09/09/02	17:09
**4cmx	0.200			0.130	ug/L		65	(34%-116%)			
**Decachlorobiphenyl	0.200			0.149	ug/L		75	(21%-122%)			
QC1200292257 MB											
Aroclor-1016			U	ND	ug/L					09/09/02	16:57
Aroclor-1221			U	ND	ug/L						
Aroclor-1232			U	ND	ug/L						
Aroclor-1242			U	ND	ug/L						
Aroclor-1248			U	ND	ug/L						
Aroclor-1254			U	ND	ug/L						
Aroclor-1260			U	ND	ug/L						
**4cmx	0.200			0.134	ug/L		67	(34%-116%)			
**Decachlorobiphenyl	0.200			0.144	ug/L		72	(21%-122%)			
QC1200292261 66197007 MS											
Aroclor-1260	1.00	U	ND	0.650	ug/L		65	(21%-113%)		09/09/02	17:34
**4cmx	0.200			0.121	ug/L		60	(34%-116%)			
**Decachlorobiphenyl	0.200			0.108	ug/L		54	(21%-122%)			
QC1200292262 66197007 MSD											
Aroclor-1260	1.00	U	ND	0.690	ug/L	6	69	(0%-30%)		09/09/02	17:46
**4cmx	0.200			0.132	ug/L		66	(34%-116%)			
**Decachlorobiphenyl	0.200			0.0968	ug/L		48	(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 d
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 66197

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<u>Paramname</u>	<u>NOM</u>	<u>Sample Qual</u>	<u>QC</u>	<u>Units</u>	<u>RPD%</u>	<u>REC%</u>	<u>Range</u>	<u>Anlst</u>	<u>Date Time</u>
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N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: September 23, 2002
Page 1 of 2

Client: Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant
Workorder: 66195

Parmaame	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anist	Date	Time
Semi-Volatiles-PCB Federal											
Batch 197837											
QC1200292268	LCS										
Aroclor-1260	33.3			30.4	ug/kg		91	(48%-116%)	MM	09/11/02	23:22
**4cmx	6.67			6.04	ug/kg		91	(31%-120%)			
**Decachlorobiphenyl	6.67			6.02	ug/kg		90	(34%-115%)			
QC1200292267	MB										
Aroclor-1016			U	ND	ug/kg					09/11/02	23:10
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			6.67	ug/kg		100	(31%-120%)			
**Decachlorobiphenyl	6.67			6.58	ug/kg		99	(34%-115%)			
QC1200292269	66195002	MS									
Aroclor-1260	33.3	U	ND	29.4	ug/kg		88	(36%-134%)		09/11/02	23:33
**4cmx	6.67		6.04	5.26	ug/kg		79	(31%-120%)			
**Decachlorobiphenyl	6.67		6.09	5.71	ug/kg		86	(34%-115%)			
QC1200292270	66195002	MSD									
Aroclor-1260	33.3	U	ND	29.4	ug/kg	2	88	(0%-30%)		09/11/02	23:45
**4cmx	6.67		6.04	5.14	ug/kg		77	(31%-120%)			
**Decachlorobiphenyl	6.67		6.09	5.65	ug/kg		85	(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.

QC Summary

Workorder: 66195

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Parmaame	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
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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 DLP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

INORGANIC ANALYSIS

**Inorganic Case Narrative for
Sandia National Laboratory
SDG# 66189**

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
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002
66189034	059702-002
66189035	059703-002
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
1200291976	Method Blank (MB) ICP-197718/197717
1200291980	Laboratory Control Sample (LCS)
1200291978	059691-002L (66189021) Serial Dilution (SD)
1200291977	059691-002D (66189021) Sample Duplicate (DUP)
1200291979	059691-002S (66189021) Matrix Spike (MS)
1200292097	Method Blank (MB) CVAA-197762/197761
1200292100	Laboratory Control Sample (LCS)
1200292098	059691-002D (66189021) Sample Duplicate (DUP)
1200292099	059691-002S (66189021) Matrix Spike (MS)

Method/Analysis Information:

Analytical Batch #:	197718, 197762
Prep Batch #:	197717, 197761
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 associated with samples from this SDG met the established recovery acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements

All continuing calibration blanks (CCB) associated with samples from 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/LCSD Recovery Statement

All LCS spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

Sample 059691-002 (66189021) was designated as the quality control sample for ICP and the 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

**Inorganic Case Narrative for
Sandia National Laboratory
SDG# 66189-1**

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
66195002	059710-002
1200294757	Method Blank (MB) ICP-199132/199131
1200294761	Laboratory Control Sample (LCS)
1200294759	059710-002L (66195002) Serial Dilution (SD)
1200294758	059710-002D (66195002) Sample Duplicate (DUP)
1200294760	059710-002S (66195002) Matrix Spike (MS)
1200295327	Method Blank (MB) CVAA-199386/199385
1200295330	Laboratory Control Sample (LCS)
1200295328	059710-002D (66195002) Sample Duplicate (DUP)
1200295329	059710-002S (66195002) Matrix Spike (MS)

Method/Analysis Information:

Analytical Batch #:	199132, 199386
Prep Batch #:	199131, 199385
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 associated with samples from this SDG met the established recovery acceptance criteria.

Continuing Calibration Blanks (CCB) Requirements

All continuing calibration blanks (CCB) associated with samples from 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/LCSD Recovery Statement

All LCS spike recoveries for this SDG were within the established acceptance limits.

QC Sample Designation

Sample 059710-002 (66195002) was designated as the quality control sample for ICP and the CVAA batches. Each batch included a sample duplicate (DUP) and a matrix spike (MS). The ICP batch included a serial dilution (SD).

MS Recovery Statement

The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All qualifying elements met the established acceptance limits for percent recovery.

RPD Statement

The relative percent difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria of 20% when the sample is greater than five times (5X) the contract required detection limit (RDL). In cases where either the sample or duplicate value is less than 5X the RDL, a control limit of +/- the RDL is used to evaluate the DUP results. All applicable elements met the DUP acceptance criteria, with the exception of barium, as indicated by the "*" qualifier.

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 other than the 5x dilution for the LCS.

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: alexis d. e.

Date: 9/23/12

**Metals Case Narrative for
Sandia National Labs (SNLS)
SDG# 66189-2**

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
66197011	059640-007
1200293696	Method Blank (MB) CVAA-198713/198712
1200293699	Laboratory Control Sample (LCS)
1200293697	059554-009D (66218007) Sample Duplicate (DUP)
1200293698	059554-009S (66218007) Matrix Spike (MS)
1200296652	Method Blank (MB) ICP-199969/199968
1200296656	Laboratory Control Sample (LCS)
1200296654	059772-005L (66619010) Serial Dilution (SD)
1200296653	059772-005D (66619010) Sample Duplicate (DUP)
1200296655	059772-005S (66619010) Matrix Spike (MS)

Method/Analysis Information:

Analytical Batch #:	198713, 199969
Prep Batch #:	198712, 199968
Analytical Method:	SW846 6010B, SW846 7470A
Prep Method:	SW846 3005B, 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 059554-009 (66218007) from SNLS SDG 66218 was designated as the quality control sample for the ICP batch. Sample 059772-005 (66619010) from SNLS SDG 66619 was designated as the QC 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 IDL 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 dilutions were 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: Alison H. [Signature]

Date: 9/19/12

**INORGANICS
QUALITY
CONTROL
SUMMARY**

QC Summary

Report Date: September 16, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Pulssant
Workorder: 66189

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP Federal											
Batch 197718											
QC1200291977 66189021 DUP											
Arsenic		4.53		4.16	mg/kg	8		(0%-20%)	RMJ	09/09/02	21:57
Barium		157		167	mg/kg	6		(0%-20%)			
Cadmium	J	0.0801	J	0.083	mg/kg	N/A	^	(+/-0.490)			
Chromium	B	10.3	B	10.7	mg/kg	4		(0%-20%)			
Lead		6.16		6.10	mg/kg	1		(0%-20%)			
Selenium	J	0.309	J	0.182	mg/kg	N/A	^	(+/-0.490)			
Silver	U	ND	U	ND	mg/kg	N/A		(+/-0.490)			
QC1200291980 LCS											
Arsenic		132		144	mg/kg		109	(74%-126%)		09/09/02	21:40
Barium		781		828	mg/kg		106	(77%-123%)			
Cadmium		51.5		58.5	mg/kg		114	(77%-123%)			
Chromium		142	B	160	mg/kg		113	(80%-120%)			
Lead		52.9		58.4	mg/kg		110	(75%-125%)			
Selenium		60.9		70.0	mg/kg		115	(71%-129%)			
Silver		125		154	mg/kg		123	(52%-148%)			
QC1200291976 MB											
Arsenic			U	ND	mg/kg					09/09/02	21:34
Barium			U	ND	mg/kg						
Cadmium			U	ND	mg/kg						
Chromium			J	0.202	mg/kg						
Lead			U	ND	mg/kg						
Selenium			U	ND	mg/kg						
Silver			U	ND	mg/kg						
QC1200291979 66189021 MS											
Arsenic	24.5	4.53		29.3	mg/kg		101	(75%-125%)		09/09/02	22:03
Barium	24.5	157		195	mg/kg		N/A	(75%-125%)			
Cadmium	24.5	J 0.0801		24.9	mg/kg		101	(75%-125%)			
Chromium	24.5	B 10.3	B	37.2	mg/kg		110	(75%-125%)			
Lead	24.5	6.16		31.5	mg/kg		103	(75%-125%)			
Selenium	24.5	J 0.309		24.0	mg/kg		97	(75%-125%)			
Silver	24.5	U ND		26.2	mg/kg		107	(75%-125%)			
QC1200291978 66189021 SDILT											
Arsenic		45.7		8.61	ug/L	5.92				09/09/02	21:51
Barium		1590		305	ug/L	3.84					
Cadmium	J	0.809	U	ND	ug/L	N/A					
Chromium	B	104	B	20.9	ug/L	.023					
Lead		62.2		11.2	ug/L	10.2					
Selenium	J	3.13	U	ND	ug/L	N/A					
Silver	U	ND	U	ND	ug/L	N/A					

Metals Analysis-Mercury Federal
Batch 197762

QC1200292098 66189021 DUP

QC Summary

Workorder: 66189

Page 2 of 2

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anl1	Date	Time
Metals Analysis-Mercury Federal											
Batch	197762										
Mercury		U	ND	J	0.00104	mg/kg	N/A	(+/-0.00984)	NOR1	09/13/02	11:53.
QC1200292100	LCS										
Mercury	4.50				4.28	mg/kg	95	(68%-132%)		09/13/02	11:49.
QC1200292097	MB										
Mercury			U	ND	mg/kg					09/13/02	11:47.
QC1200292099	66189021 MS										
Mercury	0.0885	U	ND		0.0892	mg/kg	100	(75%-125%)		09/13/02	11:55.

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 U
- ** 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.

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 SDLT 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: September 17, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant
Workorder: 66197

Partname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP Federal											
Batch 199969											
QC1200296653 66619010 DUP											
Arsenic		0.00712		0.00723	mg/L	1 ^		(+/-0.005)	RMJ	09/16/02	18:34
Barium	B	0.0102	B	0.00987	mg/L	3 ^		(+/-0.005)			
Cadmium	J	0.000843	J	0.000846	mg/L	N/A ^		(+/-0.005)			
Chromium	BJ	0.00353	BJ	0.00398	mg/L	N/A ^		(+/-0.005)			
Lead	BJ	0.00272	BJ	0.0019	mg/L	N/A ^		(+/-0.005)			
Selenium	U	ND	U	ND	mg/L	N/A		(+/-0.005)			
Silver	BU	ND	BU	ND	mg/L	N/A		(+/-0.005)			
QC1200296656 LCS											
Arsenic	0.500			0.529	mg/L		106	(80%-120%)		09/16/02	17:58
Barium	0.500		B	0.522	mg/L		104	(80%-120%)			
Cadmium	0.500			0.529	mg/L		106	(80%-120%)			
Chromium	0.500		B	0.525	mg/L		105	(80%-120%)			
Lead	0.500		B	0.532	mg/L		106	(80%-120%)			
Selenium	0.500			0.527	mg/L		105	(80%-120%)			
Silver	0.500		B	0.521	mg/L		104	(80%-120%)			
QC1200296652 MB											
Arsenic			U	ND	mg/L					09/16/02	17:52
Barium			J	0.00025	mg/L						
Cadmium			U	ND	mg/L						
Chromium			J	0.000867	mg/L						
Lead			J	0.00259	mg/L						
Selenium			U	ND	mg/L						
Silver			J	0.00085	mg/L						
QC1200296655 66619010 MS											
Arsenic	0.500	0.00712		0.524	mg/L		103	(75%-125%)		09/16/02	18:40
Barium	0.500	B 0.0102	B	0.524	mg/L		103	(75%-125%)			
Cadmium	0.500	J 0.000843		0.512	mg/L		102	(75%-125%)			
Chromium	0.500	BJ 0.00353	B	0.518	mg/L		103	(75%-125%)			
Lead	0.500	BJ 0.00272	B	0.515	mg/L		102	(75%-125%)			
Selenium	0.500	U ND		0.511	mg/L		102	(75%-125%)			
Silver	0.500	BU ND	B	0.512	mg/L		102	(75%-125%)			
QC1200296654 66619010 SDILT											
Arsenic		7.12	U	ND	ug/L	N/A				09/16/02	18:28
Barium	B	10.2	BJ	1.87	ug/L	8.17					
Cadmium	J	0.843	U	ND	ug/L	N/A					
Chromium	BJ	3.53	BJ	1.14	ug/L	61.1					
Lead	BJ	2.72	BJ	2.69	ug/L	395					
Selenium	U	ND	U	ND	ug/L	N/A					
Silver	BU	ND	BU	ND	ug/L	N/A					
Metals Analysis-Mercury Federal											
Batch 198713											
QC1200293697 66218007 DUP											

QC Summary

Workorder: 66197

Page 2 of 2

Parameter	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury Federal											
Batch 198713											
Mercury		U	ND	U	ND	mg/L	N/A	(+/-0.0002)	NOR1	09/05/02	17:17
QC1200293699	LCS										
Mercury	0.002				0.0021	mg/L	105	(80%-120%)		09/05/02	17:11
QC1200293696	MB										
Mercury				U	ND	mg/L				09/05/02	17:09
QC1200293698	66218007 MS										
Mercury	0.002	U	ND		0.00217	mg/L	108	(75%-125%)		09/05/02	17:19

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 it
- ** 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.

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 SDLT 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: September 19, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant
Workorder: 66195

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Metals Analysis-ICP Federal											
Batch 199132											
QC1200294758 66195002 DUP											
Arsenic				2.59	2.54	mg/kg	2	(0%-20%)	BAS	09/06/02	02:59
Barium				183	105	mg/kg	54*	(0%-20%)			
Cadmium	J	0.108	J	0.131	0.131	mg/kg	N/A ^	(+/-0.500)			
Chromium				6.38	6.34	mg/kg	1	(0%-20%)			
Lead				3.44	3.51	mg/kg	2	(0%-20%)			
Selenium	U	ND	U	ND	ND	mg/kg	N/A	(+/-0.500)			
Silver	U	ND	U	ND	ND	mg/kg	N/A	(+/-0.500)			
QC1200294761 LCS											
Arsenic	132				135	mg/kg		102 (74%-126%)		09/06/02	02:41
Barium	781				792	mg/kg		101 (77%-123%)			
Cadmium	51.5				52.8	mg/kg		102 (77%-123%)			
Chromium	142				148	mg/kg		104 (80%-120%)			
Lead	52.9				52.3	mg/kg		99 (75%-125%)			
Selenium	60.9				65.6	mg/kg		108 (71%-129%)			
Silver	125				135	mg/kg		108 (52%-148%)			
QC1200294757 MB											
Arsenic			U	ND	ND	mg/kg				09/06/02	02:34
Barium			U	ND	ND	mg/kg					
Cadmium			U	ND	ND	mg/kg					
Chromium			U	ND	ND	mg/kg					
Lead			U	ND	ND	mg/kg					
Selenium			U	ND	ND	mg/kg					
Silver			U	ND	ND	mg/kg					
QC1200294760 66195002 MS											
Arsenic	24.8			2.59	26.0	mg/kg		95 (75%-125%)		09/06/02	03:06
Barium	24.8			183	200	mg/kg		N/A (75%-125%)			
Cadmium	24.8	J	0.108	23.2	23.2	mg/kg		94 (75%-125%)			
Chromium	24.8		6.38	31.1	31.1	mg/kg		100 (75%-125%)			
Lead	24.8		3.44	26.9	26.9	mg/kg		95 (75%-125%)			
Selenium	24.8	U	ND	22.8	22.8	mg/kg		92 (75%-125%)			
Silver	24.8	U	ND	24.2	24.2	mg/kg		98 (75%-125%)			
QC1200294759 66195002 SDILT											
Arsenic			J	26.4	3.83	ug/L	27.7			09/06/02	02:53
Barium				1860	375	ug/L	.654				
Cadmium		J	1.10	U	ND	ug/L	N/A				
Chromium			65.1		13.5	ug/L	3.31				
Lead			35.0		6.45	ug/L	7.95				
Selenium		U	ND	U	ND	ug/L	N/A				
Silver		U	ND	U	ND	ug/L	N/A				
Metals Analysis-Mercury Federal											
Batch 199186											
QC1200295328 66195002 DUP											

QC Summary

Workorder: 66195

Page 2 of 2

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury Federal											
Batch 199386											
Mercury		J	0.00106	U	ND	mg/kg	N/A	(+/-0.00908)	NOR1	09/12/02	11:24
QC1200295330	LCS										
Mercury	4.50				3.54	mg/kg	79	(68%-132%)		09/12/02	11:20
QC1200295327	MB										
Mercury				U	ND	mg/kg				09/12/02	11:18
QC1200295329	66195002 MS										
Mercury	0.0984	J	0.00106		0.104	mg/kg	104	(75%-125%)		09/12/02	11:26

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 comparable with the sample or the duplicate RPD's are not applicable where U
- ** 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.

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.

GENERAL
CHEMISTRY
ANALYSIS

General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 66189

Method/Analysis Information

Procedure:	Total Cyanide
Analytical Method:	SW846 9012A
Prep Method:	SW846 9010B Prep
Analytical Batch Number:	197853
Prep Batch Number:	197852

Sample Analysis

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

Sample ID	Client ID
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002

66189034	059702-002
66189035	059703-002
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
1200292306	MB for batch 197852
1200292307	DUP of 66189028
1200292308	DUP of 66189029
1200292309	MS of 66189028
1200292310	MS of 66189029
1200292311	LCS for batch 197852
1200292312	LCS for batch 197852

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 recoveries for the laboratory control samples were within the required acceptance limits. The solid LCS (1200292312) was within manufacturer's limits.

Quality Control

The following samples were designated for Quality Control: 66189028, 66189029.

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: 1200292312.

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: 198031
Prep Batch Number: 198030

Sample Analysis

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

Sample ID	Client ID
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002
66189034	059702-002
66189035	059703-002
1200292711	MB for batch 198031
1200292712	DUP of 66189021

1200292713	DUP of 66189029
1200292714	MS of 66189021
1200292715	MS of 66189029
1200292716	LCS for batch 198031

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 samples were designated for Quality Control: 66189021, 66189029.

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

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.

Method/Analysis Information

Procedure: Hexavalent Chromium
Analytical Method: SW846 7196A
Prep Method: SW846 3060A
Analytical Batch Number: 198034
Prep Batch Number: 198032

Sample Analysis

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

Sample ID	Client ID
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
1200292717	MB for batch 198034
1200292718	DUP of 66189036
1200292719	MS of 66189036
1200292720	LCS for batch 198034

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: 66189036.

Sample Spike Recovery

The matrix spike for sample 66189036 was outside of the client required limits of 75%-125%; but, was within GEL SPC limits. The client and PM were notified and the data was accepted with an NCR. See NCR# 4173.

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

NCR # 4173 was written for this sample batch.

Additional Comments

Sample 66189040 was turbid (medium brown color).

Comments

* 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: 9/20/02

**General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 66189-1**

Method/Analysis Information

Procedure: Hexavalent Chromium
Analytical Method: SW846 7196A
Prep Method: SW846 3060A
Analytical Batch Number: 198034
Prep Batch Number: 198032

Sample Analysis

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

Sample ID	Client ID
66195002	059710-002
1200292717	MB for batch 198034
1200292718	DUP of 66189036
1200292719	MS of 66189036
1200292720	LCS for batch 198034

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: 66189036.

Sample Spike Recovery

The matrix spike for sample 66189036 was outside of the client required limits of 75%-125%; but, was within GEL SPC limits. The client and PM were notified and the data was accepted with an NCR. See NCR# 4173.

Sample Duplicate Acceptance

The Relative Percent Difference between the sample and duplicate for this SDG was within the required acceptance limits.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.



Sample Dilutions

No samples in this sample group required dilutions.

Miscellaneous Information:

Nonconformance Reports

NCR# 4173 was written for this sample batch.

Method/Analysis Information

Procedure: Total Cyanide
Analytical Method: SW846 9012A
Prep Method: SW846 9010B Prep
Analytical Batch Number: 198863
Prep Batch Number: 198862

Sample Analysis

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

Sample ID	Client ID
66195002	059710-002
1200293998	MB for batch 198863
1200293999	LCS for batch 198863
1200294000	DUP of 66195002
1200294001	MS of 66195002
1200294122	LCS for batch 198863

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 recoveries for the laboratory control samples were within the required acceptance limits. The solid LCS (1200294122) was within manufacturer's limits.

Quality Control

The following SNLS sample was designated for Quality Control: 66195002.

Sample Spike Recovery

The spike recovery for this sample set was within the required acceptance limits.

Sample Duplicate Acceptance

The values for the sample and duplicate for this sample group are less than the Practical Quantitation Limit (PQL); therefore, the RPD is not applicable.

Technical Information:

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

Holding Times

All samples from this sample group were analyzed within the required holding time for this method.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

The following QC sample in this sample group was diluted 1:50 due to high concentration for this analysis: 1200294122.

Miscellaneous Information:

Nonconformance Reports

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


Comments

* 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: 9/20/02

**General Chemistry Narrative
Sandia National Labs (SNLS)
SDG 66189-2**

Method/Analysis Information

Procedure: Hexavalent Chromium
Analytical Method: SW846 7196A
Analytical Batch Number: 197692

Sample Analysis

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

Sample ID	Client ID
66197010	059640-006
1200291915	MB for batch 197692
1200291916	DUP of 66197010
1200291917	PS of 66197010
1200291918	LCS for batch 197692

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: 66197010.

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

Sample 66197010 was received by the lab outside of the method specified holding time. The sample was analyzed on the day it was received.

Preparation/Analytical Method Verification

All procedures were performed as stated in the SOP.

Sample Dilutions

No samples in this sample group required dilutions.

Miscellaneous Information:**Nonconformance Reports**

Nonconformance Report (NCR) 3161 was written for this batch.

Method/Analysis Information

Procedure: Total Cyanide
Analytical Method: SW846 9012A
Prep Method: SW846 9010B Prep
Analytical Batch Number: 199201
Prep Batch Number: 199200

Sample Analysis

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

Sample ID	Client ID
66197009	059640-005
1200294945	MB for batch 199201
1200294946	LCS for batch 199201
1200294947	DUP of 66197009
1200294948	MS of 66197009

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 sample was designated for Quality Control: 66197009.

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.


Comments

* 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: 9/13/02

**GENERAL CHEMISTRY
QUALITY
CONTROL
SUMMARY**

QC Summary

Report Date: September 20, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Pulsant
Workorder: 66189

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Rapid Flow Analysis Federal											
Batch	197853										
QC1200292307	66189028	DUP									
Cyanide, Total		J	0.0669	U	ND	mg/kg	N/A ^	(+/-0.250)	ADF	08/30/02	12:15
QC1200292308	66189029	DUP									
Cyanide, Total		J	0.048	J	0.0445	mg/kg	N/A ^	(+/-0.208)		08/30/02	12:17
QC1200292311	LCS										
Cyanide, Total	2.50				2.67	mg/kg		107	(81%-125%)	08/30/02	12:03
QC1200292312	LCS										
Cyanide, Total	277				372	mg/kg		134*	(81%-125%)	08/30/02	12:06
QC1200292306	MB										
Cyanide, Total				U	ND	mg/kg				08/30/02	12:02
QC1200292309	66189028	MS									
Cyanide, Total	4.17	J	0.0669		4.62	mg/kg		109	(55%-145%)	08/30/02	12:15
QC1200292310	66189029	MS									
Cyanide, Total	4.55	J	0.048		5.07	mg/kg		110	(55%-145%)	08/30/02	12:18
Spectrometric Analysis Federal											
Batch	198031										
QC1200292712	66189021	DUP									
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0949)	BEP1	09/03/02	09:00
QC1200292713	66189029	DUP									
Hexavalent Chromium		U	ND	U	ND	mg/kg	N/A	(+/-0.0948)			
QC1200292716	LCS										
Hexavalent Chromium	1.00				0.890	mg/kg		89	(72%-121%)		
QC1200292711	MB										
Hexavalent Chromium				U	ND	mg/kg					
QC1200292714	66189021	MS									
Hexavalent Chromium	0.900	U	ND		0.756	mg/kg		84	(49%-130%)		
QC1200292715	66189029	MS									
Hexavalent Chromium	0.983	U	ND		0.816	mg/kg		85	(49%-130%)		
Batch	198034										
QC1200292718	66189036	DUP									
Hexavalent Chromium		J	0.0713	J	0.0741	mg/kg	N/A ^	(+/-0.0927)	BEP1	09/03/02	09:00
QC1200292720	LCS										
Hexavalent Chromium	0.941				0.819	mg/kg		87	(72%-121%)		
QC1200292717	MB										
Hexavalent Chromium				U	ND	mg/kg					
QC1200292719	66189036	MS									
Hexavalent Chromium	0.978	J	0.0713		0.792	mg/kg		74	(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 it
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.

QC Summary

Workorder: 66189

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
H											
J											
P											
U											
X											
X											
X											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: September 13, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Puissant
Workorder: 66197

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anst	Date	Time
Rapid Flow Analysis Federal											
Batch	199201										
QC1200294947	66197009	DUP									
Cyanide, Total		U	ND	U	ND	mg/L	N/A	(+/-0.005)	ADF	09/05/02	14:21
QC1200294946	LCS										
Cyanide, Total	0.050				0.0526	mg/L	105	(90%-110%)		09/05/02	14:19
QC1200294945	MB										
Cyanide, Total				U	ND	mg/L				09/05/02	14:18
QC1200294948	66197009	MS									
Cyanide, Total	0.100	U	ND		0.0947	mg/L	95	(72%-133%)		09/05/02	14:22
Spectrometric Analysis Federal											
Batch	197592										
QC1200291916	66197010	DLP									
Hexavalent Chromium		HU	ND	HU	ND	mg/L	N/A	(+/-0.010)	VH1	08/28/02	17:45
QC1200291918	LCS										
Hexavalent Chromium	0.100				0.107	mg/L	107	(89%-110%)			
QC1200291915	MB										
Hexavalent Chromium				U	ND	mg/L					
QC1200291917	66197010	PS									
Hexavalent Chromium	0.100	HU	ND	H	0.119	mg/L	118	(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 d
- ** Indicates analyte is a surrogate compound.
- B The analyte was found in the blank above the effective MDL.
- H Holding time was exceeded
- J Estimated value, the analyte concentration fell above the effective MDL and below the effective PQL
- P The response between the confirmation column and the primary column is >40%D
- U The analyte was analyzed for but not detected below this concentration. For Organic and Inorganic analytes the result is less than the effective MDL. I
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 66197

Page 2 of 2

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

QC Summary

Report Date: September 20, 2002
Page 1 of 2

Client : Sandia National Laboratories
MS-0756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Poissant
Workorder: 66195

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analst	Date	Time
Rapid Flow Analysis Federal											
Batch	198863										
QC1200294000	66195002	DUP									
Cyanide, Total		U	ND	U	ND	mg/kg	N/A	(+/-0.278)	ADF	09/04/02	07:15
QC1200293999	LCS										
Cyanide, Total	2.50				2.65	mg/kg	106	(81%-125%)		09/04/02	07:04
QC1200294122	LCS										
Cyanide, Total	277				386	mg/kg	139*	(81%-125%)		09/04/02	07:08
QC1200293998	MB										
Cyanide, Total				U	ND	mg/kg				09/04/02	07:03
QC1200294001	66195002	MS									
Cyanide, Total	5.56	U	ND		5.11	mg/kg	92	(55%-145%)		09/04/02	07:16
Spectrometric Analysis Federal											
Batch	198034										
QC1200292718	66189036	DUP									
Hexavalent Chromium		J	0.0713	J	0.0741	mg/kg	N/A ^	(+/-0.0927)	BEP1	09/03/02	09:00
QC1200292720	LCS										
Hexavalent Chromium	0.941				0.819	mg/kg	87	(72%-121%)			
QC1200292717	MB										
Hexavalent Chromium				U	ND	mg/kg					
QC1200292719	66189036	MS									
Hexavalent Chromium	0.978	J	0.0713		0.792	mg/kg	74	(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 it
- ** 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 information.
- X Uncertain identification for gamma spectroscopy.

QC Summary

Workorder: 66195

Page 2 of 2

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDLT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

RADIOLOGICAL
ANALYSIS

**Radiochemistry Case Narrative
Sandia National Labs (SNLS)
Workorder 66189**

Method/Analysis Information

Batch Number: 198986
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method: EPA 900.0

Sample ID	Client ID
66189021	059691-002
66189022	059692-002
66189023	059693-002
66189024	059694-002
66189025	059695-002
66189026	059696-002
66189027	059697-002
66189028	059698-002
66189029	059699-002
66189030	059641-002
66189031	059642-002
66189032	059700-002
66189033	059701-002
66189034	059702-002
66189035	059703-002
66189036	059705-002
66189037	059706-002
66189038	059707-002
66189039	059708-002
66189040	059709-002
1200294348	MB for batch 198986
1200294349	059691-002(66189021DUP)
1200294350	059691-002(66189021MS)
1200294351	059691-002(66189021MSD)
1200294352	LCS for batch 198986

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:

**Radiochemistry Case Narrative
Sandia National Labs (SNLS)
Workorder 66195**

Method/Analysis Information

Batch Number: 200142
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method: EPA 900.0

Sample ID	Client ID
66195002	059710-002
1200297097	MB for batch 200142
1200297098	059710-002(66195002DUP)
1200297099	059710-002(66195002MS)
1200297100	059710-002(66195002MSD)
1200297101	LCS for batch 200142

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(s) was used for QC: 66195002.

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.

**Radiochemistry Case Narrative
Sandia National Labs (SNLS)
SDG 66189-2**

Method/Analysis Information

Batch Number: 198970
Procedure: Determination of Gross Alpha And Gross Non-Volatile Beta in Water
Analytical Method: EPA 900.0

Sample ID	Client ID
66197012	059640-008
1200294292	MB for batch 198970
1200294293	059540-008(65919003DUP)
1200294294	059540-008(65919003MS)
1200294295	059540-008(65919003MSD)
1200294296	LCS for batch 198970

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(s) was used for QC: 65919003. Qc sample is from Snls.

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

Samples 1200294294, 1200294295 and 1200294296 were recounted due to high alpha recovery.

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.

Comments

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

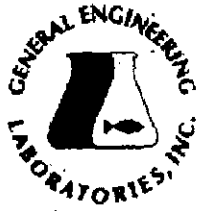
Review Validation:

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

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

Reviewer: Valerie Drum Date: 9/16/02

**RADIOCHEMISTRY
QUALITY
CONTROL
SUMMARY**



GENERAL ENGINEERING LABORATORIES

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QC Summary

Report Date: September 19, 2002
Page 1 of 2

Client: Sandia National Laboratories
MS-8756
P.O. Box 5806
Albuquerque, New Mexico
Contact: Pamela M. Patisant
Workorder: 66189

Parameter	NOM	Sample	QC	Units	REB	REC%	Range	Anal	Date Time
Gravimetric Solids									
Batch	197803								
QC1200292209	66189021	DUP							
Moisture		3.55	3.38	percent	200*		(0%-24%)	MLA	09/03/02 15:03
Rad Gas Flow									
Batch	198916								
QC1200294349	66189021	DUP							
Alpha		14.7	23.9	pCi/g	0.633		(0%-20%)	HO81	09/16/02 16:31
	Uncert:	+/-5.13	+/-6.47						
	TPU:	5.34	9.18						
Beta		21.0	23.7	pCi/g	0.714		(0%-20%)		
	Uncert:	+/-1.80	+/-1.83						
	TPU:	1.88	1.93						
QC1200294352	LCS								
Alpha	9.89		9.90	pCi/g		100	(75%-125%)		09/13/02 13:41
	Uncert:		+/-1.51						
	TPU:		1.72						
Beta	39.7		42.1	pCi/g		106	(75%-125%)		
	Uncert:		+/-2.47						
	TPU:		2.66						
QC1200294348	MS								
Alpha		U	0.178	pCi/g					09/14/02 12:52
	Uncert:		+/-0.213						
	TPU:		0.214						
Beta		U	-0.0049	pCi/g					
	Uncert:		+/-0.168						
	TPU:		0.169						
QC1200294350	66189021	MS							
Alpha	93.3	14.7	117	pCi/g		110	(75%-125%)		09/13/02 13:41
	Uncert:	+/-5.13	+/-19.9						
	TPU:	5.34	21.8						
Beta	375	21.0	354	pCi/g		89	(75%-125%)		
	Uncert:	+/-1.80	+/-22.5						
	TPU:	1.88	24.3						
QC1200294351	66189021	MSD							
Alpha	97.9	14.7	124	pCi/g		111			
	Uncert:	+/-5.13	+/-20.8						
	TPU:	5.34	23.8						
Beta	394	21.0	390	pCi/g		94			
	Uncert:	+/-1.80	+/-24.1						
	TPU:	1.88	26.0						

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GENERAL ENGINEERING LABORATORIES

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QC Summary

Workorder: 66189

Page 2 of 2

Formname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Asst	Date	Time
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Notes:

The Qualifiers in this report are defined as follows:

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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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QC Summary

Report Date: September 16, 2002

Page 1 of 2

Client: Sandia National Laboratories

MS-0154

P.O. Box 5800

Albuquerque, New Mexico

Contact: Pamela M. Polesant

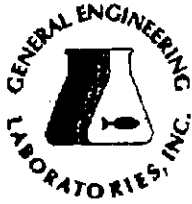
Workorder: 66197

Parameter	NOM	Sample Qual	QC	Units	RRR	REC%	Range	Analst	Date Time
Rad Gas Flow									
Batch	198970								
QC1200294291 65919003 DUP									
Alpha		100	137	pCi/L	8.562		(0%-20%)	MOB1	09/10/02 01:17
	Uncert:	+/-27.9	+/-31.1						
	TPU:	29.9	35.5						
Beta		106	109	pCi/L	0.0835		(0%-20%)		
	Uncert:	+/-19.9	+/-20.0						
	TPU:	19.9	20.0						
QC1200294296 LCS									
Alpha	9.89		9.16	pCi/L		93	(75%-125%)		09/10/02 07:17
	Uncert:		+/-1.68						
	TPU:		1.92						
Beta	39.7		42.3	pCi/L		106	(75%-125%)		
	Uncert:		+/-2.37						
	TPU:		2.40						
QC1200294292 MB									
Alpha		U	0.0348	pCi/L					09/10/02 01:17
	Uncert:		+/-0.0704						
	TPU:		0.0705						
Beta		U	0.0992	pCi/L					
	Uncert:		+/-0.0774						
	TPU:		0.0774						
QC1200294294 65919003 MS									
Alpha	1980	100	2460	pCi/L		120	(75%-125%)		09/10/02 07:17
	Uncert:	+/-27.9	+/-410						
	TPU:	29.9	473						
Beta	7950	106	9230	pCi/L		115	(75%-125%)		
	Uncert:	+/-19.9	+/-495						
	TPU:	19.9	499						
QC1200294295 65919003 MSD									
Alpha	1980	100	2550	pCi/L		124	(75%-125%)		
	Uncert:	+/-27.9	+/-427						
	TPU:	29.9	475						
Beta	7930	106	8560	pCi/L		106	(75%-125%)		
	Uncert:	+/-19.9	+/-480						
	TPU:	19.9	489						

Notes:

The Qualifiers in this report are defined as follows:

- * Recovery or %RPD not within acceptance limits and/or spike amount not comparable 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.



GENERAL ENGINEERING LABORATORIES

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QC Summary

Workorder: 66197

Page 2 of 2

Paramname	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anlst	Date	Time
H										
J										
P										
U										
X										
X										
X										

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

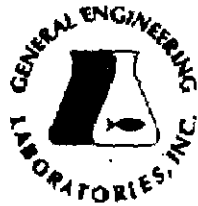
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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QC Summary

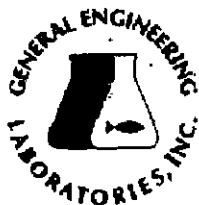
Report Date: September 23, 2002
Page 1 of 2

Client: Sandia National Laboratories
MS-8756
P.O. Box 5800
Albuquerque, New Mexico
Contact: Pamela M. Paineant
Workorder: 66195

Parameter	NOM	Sample Qual	QC	Units	RER	REC%	Range	Anal	Date Time
Gravimetric Solids									
Batch:	197883								
QC1200292209	66195031	DOP							
Moisture		3.55	3.38	percent	200*		(0%-24%)	MLA	09/03/02 15:03
Rad Gas Flow									
Batch:	380142								
QC1200297098	66195002	DUP							
Alpha		19.3	20.8	pCi/g	0.271		(0%-20%)	JS1	09/18/02 01:56
	Uncert:	+/-2.30	+/-2.42						
	TPU:	2.73	2.86						
Beta		20.8	20.3	pCi/g	0.0654		(0%-20%)		
	Uncert:	+/-1.94	+/-2.10						
	TPU:	2.12	2.29						
QC1200297107	LCS								
Alpha	9.89		10.3	pCi/g		104	(75%-125%)		09/18/02 09:53
	Uncert:		+/-1.10						
	TPU:		1.43						
Beta	39.7		42.2	pCi/g		106	(75%-125%)		
	Uncert:		+/-2.58						
	TPU:		3.07						
QC1200297097	MB								
Alpha		U	0.0251	pCi/g					
	Uncert:		+/-0.245						
	TPU:		0.145						
Beta		U	-0.0009	pCi/g					
	Uncert:		+/-0.139						
	TPU:		0.139						
QC1200297099	66195002	MS							
Alpha	96.9	19.3	97.9	pCi/g		81	(75%-125%)		
	Uncert:	+/-2.30	+/-13.5						
	TPU:	2.73	14.6						
Beta	390	20.8	389	pCi/g		95	(75%-125%)		
	Uncert:	+/-1.94	+/-24.4						
	TPU:	2.12	27.7						
QC1200297100	66195002	MSD							
Alpha	95.1	19.3	94.0	pCi/g		79			
	Uncert:	+/-2.30	+/-13.0						
	TPU:	2.73	13.8						
Beta	382	20.8	380	pCi/g		94			
	Uncert:	+/-1.94	+/-23.9						
	TPU:	2.12	29.3						

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QC Summary

Workorder: 66195

Page 2 of 2

Parameter	NDM	Sample Qual	QC	Units	RER	REC%	Range	Anlot	Date	Time
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Notes:

The Qualifiers in this report are defined as follows:

- A 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%AD.
- 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 medichechemical analytes the result is less than the Decision Level.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Presumptive evidence that the analyte is not present. Please see narrative for further information.
- X Uncertain identification for gamma spectroscopy.

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

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428

COC# 605641

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 4:17:17 AM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135)
 Customer Sample ID : 059641-003
 Lab Sample ID : 20119120

Sample Description : 6643/1079-DF1-BH1-11-S
 Sample Quantity : 811.300 gram
 Sample Date/Time : 8/22/02 2:10:00 PM
 Acquire Start Date/Time : 8/28/02 2:37:03 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	-----	4.52E-001
RA-226	1.45E+000	4.99E-001	6.87E-001
PB-214	5.52E-001	8.98E-002	6.36E-002
-214	4.92E-001	8.65E-002	5.40E-002
-210	Not Detected	-----	8.02E+000
TH-232	6.23E-001	3.02E-001	1.80E-001
RA-228	6.99E-001	1.48E-001	1.50E-001
AC-228	Not Detected	-----	1.98E-001
TH-228	Not Detected	-----	6.72E-001
RA-224	6.70E-001	1.72E-001	8.41E-002
PB-212	6.12E-001	9.21E-002	3.60E-002
BI-212	7.50E-001	2.93E-001	3.87E-001
TL-208	5.75E-001	1.06E-001	8.15E-002
U-235	Not Detected	-----	1.80E-001
TH-231	Not Detected	-----	5.90E+000
PA-231	Not Detected	-----	1.33E+000
TH-227	Not Detected	-----	3.01E-001
RA-223	Not Detected	-----	1.38E-001
RN-219	Not Detected	-----	3.46E-001
PB-211	Not Detected	-----	7.81E-001
TL-207	Not Detected	-----	1.39E+001
AM-241	Not Detected	-----	1.57E-001
PU-239	Not Detected	-----	3.29E+002
NP-237	Not Detected	-----	1.70E+000
PA-233	Not Detected	-----	5.33E-002
-229	Not Detected	-----	1.78E-001

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 5:59:35 AM *

* Analyzed by: *VC 8/28/02* Reviewed by: *K 8/28/02*

Customer : SANDERS M (6135)
 Customer Sample ID : 059642-003
 Lab Sample ID : 20119121

Sample Description : 6643/1079-DF1-BH1-16-S
 Sample Quantity : 914.800 gram
 Sample Date/Time : 8/22/02 2:35:00 PM
 Acquire Start Date/Time : 8/28/02 4:19:22 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	-----	4.13E-001
RA-226	1.45E+000	4.76E-001	6.48E-001
PB-214	6.07E-001	9.24E-002	5.27E-002
BI-214	4.97E-001	8.54E-002	5.10E-002
PB-210	Not Detected	-----	6.92E+000
TH-232	5.01E-001	2.43E-001	1.45E-001
RA-228	4.56E-001	1.07E-001	1.21E-001
AC-228	4.84E-001	1.03E-001	7.27E-002
TH-228	4.76E-001	1.72E-001	3.58E-001
RA-224	5.71E-001	1.48E-001	7.35E-002
PB-212	5.21E-001	7.86E-002	2.99E-002
BI-212	5.95E-001	2.25E-001	2.88E-001
TL-208	4.19E-001	8.21E-002	6.79E-002
U-235	Not Detected	-----	1.68E-001
TH-231	Not Detected	-----	5.50E+000
PA-231	Not Detected	-----	1.16E+000
TH-227	Not Detected	-----	2.62E-001
RA-223	Not Detected	-----	1.27E-001
RN-219	Not Detected	-----	3.25E-001
PB-211	Not Detected	-----	7.16E-001
TL-207	Not Detected	-----	1.27E+001
AM-241	Not Detected	-----	1.43E-001
PU-239	Not Detected	-----	2.92E+002
NP-237	Not Detected	-----	1.56E+000
PA-233	Not Detected	-----	4.68E-002
TH-229	Not Detected	-----	1.61E-001

[Summary Report] - Sample ID: : 20119120

Nuclide ame	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.17E-002
AG-110m	Not Detected	-----	2.94E-002
BA-133	Not Detected	-----	3.80E-002
BE-7	Not Detected	-----	2.37E-001
CD-115	Not Detected	-----	3.38E-001
CE-139	Not Detected	-----	2.35E-002
CE-141	Not Detected	-----	4.31E-002
CE-144	Not Detected	-----	1.81E-001
CM-243	Not Detected	-----	1.57E-001
CO-56	Not Detected	-----	3.45E-002
CO-57	Not Detected	-----	2.27E-002
CO-58	Not Detected	-----	3.26E-002
CO-60	Not Detected	-----	3.97E-002
CR-51	Not Detected	-----	2.39E-001
CS-134	Not Detected	-----	4.36E-002
CS-137	Not Detected	-----	3.23E-002
EU-152	Not Detected	-----	6.74E-002
EU-154	Not Detected	-----	1.92E-001
EU-155	Not Detected	-----	1.00E-001
FE-59	Not Detected	-----	8.17E-002
GD-153	Not Detected	-----	5.86E-002
HG-203	Not Detected	-----	3.06E-002
I-131	Not Detected	-----	3.94E-002
-192	Not Detected	-----	2.57E-002
40	1.60E+001	2.20E+000	3.12E-001
MN-52	Not Detected	-----	6.76E-002
MN-54	Not Detected	-----	3.61E-002
MO-99	Not Detected	-----	9.97E-001
NA-22	Not Detected	-----	4.36E-002
NA-24	Not Detected	-----	1.59E+001
ND-147	Not Detected	-----	2.70E-001
NI-57	Not Detected	-----	6.67E-001
RU-103	Not Detected	-----	2.98E-002
RU-106	Not Detected	-----	2.66E-001
SB-122	Not Detected	-----	1.64E-001
SB-124	Not Detected	-----	2.82E-002
SB-125	Not Detected	-----	7.99E-002
SN-113	Not Detected	-----	3.62E-002
SR-85	Not Detected	-----	3.48E-002
TA-182	Not Detected	-----	1.61E-001
TA-183	Not Detected	-----	2.84E-001
TL-201	Not Detected	-----	2.54E-001
Y-88	Not Detected	-----	3.21E-002
ZN-65	Not Detected	-----	1.08E-001
ZR-95	Not Detected	-----	5.75E-002

[Summary Report] - Sample ID: : 20119121

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.53E-002
AG-110m	Not Detected	-----	2.50E-002
BA-133	Not Detected	-----	3.44E-002
BE-7	Not Detected	-----	2.23E-001
CD-115	Not Detected	-----	2.97E-001
CE-139	Not Detected	-----	2.08E-002
CE-141	Not Detected	-----	4.12E-002
CE-144	Not Detected	-----	1.65E-001
CM-243	Not Detected	-----	1.42E-001
CO-56	Not Detected	-----	3.07E-002
CO-57	Not Detected	-----	2.07E-002
CO-58	Not Detected	-----	3.05E-002
CO-60	Not Detected	-----	3.50E-002
CR-51	Not Detected	-----	2.12E-001
CS-134	Not Detected	-----	3.89E-002
CS-137	Not Detected	-----	2.80E-002
EU-152	Not Detected	-----	6.15E-002
EU-154	Not Detected	-----	1.62E-001
EU-155	Not Detected	-----	9.03E-002
FE-59	Not Detected	-----	7.27E-002
GD-153	Not Detected	-----	5.46E-002
HG-203	Not Detected	-----	2.71E-002
I-131	Not Detected	-----	3.63E-002
IR-192	Not Detected	-----	2.23E-002
K-40	1.38E+001	1.91E+000	2.94E-001
MN-52	Not Detected	-----	5.63E-002
MN-54	Not Detected	-----	3.07E-002
MO-99	Not Detected	-----	9.07E-001
NA-22	Not Detected	-----	4.32E-002
NA-24	Not Detected	-----	1.58E+001
ND-147	Not Detected	-----	2.46E-001
NI-57	Not Detected	-----	5.81E-001
RU-103	Not Detected	-----	2.49E-002
RU-106	Not Detected	-----	2.46E-001
SB-122	Not Detected	-----	1.32E-001
SB-124	Not Detected	-----	2.52E-002
SB-125	Not Detected	-----	6.81E-002
SN-113	Not Detected	-----	3.23E-002
SR-85	Not Detected	-----	3.05E-002
TA-182	Not Detected	-----	1.51E-001
TA-183	Not Detected	-----	2.56E-001
TL-201	Not Detected	-----	2.38E-001
Y-88	Not Detected	-----	2.39E-002
ZN-65	Not Detected	-----	1.01E-001
ZR-95	Not Detected	-----	5.33E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 3:47:23 PM *

* Analyzed by: *Beverly Key* 8/27/02 Reviewed by: *[Signature]* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059691-003
 Lab Sample ID : 20119101

Sample Description : 6640/1078-DF1-BH1-5-S
 Sample Quantity : 750.200 gram
 Sample Date/Time : 8/23/02 11:15:00 AM
 Acquire Start Date/Time : 8/27/02 10:56:57 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6003 seconds

Comments:
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.68E-001
RA-226	1.68E+000	4.80E-001	6.22E-001
PB-214	7.41E-001	1.08E-001	5.40E-002
BI-214	6.30E-001	1.01E-001	4.92E-002
PB-210	Not Detected	-----	2.59E+001
TH-232	7.60E-001	3.57E-001	1.82E-001
RA-228	7.78E-001	1.42E-001	1.11E-001
AC-228	7.53E-001	1.45E-001	1.01E-001
TH-228	5.03E-001	3.33E-001	5.09E-001
RA-224	1.05E+000	2.25E-001	6.83E-002
PB-212	8.20E-001	1.19E-001	3.82E-002
BI-212	8.90E-001	2.85E-001	3.58E-001
TL-208	7.43E-001	1.20E-001	7.19E-002
U-235	Not Detected	-----	2.11E-001
TH-231	Not Detected	-----	1.03E+001
PA-231	Not Detected	-----	1.27E+000
TH-227	Not Detected	-----	3.42E-001
RA-223	Not Detected	-----	2.05E-001
RN-219	Not Detected	-----	3.17E-001
PB-211	Not Detected	-----	7.25E-001
TL-207	Not Detected	-----	1.20E+001
AM-241	Not Detected	-----	3.90E-001
PU-239	Not Detected	-----	3.79E+002
NP-237	Not Detected	-----	2.02E+000
PA-233	Not Detected	-----	5.02E-002
TH-229	Not Detected	-----	2.12E-001

[Summary Report] - Sample ID: : 20119101

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.24E-002
AG-110m	Not Detected	-----	2.55E-002
BA-133	Not Detected	-----	4.15E-002
BE-7	Not Detected	-----	2.14E-001
CD-115	Not Detected	-----	2.02E-001
CE-139	Not Detected	-----	2.63E-002
CE-141	Not Detected	-----	5.03E-002
CE-144	Not Detected	-----	2.08E-001
CM-243	Not Detected	-----	1.53E-001
CO-56	Not Detected	-----	2.73E-002
CO-57	Not Detected	-----	2.76E-002
CO-58	Not Detected	-----	2.83E-002
CO-60	Not Detected	-----	3.17E-002
CR-51	Not Detected	-----	2.17E-001
CS-134	Not Detected	-----	3.96E-002
CS-137	Not Detected	-----	2.57E-002
EU-152	Not Detected	-----	8.31E-002
EU-154	Not Detected	-----	1.49E-001
EU-155	Not Detected	-----	1.23E-001
FE-59	Not Detected	-----	6.21E-002
GD-153	Not Detected	-----	8.89E-002
HG-203	Not Detected	-----	2.97E-002
I-131	Not Detected	-----	3.52E-002
IR-192	Not Detected	-----	2.45E-002
K-40	1.59E+001	2.15E+000	2.18E-001
MN-52	Not Detected	-----	4.32E-002
MN-54	Not Detected	-----	2.84E-002
MO-99	Not Detected	-----	5.11E-001
NA-22	Not Detected	-----	3.41E-002
NA-24	Not Detected	-----	2.37E+000
ND-147	Not Detected	-----	2.00E-001
NI-57	Not Detected	-----	1.57E-001
RU-103	Not Detected	-----	2.40E-002
RU-106	Not Detected	-----	2.22E-001
SB-122	Not Detected	-----	8.96E-002
SB-124	Not Detected	-----	2.44E-002
SB-125	Not Detected	-----	7.29E-002
SN-113	Not Detected	-----	3.27E-002
SR-85	Not Detected	-----	3.19E-002
TA-182	Not Detected	-----	1.35E-001
TA-183	Not Detected	-----	5.77E-001
TL-201	Not Detected	-----	3.59E-001
Y-88	Not Detected	-----	2.28E-002
ZN-65	Not Detected	-----	9.05E-002
ZR-95	Not Detected	-----	4.88E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 3:50:43 PM *

* Analyzed by: *Beverly Key* 8/27/02 Reviewed by: *K. K. K.* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059692-003
 Lab Sample ID : 20119102

Sample Description : 6640/1078-DF1-BH1-10-S
 Sample Quantity : 730.600 gram
 Sample Date/Time : 8/23/02 11:30:00 AM
 Acquire Start Date/Time : 8/27/02 12:38:58 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.40E-001
RA-226	1.54E+000	4.57E-001	5.96E-001
PB-214	6.49E-001	9.59E-002	4.90E-002
BI-214	5.27E-001	8.74E-002	4.83E-002
PB-210	Not Detected	-----	2.52E+001
TH-232	7.11E-001	3.35E-001	1.71E-001
RA-228	6.14E-001	1.22E-001	1.13E-001
AC-228	5.72E-001	1.20E-001	9.86E-002
TH-228	9.87E-001	3.96E-001	5.53E-001
RA-224	8.10E-001	1.82E-001	7.05E-002
PB-212	6.41E-001	9.47E-002	3.62E-002
BI-212	6.87E-001	2.70E-001	3.66E-001
TL-208	5.85E-001	1.02E-001	7.25E-002
U-235	Not Detected	-----	2.01E-001
TH-231	Not Detected	-----	1.01E+001
PA-231	Not Detected	-----	1.18E+000
TH-227	Not Detected	-----	3.17E-001
RA-223	Not Detected	-----	1.97E-001
RN-219	Not Detected	-----	3.12E-001
PB-211	Not Detected	-----	7.37E-001
TL-207	Not Detected	-----	1.03E+001
AM-241	Not Detected	-----	3.80E-001
PU-239	Not Detected	-----	3.67E+002
NP-237	Not Detected	-----	1.96E+000
PA-233	Not Detected	-----	4.83E-002
TH-229	Not Detected	-----	2.14E-001

[Summary Report] - Sample ID: : 20119102

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.12E-002
AG-110m	Not Detected	-----	2.45E-002
BA-133	Not Detected	-----	3.86E-002
BE-7	Not Detected	-----	2.05E-001
CD-115	Not Detected	-----	1.98E-001
CE-139	Not Detected	-----	2.48E-002
CE-141	Not Detected	-----	4.66E-002
CE-144	Not Detected	-----	1.96E-001
CM-243	Not Detected	-----	1.44E-001
CO-56	Not Detected	-----	2.86E-002
CO-57	Not Detected	-----	2.56E-002
CO-58	Not Detected	-----	2.58E-002
CO-60	Not Detected	-----	3.10E-002
CR-51	Not Detected	-----	2.19E-001
CS-134	Not Detected	-----	3.77E-002
CS-137	Not Detected	-----	2.74E-002
EU-152	Not Detected	-----	7.64E-002
EU-154	Not Detected	-----	1.43E-001
EU-155	Not Detected	-----	1.17E-001
FE-59	Not Detected	-----	5.98E-002
GD-153	Not Detected	-----	8.75E-002
HG-203	Not Detected	-----	2.81E-002
I-131	Not Detected	-----	3.49E-002
IR-192	Not Detected	-----	2.39E-002
K-40	1.56E+001	2.11E+000	2.76E-001
MN-52	Not Detected	-----	3.89E-002
MN-54	Not Detected	-----	2.75E-002
MO-99	Not Detected	-----	5.19E-001
NA-22	Not Detected	-----	3.40E-002
NA-24	Not Detected	-----	2.32E+000
ND-147	Not Detected	-----	2.03E-001
NI-57	Not Detected	-----	1.77E-001
RU-103	Not Detected	-----	2.41E-002
RU-106	Not Detected	-----	2.23E-001
SB-122	Not Detected	-----	9.11E-002
SB-124	Not Detected	-----	2.38E-002
SB-125	Not Detected	-----	6.65E-002
SN-113	Not Detected	-----	3.16E-002
SR-85	Not Detected	-----	3.10E-002
TA-182	Not Detected	-----	1.27E-001
TA-183	Not Detected	-----	5.66E-001
TL-201	Not Detected	-----	3.39E-001
Y-88	Not Detected	-----	2.42E-002
ZN-65	Not Detected	-----	8.36E-002
ZR-95	Not Detected	-----	4.62E-002

* Sandia National Laboratories *
* Radiation Protection Sample Diagnostics Program *
* 8/27/02 4:07:13 PM *

* Analyzed by: *Beverly Kay* 8/27/02 Reviewed by: *K. oblog* *

Customer : SANDERS M (6135)
Customer Sample ID : 059693-003
Lab Sample ID : 20119103

Sample Description : 6640/1078-DF1-BH2-5-S
Sample Quantity : 766.900 gram
Sample Date/Time : 8/23/02 12:55:00 PM
Acquire Start Date/Time : 8/27/02 2:21:05 PM
Detector Name : LAB02
Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.43E-001
RA-226	1.75E+000	4.67E-001	5.83E-001
PB-214	7.18E-001	1.04E-001	5.23E-002
BI-214	6.21E-001	9.89E-002	4.62E-002
PB-210	Not Detected	-----	2.48E+001
TH-232	6.16E-001	2.95E-001	1.70E-001
RA-228	7.42E-001	1.35E-001	9.94E-002
AC-228	7.30E-001	1.40E-001	9.56E-002
TH-228	4.29E-001	3.78E-001	5.95E-001
RA-224	8.16E-001	1.81E-001	6.22E-002
PB-212	6.78E-001	9.95E-002	3.61E-002
BI-212	7.68E-001	2.67E-001	3.48E-001
TL-208	6.21E-001	1.05E-001	7.15E-002
U-235	Not Detected	-----	2.02E-001
TH-231	Not Detected	-----	9.94E+000
PA-231	Not Detected	-----	1.20E+000
TH-227	Not Detected	-----	3.12E-001
RA-223	Not Detected	-----	2.02E-001
RN-219	Not Detected	-----	3.10E-001
PB-211	Not Detected	-----	7.00E-001
TL-207	Not Detected	-----	1.05E+001
AM-241	Not Detected	-----	3.87E-001
PU-239	Not Detected	-----	3.62E+002
NP-237	Not Detected	-----	1.93E+000
PA-233	Not Detected	-----	4.84E-002
TH-229	Not Detected	-----	2.06E-001

[Summary Report] - Sample ID: : 20119103

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.16E-002
AG-110m	Not Detected	-----	2.44E-002
BA-133	Not Detected	-----	3.94E-002
BE-7	Not Detected	-----	2.00E-001
CD-115	Not Detected	-----	1.91E-001
CE-139	Not Detected	-----	2.50E-002
CE-141	Not Detected	-----	4.76E-002
CE-144	Not Detected	-----	1.96E-001
CM-243	Not Detected	-----	1.46E-001
CO-56	Not Detected	-----	2.62E-002
CO-57	Not Detected	-----	2.53E-002
CO-58	Not Detected	-----	2.42E-002
CO-60	Not Detected	-----	3.04E-002
CR-51	Not Detected	-----	2.13E-001
CS-134	Not Detected	-----	3.86E-002
CS-137	Not Detected	-----	2.65E-002
EU-152	Not Detected	-----	7.52E-002
EU-154	Not Detected	-----	1.45E-001
EU-155	Not Detected	-----	1.12E-001
FE-59	Not Detected	-----	5.61E-002
GD-153	Not Detected	-----	8.66E-002
HG-203	Not Detected	-----	2.86E-002
I-131	Not Detected	-----	3.43E-002
IR-192	Not Detected	-----	2.40E-002
K-40	1.36E+001	1.85E+000	2.56E-001
MN-52	Not Detected	-----	4.07E-002
MN-54	Not Detected	-----	2.86E-002
MO-99	Not Detected	-----	5.01E-001
NA-22	Not Detected	-----	3.30E-002
NA-24	Not Detected	-----	2.43E+000
ND-147	Not Detected	-----	2.03E-001
NI-57	Not Detected	-----	1.82E-001
RU-103	Not Detected	-----	2.39E-002
RU-106	Not Detected	-----	2.25E-001
SB-122	Not Detected	-----	9.12E-002
SB-124	Not Detected	-----	2.32E-002
SB-125	Not Detected	-----	6.64E-002
SN-113	Not Detected	-----	3.18E-002
SR-85	Not Detected	-----	3.08E-002
TA-182	Not Detected	-----	1.26E-001
TA-183	Not Detected	-----	5.78E-001
TL-201	Not Detected	-----	3.45E-001
Y-88	Not Detected	-----	2.26E-002
ZN-65	Not Detected	-----	8.46E-002
ZR-95	Not Detected	-----	4.52E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 7:41:45 AM *

* Analyzed by: *Beverly Key 8/28/02* Reviewed by: *K. E. [signature]* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059694-003
 Lab Sample ID : 20119104

Sample Description : 6640/1078-DF1-BH2-10-S
 Sample Quantity : 768.000 gram
 Sample Date/Time : 8/23/02 1:30:00 PM
 Acquire Start Date/Time : 8/27/02 4:03:07 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	-----	6.46E-001
RA-226	1.69E+000	4.91E-001	6.42E-001
PB-214	6.55E-001	9.74E-002	5.41E-002
BI-214	5.61E-001	9.22E-002	5.16E-002
PB-210	Not Detected	-----	2.49E+001
TH-232	7.68E-001	3.57E-001	1.63E-001
RA-228	6.61E-001	1.28E-001	1.17E-001
AC-228	6.70E-001	1.27E-001	7.85E-002
TH-228	1.07E+000	4.15E-001	5.78E-001
RA-224	7.09E-001	1.63E-001	6.81E-002
PB-212	6.94E-001	1.02E-001	3.63E-002
BI-212	7.55E-001	2.59E-001	3.34E-001
TL-208	6.45E-001	1.06E-001	6.40E-002
U-235	Not Detected	-----	2.03E-001
TH-231	Not Detected	-----	9.90E+000
PA-231	Not Detected	-----	1.20E+000
TH-227	Not Detected	-----	3.19E-001
RA-223	Not Detected	-----	2.00E-001
RN-219	Not Detected	-----	3.17E-001
PB-211	Not Detected	-----	7.09E-001
TL-207	Not Detected	-----	1.09E+001
AM-241	Not Detected	-----	3.91E-001
PU-239	Not Detected	-----	3.71E+002
NP-237	Not Detected	-----	1.97E+000
PA-233	Not Detected	-----	4.76E-002
TH-229	Not Detected	-----	2.11E-001

{Summary Report} - Sample ID: : 20119104

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	2.91E-002
AG-110m	Not Detected	-----	2.47E-002
BA-133	Not Detected	-----	3.88E-002
BE-7	Not Detected	-----	2.11E-001
CD-115	Not Detected	-----	2.01E-001
CE-139	Not Detected	-----	2.54E-002
CE-141	Not Detected	-----	4.77E-002
CE-144	Not Detected	-----	2.01E-001
CM-243	Not Detected	-----	1.46E-001
CO-56	Not Detected	-----	2.78E-002
CO-57	Not Detected	-----	2.65E-002
CO-58	Not Detected	-----	2.80E-002
CO-60	Not Detected	-----	3.03E-002
CR-51	Not Detected	-----	2.11E-001
CS-134	Not Detected	-----	3.80E-002
CS-137	Not Detected	-----	2.60E-002
EU-152	Not Detected	-----	7.90E-002
EU-154	Not Detected	-----	1.34E-001
EU-155	Not Detected	-----	1.18E-001
FE-59	Not Detected	-----	6.08E-002
GD-153	Not Detected	-----	8.52E-002
HG-203	Not Detected	-----	2.79E-002
I-131	Not Detected	-----	3.46E-002
IR-192	Not Detected	-----	2.33E-002
K-40	1.66E+001	2.23E+000	2.56E-001
MN-52	Not Detected	-----	4.07E-002
MN-54	Not Detected	-----	2.83E-002
MO-99	Not Detected	-----	5.18E-001
NA-22	Not Detected	-----	3.60E-002
NA-24	Not Detected	-----	2.73E+000
ND-147	Not Detected	-----	1.97E-001
NI-57	Not Detected	-----	1.84E-001
RU-103	Not Detected	-----	2.32E-002
RU-106	Not Detected	-----	2.22E-001
SB-122	Not Detected	-----	9.22E-002
SB-124	Not Detected	-----	2.37E-002
SB-125	Not Detected	-----	6.97E-002
SN-113	Not Detected	-----	3.23E-002
SR-85	Not Detected	-----	3.12E-002
TA-182	Not Detected	-----	1.26E-001
TA-183	Not Detected	-----	5.87E-001
TL-201	Not Detected	-----	3.59E-001
Y-88	Not Detected	-----	1.85E-002
ZN-65	Not Detected	-----	8.45E-002
ZR-95	Not Detected	-----	4.45E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 9:07:19 PM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135)
 Customer Sample ID : 059695-003
 Lab Sample ID : 20119106

Sample Description : 6640/1078-DF1-BH3-5-S
 Sample Quantity : 753.700 gram
 Sample Date/Time : 8/23/02 2:25:00 PM
 Acquire Start Date/Time : 8/27/02 7:27:04 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	-----	6.88E-001
RA-226	1.59E+000	5.06E-001	6.85E-001
PB-214	6.92E-001	1.02E-001	5.36E-002
BI-214	6.22E-001	9.98E-002	4.85E-002
PB-210	Not Detected	-----	2.57E+001
TH-232	7.67E-001	3.59E-001	1.74E-001
RA-228	7.48E-001	1.38E-001	1.10E-001
AC-228	7.84E-001	1.45E-001	8.43E-002
TH-228	3.81E-001	3.91E-001	6.23E-001
RA-224	7.94E-001	1.78E-001	6.94E-002
PB-212	7.99E-001	1.16E-001	3.69E-002
BI-212	8.51E-001	2.84E-001	3.64E-001
TL-208	6.58E-001	1.11E-001	7.48E-002
U-235	Not Detected	-----	2.02E-001
TH-231	Not Detected	-----	1.02E+001
PA-231	Not Detected	-----	1.22E+000
TH-227	Not Detected	-----	3.36E-001
RA-223	Not Detected	-----	2.05E-001
RN-219	Not Detected	-----	3.17E-001
PB-211	Not Detected	-----	7.13E-001
TL-207	Not Detected	-----	1.05E+001
AM-241	Not Detected	-----	3.81E-001
PU-239	Not Detected	-----	3.78E+002
NP-237	Not Detected	-----	2.01E+000
PA-233	Not Detected	-----	5.06E-002
TH-229	Not Detected	-----	2.15E-001

[Summary Report] - Sample ID: : 20119106

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.28E-002
AG-110m	Not Detected	-----	2.49E-002
BA-133	Not Detected	-----	4.13E-002
BE-7	Not Detected	-----	2.14E-001
CD-115	Not Detected	-----	2.12E-001
CE-139	Not Detected	-----	2.59E-002
CE-141	Not Detected	-----	4.82E-002
CE-144	Not Detected	-----	2.10E-001
CM-243	Not Detected	-----	1.56E-001
CO-56	Not Detected	-----	2.78E-002
CO-57	Not Detected	-----	2.77E-002
CO-58	Not Detected	-----	2.67E-002
CO-60	Not Detected	-----	3.04E-002
CR-51	Not Detected	-----	2.21E-001
CS-134	Not Detected	-----	4.06E-002
CS-137	Not Detected	-----	2.75E-002
EU-152	Not Detected	-----	8.30E-002
EU-154	Not Detected	-----	1.51E-001
EU-155	Not Detected	-----	1.20E-001
FE-59	Not Detected	-----	6.03E-002
GD-153	Not Detected	-----	9.04E-002
HG-203	Not Detected	-----	2.93E-002
I-131	Not Detected	-----	3.46E-002
IR-192	Not Detected	-----	2.39E-002
K-40	1.57E+001	2.12E+000	2.49E-001
MN-52	Not Detected	-----	4.18E-002
MN-54	Not Detected	-----	2.95E-002
MO-99	Not Detected	-----	5.24E-001
NA-22	Not Detected	-----	3.56E-002
NA-24	Not Detected	-----	2.98E+000
ND-147	Not Detected	-----	2.06E-001
NI-57	Not Detected	-----	1.90E-001
RU-103	Not Detected	-----	2.50E-002
RU-106	Not Detected	-----	2.39E-001
SB-122	Not Detected	-----	9.82E-002
SB-124	Not Detected	-----	2.56E-002
SB-125	Not Detected	-----	6.98E-002
SN-113	Not Detected	-----	3.29E-002
SR-85	Not Detected	-----	3.22E-002
TA-182	Not Detected	-----	1.32E-001
TA-183	Not Detected	-----	5.81E-001
TL-201	Not Detected	-----	3.75E-001
Y-88	Not Detected	-----	2.03E-002
ZN-65	Not Detected	-----	8.78E-002
ZR-95	Not Detected	-----	4.95E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 10:49:18 PM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135)
 Customer Sample ID : 059696-003
 Lab Sample ID : 20119107

Sample Description : 6640/1078-DF1-BH3-10-S
 Sample Quantity : 779.700 gram
 Sample Date/Time : 8/26/02 9:55:00 AM
 Acquire Start Date/Time : 8/27/02 9:09:03 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.05E-001
RA-226	1.52E+000	4.62E-001	6.13E-001
PB-214	6.24E-001	9.25E-002	4.93E-002
BI-214	5.26E-001	8.60E-002	4.45E-002
PB-210	Not Detected	-----	2.36E+001
TH-232	5.20E-001	2.58E-001	1.76E-001
RA-228	6.84E-001	1.27E-001	9.73E-002
AC-228	6.62E-001	1.28E-001	8.79E-002
TH-228	3.88E-001	2.76E-001	4.25E-001
RA-224	6.56E-001	1.54E-001	7.61E-002
PB-212	6.54E-001	9.61E-002	3.33E-002
BI-212	5.90E-001	2.37E-001	3.22E-001
TL-208	5.26E-001	9.30E-002	6.93E-002
U-235	1.71E-001	1.54E-001	1.98E-001
TH-231	Not Detected	-----	9.44E+000
PA-231	Not Detected	-----	1.16E+000
TH-227	Not Detected	-----	3.03E-001
RA-223	Not Detected	-----	1.63E-001
RN-219	Not Detected	-----	2.93E-001
PB-211	Not Detected	-----	6.54E-001
TL-207	Not Detected	-----	1.09E+001
AM-241	Not Detected	-----	3.62E-001
PU-239	Not Detected	-----	3.41E+002
NP-237	Not Detected	-----	1.82E+000
PA-233	Not Detected	-----	4.64E-002
TH-229	Not Detected	-----	2.02E-001

[Summary Report] - Sample ID: : 20119107

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	2.78E-002
AG-110m	Not Detected	-----	2.20E-002
BA-133	Not Detected	-----	3.85E-002
BE-7	Not Detected	-----	1.94E-001
CD-115	Not Detected	-----	8.26E-002
CE-139	Not Detected	-----	2.37E-002
CE-141	Not Detected	-----	4.28E-002
CE-144	Not Detected	-----	1.93E-001
CM-243	Not Detected	-----	1.40E-001
CO-56	Not Detected	-----	2.47E-002
CO-57	Not Detected	-----	2.50E-002
CO-58	Not Detected	-----	2.39E-002
CO-60	Not Detected	-----	2.75E-002
CR-51	Not Detected	-----	1.82E-001
CS-134	Not Detected	-----	3.71E-002
CS-137	Not Detected	-----	2.38E-002
EU-152	Not Detected	-----	7.48E-002
EU-154	Not Detected	-----	1.28E-001
EU-155	Not Detected	-----	1.10E-001
FE-59	Not Detected	-----	5.18E-002
GD-153	Not Detected	-----	8.00E-002
HG-203	Not Detected	-----	2.57E-002
I-131	Not Detected	-----	2.42E-002
IR-192	Not Detected	-----	2.14E-002
K-40	1.33E+001	1.81E+000	2.31E-001
MN-52	Not Detected	-----	2.73E-002
MN-54	Not Detected	-----	2.84E-002
MO-99	Not Detected	-----	2.62E-001
NA-22	Not Detected	-----	2.96E-002
NA-24	Not Detected	-----	1.35E-001
ND-147	Not Detected	-----	1.60E-001
NI-57	Not Detected	-----	5.52E-002
RU-103	Not Detected	-----	2.21E-002
RU-106	Not Detected	-----	2.19E-001
SB-122	Not Detected	-----	4.40E-002
SB-124	Not Detected	-----	2.22E-002
SB-125	Not Detected	-----	6.66E-002
SN-113	Not Detected	-----	2.80E-002
SR-85	Not Detected	-----	2.80E-002
TA-182	Not Detected	-----	1.18E-001
TA-183	Not Detected	-----	3.80E-001
TL-201	Not Detected	-----	1.88E-001
Y-88	Not Detected	-----	2.23E-002
ZN-65	Not Detected	-----	8.16E-002
ZR-95	Not Detected	-----	4.17E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 7:45:51 AM *

* Analyzed by: *Beverly Key 8/28/02* Reviewed by: *K. [Signature]* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059697-003
 Lab Sample ID : 20119105

Sample Description : 6640/1078-DF1-BH3-5-DU
 Sample Quantity : 665.300 gram
 Sample Date/Time : 8/23/02 2:30:00 PM
 Acquire Start Date/Time : 8/27/02 5:45:06 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.50E-001
RA-226	1.46E+000	4.73E-001	6.36E-001
PB-214	7.41E-001	1.10E-001	5.78E-002
BI-214	6.06E-001	9.92E-002	5.10E-002
PB-210	Not Detected	-----	2.45E+001
TH-232	5.05E-001	2.58E-001	1.96E-001
RA-228	5.04E-001	1.11E-001	1.21E-001
AC-228	Not Detected	-----	1.71E-001
TH-228	5.10E-001	3.88E-001	6.02E-001
RA-224	6.56E-001	1.57E-001	6.59E-002
PB-212	6.10E-001	9.12E-002	3.71E-002
BI-212	9.14E-001	2.83E-001	3.41E-001
TL-208	4.97E-001	9.36E-002	7.65E-002
U-235	Not Detected	-----	2.13E-001
TH-231	Not Detected	-----	1.04E+001
PA-231	Not Detected	-----	1.24E+000
TH-227	Not Detected	-----	3.17E-001
RA-223	Not Detected	-----	2.05E-001
RN-219	Not Detected	-----	3.34E-001
PB-211	Not Detected	-----	7.80E-001
TL-207	Not Detected	-----	1.11E+001
AM-241	Not Detected	-----	3.91E-001
PU-239	Not Detected	-----	3.82E+002
NP-237	Not Detected	-----	2.00E+000
PA-233	Not Detected	-----	5.27E-002
TH-229	Not Detected	-----	2.14E-001

[Summary Report] - Sample ID: : 20119105

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.28E-002
AG-110m	Not Detected	-----	2.61E-002
BA-133	Not Detected	-----	4.39E-002
BE-7	Not Detected	-----	2.18E-001
CD-115	Not Detected	-----	2.05E-001
CE-139	Not Detected	-----	2.64E-002
CE-141	Not Detected	-----	5.08E-002
CE-144	Not Detected	-----	2.13E-001
CM-243	Not Detected	-----	1.45E-001
CO-56	Not Detected	-----	2.91E-002
CO-57	Not Detected	-----	2.75E-002
CO-58	Not Detected	-----	2.64E-002
CO-60	Not Detected	-----	2.93E-002
CR-51	Not Detected	-----	2.15E-001
CS-134	Not Detected	-----	4.22E-002
CS-137	Not Detected	-----	2.80E-002
EU-152	Not Detected	-----	8.14E-002
EU-154	Not Detected	-----	1.51E-001
EU-155	Not Detected	-----	1.19E-001
FE-59	Not Detected	-----	6.34E-002
GD-155	Not Detected	-----	8.85E-002
HG-203	Not Detected	-----	2.78E-002
I-131	Not Detected	-----	3.70E-002
IR-192	Not Detected	-----	2.47E-002
K-40	1.31E+001	1.80E+000	2.54E-001
MN-52	Not Detected	-----	4.51E-002
MN-54	Not Detected	-----	3.00E-002
MO-99	Not Detected	-----	5.37E-001
NA-22	Not Detected	-----	3.56E-002
NA-24	Not Detected	-----	2.76E+000
ND-147	Not Detected	-----	2.05E-001
NI-57	Not Detected	-----	1.64E-001
RU-103	Not Detected	-----	2.51E-002
RU-106	Not Detected	-----	2.31E-001
SB-122	Not Detected	-----	9.47E-002
SB-124	Not Detected	-----	2.56E-002
SB-125	Not Detected	-----	6.89E-002
SN-113	Not Detected	-----	3.21E-002
SR-85	Not Detected	-----	3.24E-002
TA-182	Not Detected	-----	1.29E-001
TA-183	Not Detected	-----	5.89E-001
TL-201	Not Detected	-----	3.53E-001
Y-88	Not Detected	-----	2.13E-002
ZN-65	Not Detected	-----	8.65E-002
ZR-95	Not Detected	-----	4.97E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 8:03:35 AM *

* Analyzed by: *Beverly Key 8/28/02* Reviewed by: *K 8/28/02* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059698-003
 Lab Sample ID : 20119108

Sample Description : 6643/1120-DW1-BH1-8-S
 Sample Quantity : 678.500 gram
 Sample Date/Time : 8/22/02 11:40:00 AM
 Acquire Start Date/Time : 8/27/02 10:51:02 PM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.68E-001
RA-226	1.55E+000	4.65E-001	6.09E-001
PB-214	5.82E-001	9.11E-002	5.94E-002
BI-214	5.66E-001	9.35E-002	5.00E-002
PB-210	Not Detected	-----	2.61E+001
TH-232	6.93E-001	3.35E-001	2.02E-001
RA-228	6.17E-001	1.26E-001	1.22E-001
AC-228	6.30E-001	1.32E-001	1.08E-001
TH-228	6.78E-001	3.48E-001	5.10E-001
RA-224	7.65E-001	1.77E-001	7.12E-002
PB-212	6.41E-001	9.53E-002	3.98E-002
BI-212	5.69E-001	2.39E-001	3.26E-001
TL-208	5.93E-001	1.06E-001	7.94E-002
U-235	Not Detected	-----	2.10E-001
TH-231	Not Detected	-----	1.04E+001
PA-231	Not Detected	-----	1.26E+000
TH-227	Not Detected	-----	3.32E-001
RA-223	Not Detected	-----	2.27E-001
RN-219	Not Detected	-----	3.19E-001
PB-211	Not Detected	-----	7.20E-001
TL-207	Not Detected	-----	1.12E+001
AM-241	Not Detected	-----	3.96E-001
PU-239	Not Detected	-----	3.89E+002
NP-237	Not Detected	-----	2.04E+000
PA-233	Not Detected	-----	4.79E-002
TH-229	Not Detected	-----	2.23E-001

[Summary Report] - Sample ID: : 20119108

Juclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.36E-002
AG-110m	Not Detected	-----	2.62E-002
BA-133	Not Detected	-----	4.31E-002
BE-7	Not Detected	-----	2.21E-001
CD-115	Not Detected	-----	3.26E-001
CE-139	Not Detected	-----	2.64E-002
CE-141	Not Detected	-----	5.20E-002
CE-144	Not Detected	-----	2.09E-001
CM-243	Not Detected	-----	1.54E-001
CO-56	Not Detected	-----	2.90E-002
CO-57	Not Detected	-----	2.75E-002
CO-58	Not Detected	-----	2.95E-002
CO-60	Not Detected	-----	3.21E-002
CR-51	Not Detected	-----	2.33E-001
CS-134	Not Detected	-----	4.17E-002
CS-137	Not Detected	-----	2.79E-002
EU-152	Not Detected	-----	8.23E-002
EU-154	Not Detected	-----	1.54E-001
EU-155	Not Detected	-----	1.20E-001
FE-59	Not Detected	-----	6.25E-002
GD-153	Not Detected	-----	9.12E-002
HG-203	Not Detected	-----	3.04E-002
I-131	Not Detected	-----	4.10E-002
IR-192	Not Detected	-----	2.39E-002
K-40	1.64E+001	2.22E+000	3.02E-001
MN-52	Not Detected	-----	4.70E-002
MN-54	Not Detected	-----	3.06E-002
MO-99	Not Detected	-----	7.47E-001
NA-22	Not Detected	-----	3.53E-002
NA-24	Not Detected	-----	1.30E+001
ND-147	Not Detected	-----	2.37E-001
NI-57	Not Detected	-----	5.62E-001
RU-103	Not Detected	-----	2.70E-002
RU-106	Not Detected	-----	2.36E-001
SB-122	Not Detected	-----	1.41E-001
SB-124	Not Detected	-----	2.62E-002
SB-125	Not Detected	-----	7.12E-002
SN-113	Not Detected	-----	3.32E-002
SR-85	Not Detected	-----	3.33E-002
TA-182	Not Detected	-----	1.39E-001
TA-183	Not Detected	-----	7.15E-001
TL-201	Not Detected	-----	4.95E-001
Y-88	Not Detected	-----	2.34E-002
ZN-65	Not Detected	-----	8.87E-002
ZR-95	Not Detected	-----	5.06E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 7:59:59 AM *

* Analyzed by: *Beverly Cey 8/28/02* Reviewed by: *[Signature] 8/28/02* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059699-003
 Lab Sample ID : 20119109

Sample Description : 6643/1120-DW1-BH1-13-S
 Sample Quantity : 672.600 gram
 Sample Date/Time : 8/22/02 12:05:00 PM
 Acquire Start Date/Time : 8/28/02 12:33:12 AM
 Detector Name : LAB02
 Elapsed Live/Real Time : 6000 / 6002 seconds

Comments:
 U-235/Ra-226 peaks not resolved. Either isotope may be overestimated.

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
U-238	Not Detected	-----	6.76E-001
RA-226	1.57E+000	4.98E-001	6.68E-001
PB-214	6.31E-001	9.64E-002	5.75E-002
214	5.32E-001	8.99E-002	5.33E-002
210	Not Detected	-----	2.60E+001
TH-232	5.76E-001	2.84E-001	1.87E-001
RA-228	7.00E-001	1.37E-001	1.20E-001
AC-228	5.29E-001	1.18E-001	1.06E-001
TH-228	7.71E-001	4.18E-001	6.22E-001
RA-224	7.98E-001	1.84E-001	8.27E-002
PB-212	6.64E-001	9.85E-002	3.75E-002
BI-212	8.36E-001	2.64E-001	3.18E-001
TL-208	5.62E-001	1.15E-001	1.16E-001
U-235	1.57E-001	1.66E-001	2.13E-001
TH-231	5.69E+000	4.91E+000	1.07E+001
PA-231	Not Detected	-----	1.27E+000
TH-227	Not Detected	-----	3.29E-001
RA-223	Not Detected	-----	2.26E-001
RN-219	Not Detected	-----	3.27E-001
PB-211	Not Detected	-----	7.33E-001
TL-207	Not Detected	-----	1.10E+001
AM-241	Not Detected	-----	3.98E-001
PU-239	Not Detected	-----	3.87E+002
NP-237	Not Detected	-----	1.99E+000
PA-233	Not Detected	-----	5.13E-002
229	Not Detected	-----	2.18E-001

[Summary Report] - Sample ID: : 20119109

Slide No	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.29E-002
AG-110m	Not Detected	-----	2.53E-002
BA-133	Not Detected	-----	4.09E-002
BE-7	Not Detected	-----	2.26E-001
CD-115	Not Detected	-----	3.19E-001
CE-139	Not Detected	-----	2.69E-002
CE-141	Not Detected	-----	5.22E-002
CE-144	Not Detected	-----	2.16E-001
CM-243	Not Detected	-----	1.56E-001
CO-56	Not Detected	-----	2.94E-002
CO-57	Not Detected	-----	2.76E-002
CO-58	Not Detected	-----	3.11E-002
CO-60	Not Detected	-----	3.12E-002
CR-51	Not Detected	-----	2.23E-001
CS-134	Not Detected	-----	4.15E-002
CS-137	Not Detected	-----	2.76E-002
EU-152	Not Detected	-----	8.22E-002
EU-154	Not Detected	-----	1.51E-001
EU-155	Not Detected	-----	1.21E-001
FE-59	Not Detected	-----	6.41E-002
GD-153	Not Detected	-----	8.98E-002
HG-203	Not Detected	-----	3.04E-002
I-131	Not Detected	-----	3.95E-002
I-192	Not Detected	-----	2.47E-002
MO-10	1.65E+001	2.24E+000	2.57E-001
MN-52	Not Detected	-----	5.33E-002
MN-54	Not Detected	-----	3.12E-002
MO-99	Not Detected	-----	8.16E-001
NA-22	Not Detected	-----	3.51E-002
NA-24	Not Detected	-----	1.37E+001
ND-147	Not Detected	-----	2.38E-001
NI-57	Not Detected	-----	5.74E-001
RU-103	Not Detected	-----	2.66E-002
RU-106	Not Detected	-----	2.27E-001
SB-122	Not Detected	-----	1.38E-001
SB-124	Not Detected	-----	2.51E-002
SB-125	Not Detected	-----	6.80E-002
SN-113	Not Detected	-----	3.29E-002
SR-85	Not Detected	-----	3.24E-002
TA-182	Not Detected	-----	1.36E-001
TA-183	Not Detected	-----	7.24E-001
TL-201	Not Detected	-----	5.14E-001
Y-88	Not Detected	-----	2.48E-002
ZN-65	Not Detected	-----	9.43E-002
ZR-95	Not Detected	-----	4.78E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 8:05:10 AM *

* Analyzed by: *Beverly Key 8/28/02* Reviewed by: *[Signature] 8/28/02* *

Customer : SANDERS M (6135)
 Customer Sample ID : 059700-003
 Lab Sample ID : 20119110

Sample Description : 6643/1079-DF1-BH2-11-S
 Sample Quantity : 657.200 gram
 Sample Date/Time : 8/23/02 8:40:00 AM
 Acquire Start Date/Time : 8/28/02 2:15:10 AM
 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	-----	7.08E-001
RA-226	1.40E+000	5.09E-001	7.14E-001
PB-214	6.31E-001	9.75E-002	6.12E-002
BI-214	5.11E-001	8.82E-002	5.62E-002
PB-210	Not Detected	-----	2.67E+001
TH-232	7.05E-001	3.36E-001	1.83E-001
RA-228	6.84E-001	1.34E-001	1.09E-001
AC-228	7.04E-001	1.39E-001	9.78E-002
TH-228	7.72E-001	4.50E-001	6.80E-001
RA-224	7.40E-001	1.71E-001	5.84E-002
PE-212	7.08E-001	1.04E-001	3.85E-002
BI-212	8.36E-001	2.91E-001	3.76E-001
TL-208	5.81E-001	1.06E-001	8.28E-002
U-235	Not Detected	-----	2.17E-001
TH-231	Not Detected	-----	1.06E+001
PA-231	Not Detected	-----	1.29E+000
TH-227	Not Detected	-----	3.48E-001
RA-223	Not Detected	-----	2.25E-001
RN-219	2.48E-001	2.75E-001	3.28E-001
PB-211	Not Detected	-----	7.05E-001
TL-207	Not Detected	-----	1.23E+001
AM-241	Not Detected	-----	4.06E-001
PU-239	Not Detected	-----	4.08E+002
NP-237	Not Detected	-----	2.10E+000
PA-233	Not Detected	-----	4.98E-002
TH-229	Not Detected	-----	2.25E-001

[Summary Report] - Sample ID: : 20119110

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.49E-002
AG-110m	Not Detected	-----	2.66E-002
BA-133	Not Detected	-----	4.20E-002
BE-7	Not Detected	-----	2.29E-001
CD-115	Not Detected	-----	2.65E-001
CE-139	Not Detected	-----	2.74E-002
CE-141	Not Detected	-----	5.16E-002
CE-144	Not Detected	-----	2.17E-001
CM-243	Not Detected	-----	1.61E-001
CO-56	Not Detected	-----	3.07E-002
CO-57	Not Detected	-----	2.87E-002
CO-58	Not Detected	-----	2.86E-002
CO-60	Not Detected	-----	3.50E-002
CR-51	Not Detected	-----	2.30E-001
CS-134	Not Detected	-----	4.15E-002
CS-137	Not Detected	-----	2.90E-002
EU-152	Not Detected	-----	8.65E-002
EU-154	Not Detected	-----	1.61E-001
EU-155	Not Detected	-----	1.26E-001
FE-59	Not Detected	-----	6.47E-002
GD-153	Not Detected	-----	9.32E-002
HG-203	Not Detected	-----	3.13E-002
I-131	Not Detected	-----	3.99E-002
IR-192	Not Detected	-----	2.52E-002
K-40	1.55E+001	2.10E+000	2.54E-001
MN-52	Not Detected	-----	4.62E-002
MN-54	Not Detected	-----	2.99E-002
MO-99	Not Detected	-----	6.65E-001
NA-22	Not Detected	-----	3.65E-002
NA-24	Not Detected	-----	5.55E+000
ND-147	Not Detected	-----	2.25E-001
NI-57	Not Detected	-----	2.65E-001
RU-103	Not Detected	-----	2.62E-002
RU-106	Not Detected	-----	2.44E-001
SB-122	Not Detected	-----	1.17E-001
SB-124	Not Detected	-----	2.65E-002
SB-125	Not Detected	-----	7.54E-002
SN-113	Not Detected	-----	3.32E-002
SR-85	Not Detected	-----	3.46E-002
TA-182	Not Detected	-----	1.36E-001
TA-183	Not Detected	-----	6.64E-001
TL-201	Not Detected	-----	4.32E-001
Y-88	Not Detected	-----	2.44E-002
ZN-65	Not Detected	-----	9.33E-002
ZR-95	Not Detected	-----	5.12E-002

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 8/27/02 12:56:26 PM

* Analyzed by: *Beverly Kay 8/27/02* Reviewed by: *K. Abbott*

Customer : SANDERS M (6135)
 Customer Sample ID : 059701-003
 Lab Sample ID : 20119111

Sample Description : 6643/1079-DF1-BH2-16-S
 Sample Quantity : 791.300 gram
 Sample Date/Time : 8/23/02 8:55:00 AM
 Acquire Start Date/Time : 8/27/02 11:16:12 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	-----	4.53E-001
RA-226	1.77E+000	5.37E-001	7.10E-001
PB-214	6.10E-001	9.70E-002	6.46E-002
BI-214	5.21E-001	9.14E-002	5.73E-002
PB-210	Not Detected	-----	8.46E+000
TH-232	5.59E-001	2.78E-001	1.87E-001
RA-228	5.32E-001	1.51E-001	1.68E-001
AC-228	Not Detected	-----	1.89E-001
TH-228	5.20E-001	1.95E-001	4.21E-001
RA-224	7.06E-001	1.79E-001	8.04E-002
PB-212	5.84E-001	8.84E-002	3.52E-002
BI-212	6.04E-001	2.85E-001	3.99E-001
TL-208	4.54E-001	9.22E-002	8.09E-002
U-235	Not Detected	-----	1.80E-001
TH-231	Not Detected	-----	5.98E+000
PA-231	Not Detected	-----	1.27E+000
TH-227	Not Detected	-----	3.01E-001
RA-223	Not Detected	-----	1.29E-001
RN-219	Not Detected	-----	3.54E-001
PB-211	Not Detected	-----	7.98E-001
TL-207	Not Detected	-----	1.39E+001
AM-241	Not Detected	-----	1.59E-001
PU-239	Not Detected	-----	3.26E+002
NP-237	Not Detected	-----	1.75E+000
PA-233	Not Detected	-----	5.33E-002
TH-229	Not Detected	-----	1.74E-001

[Summary Report] - Sample ID: : 20119111

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.85E-002
AG-110m	Not Detected	-----	2.92E-002
BA-133	Not Detected	-----	3.84E-002
BE-7	Not Detected	-----	2.34E-001
CD-115	Not Detected	-----	2.13E-001
CE-139	Not Detected	-----	2.33E-002
CE-141	Not Detected	-----	4.28E-002
CE-144	Not Detected	-----	1.84E-001
CM-243	Not Detected	-----	1.56E-001
CO-56	Not Detected	-----	3.14E-002
CO-57	Not Detected	-----	2.20E-002
CO-58	Not Detected	-----	3.22E-002
CO-60	Not Detected	-----	3.79E-002
CR-51	Not Detected	-----	2.39E-001
CS-134	Not Detected	-----	4.24E-002
CS-137	Not Detected	-----	3.04E-002
EU-152	Not Detected	-----	6.57E-002
EU-154	Not Detected	-----	1.80E-001
EU-155	Not Detected	-----	1.02E-001
FE-59	Not Detected	-----	7.62E-002
GD-153	Not Detected	-----	5.74E-002
HG-203	Not Detected	-----	2.93E-002
I-131	Not Detected	-----	3.58E-002
IR-192	Not Detected	-----	2.68E-002
K-40	1.36E+001	1.89E+000	3.02E-001
MN-52	Not Detected	-----	5.12E-002
MN-54	1.00E-002	1.09E-002	1.72E-002
MO-99	Not Detected	-----	6.49E-001
NA-22	Not Detected	-----	4.30E-002
NA-24	Not Detected	-----	3.14E+000
ND-147	Not Detected	-----	2.44E-001
NI-57	Not Detected	-----	3.17E-001
RU-103	Not Detected	-----	2.78E-002
RU-106	Not Detected	-----	2.65E-001
SB-122	Not Detected	-----	1.08E-001
SB-124	Not Detected	-----	2.70E-002
SB-125	Not Detected	-----	7.88E-002
SN-113	Not Detected	-----	3.49E-002
SR-85	Not Detected	-----	3.41E-002
TA-182	Not Detected	-----	1.56E-001
TA-183	Not Detected	-----	2.37E-001
TL-201	Not Detected	-----	1.87E-001
Y-88	Not Detected	-----	3.14E-002
ZN-65	Not Detected	-----	1.08E-001
ZR-95	Not Detected	-----	5.82E-002

NOT DETECTED *FA 8/27/02*

Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 8/27/02 2:38:47 PM

* Analyzed by: *Beverly Key 8/27/02* Reviewed by: *K. B. 8/27/02*

Customer : SANDERS M (6135)
 Customer Sample ID : 059702-003
 Lab Sample ID : 20119112

Sample Description : 6643/1079-DF1-BH3-11-S
 Sample Quantity : 675.800 gram
 Sample Date/Time : 8/23/02 9:50:00 AM
 Acquire Start Date/Time : 8/27/02 12:58:31 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	-----	5.03E-001
RA-226	1.70E+000	5.65E-001	7.66E-001
PB-214	5.65E-001	9.20E-002	6.00E-002
BI-214	5.76E-001	1.02E-001	6.29E-002
PB-210	Not Detected	-----	8.66E+000
TH-232	7.10E-001	3.37E-001	1.70E-001
RA-228	5.56E-001	1.38E-001	1.73E-001
AC-228	6.00E-001	1.38E-001	1.17E-001
TH-228	5.61E-001	2.18E-001	4.58E-001
RA-224	6.98E-001	1.90E-001	1.17E-001
PB-212	6.67E-001	1.01E-001	3.85E-002
BI-212	5.99E-001	2.93E-001	4.11E-001
TL-208	5.92E-001	1.15E-001	9.33E-002
U-235	Not Detected	-----	2.03E-001
TH-231	Not Detected	-----	6.66E+000
PA-231	Not Detected	-----	1.46E+000
TH-227	Not Detected	-----	3.39E-001
RA-223	Not Detected	-----	1.43E-001
RN-219	Not Detected	-----	4.06E-001
PB-211	Not Detected	-----	8.89E-001
TL-207	Not Detected	-----	1.54E+001
AM-241	Not Detected	-----	1.78E-001
PU-239	Not Detected	-----	3.52E+002
NP-237	Not Detected	-----	1.95E+000
PA-233	Not Detected	-----	5.63E-002
TH-229	Not Detected	-----	1.89E-001

[Summary Report] - Sample ID: : 20119112

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.33E-002
AG-110m	Not Detected	-----	3.19E-002
BA-133	Not Detected	-----	4.36E-002
BE-7	Not Detected	-----	2.61E-001
CD-115	Not Detected	-----	2.47E-001
CE-139	Not Detected	-----	2.54E-002
CE-141	Not Detected	-----	4.82E-002
CE-144	Not Detected	-----	1.98E-001
CM-243	Not Detected	-----	1.79E-001
CO-56	Not Detected	-----	3.85E-002
CO-57	Not Detected	-----	2.52E-002
CO-58	Not Detected	-----	3.56E-002
CO-60	Not Detected	-----	4.19E-002
CR-51	Not Detected	-----	2.67E-001
CS-134	Not Detected	-----	4.85E-002
CS-137	Not Detected	-----	3.67E-002
EU-152	Not Detected	-----	7.52E-002
EU-154	Not Detected	-----	2.01E-001
EU-155	Not Detected	-----	1.14E-001
FE-59	Not Detected	-----	9.32E-002
GD-153	Not Detected	-----	6.76E-002
HG-203	Not Detected	-----	3.40E-002
I-131	Not Detected	-----	3.88E-002
IR-192	Not Detected	-----	2.83E-002
K-40	1.52E+001	2.13E+000	3.28E-001
MN-52	Not Detected	-----	6.07E-002
MN-54	Not Detected	-----	3.77E-002
MO-99	Not Detected	-----	7.77E-001
NA-22	Not Detected	-----	5.05E-002
NA-24	Not Detected	-----	4.02E+000
ND-147	Not Detected	-----	2.73E-001
NI-57	Not Detected	-----	3.68E-001
RU-103	Not Detected	-----	3.16E-002
RU-106	Not Detected	-----	2.92E-001
SB-122	Not Detected	-----	1.14E-001
SB-124	Not Detected	-----	3.13E-002
SB-125	Not Detected	-----	8.79E-002
SN-113	Not Detected	-----	3.83E-002
SR-85	Not Detected	-----	4.02E-002
TA-182	Not Detected	-----	1.76E-001
TA-183	Not Detected	-----	2.61E-001
TL-201	Not Detected	-----	2.14E-001
Y-88	Not Detected	-----	3.37E-002
ZN-65	Not Detected	-----	1.19E-001
ZR-95	Not Detected	-----	6.54E-002

Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 8/27/02 4:21:06 PM

* Analyzed by: *[Signature]* Reviewed by: *[Signature]*

Customer : SANDERS M (6135)
 Customer Sample ID : C59703-003
 Lab Sample ID : 20119113

 Sample Description : 6643/1079-DF1-BH3-16-S
 Sample Quantity : 715.800 gram
 Sample Date/Time : 8/23/02 10:05:00 AM
 Acquire Start Date/Time : 8/27/02 2:40:53 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	-----	4.89E-001
RA-226	1.05E+000	5.00E-001	7.39E-001
PB-214	5.57E-001	1.07E-001	1.08E-001
BI-214	4.73E-001	8.92E-002	6.80E-002
PB-210	Not Detected	-----	8.22E+000
TH-232	6.34E-001	3.09E-001	1.89E-001
RA-228	6.98E-001	1.52E-001	1.50E-001
AC-228	Not Detected	-----	2.08E-001
TH-228	6.63E-001	2.21E-001	4.24E-001
RA-224	6.14E-001	1.70E-001	1.05E-001
PB-212	5.89E-001	8.98E-002	3.64E-002
BI-212	6.26E-001	3.04E-001	4.28E-001
TL-208	5.11E-001	1.01E-001	8.48E-002
U-235	Not Detected	-----	1.93E-001
TH-231	Not Detected	-----	6.11E+000
PA-231	Not Detected	-----	1.37E+000
TH-227	Not Detected	-----	3.14E-001
RA-223	Not Detected	-----	1.35E-001
RN-219	Not Detected	-----	3.87E-001
PB-211	Not Detected	-----	8.52E-001
TL-207	Not Detected	-----	1.49E+001
AM-241	Not Detected	-----	1.69E-001
PU-239	Not Detected	-----	3.45E+002
NP-237	Not Detected	-----	1.79E+000
PA-233	Not Detected	-----	5.47E-002
TH-229	Not Detected	-----	1.90E-001

[Summary Report] - Sample ID: : 20119113

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.31E-002
AG-110m	Not Detected	-----	2.73E-002
BA-133	Not Detected	-----	4.16E-002
BE-7	Not Detected	-----	2.46E-001
CD-115	Not Detected	-----	2.36E-001
CE-139	Not Detected	-----	2.51E-002
CE-141	Not Detected	-----	4.51E-002
CE-144	Not Detected	-----	1.90E-001
CM-243	Not Detected	-----	1.68E-001
CO-56	Not Detected	-----	3.42E-002
CO-57	Not Detected	-----	2.35E-002
CO-58	Not Detected	-----	3.38E-002
CO-60	Not Detected	-----	4.23E-002
CR-51	Not Detected	-----	2.43E-001
CS-134	Not Detected	-----	4.47E-002
CS-137	Not Detected	-----	3.21E-002
EU-152	Not Detected	-----	7.01E-002
EU-154	Not Detected	-----	1.97E-001
EU-155	Not Detected	-----	1.06E-001
FE-59	Not Detected	-----	8.44E-002
GD-153	Not Detected	-----	6.31E-002
HG-203	Not Detected	-----	3.17E-002
I-131	Not Detected	-----	3.80E-002
IR-192	Not Detected	-----	2.73E-002
K-40	1.49E+001	2.08E+000	3.23E-001
MN-52	Not Detected	-----	5.13E-002
MN-54	Not Detected	-----	3.59E-002
MO-99	Not Detected	-----	7.72E-001
NA-22	Not Detected	-----	4.72E-002
NA-24	Not Detected	-----	4.06E+000
ND-147	Not Detected	-----	2.67E-001
NI-57	Not Detected	-----	3.88E-001
RU-103	Not Detected	-----	2.80E-002
RU-106	Not Detected	-----	2.91E-001
SB-122	Not Detected	-----	1.20E-001
SB-124	Not Detected	-----	2.89E-002
SB-125	Not Detected	-----	8.36E-002
SN-113	Not Detected	-----	3.68E-002
SR-85	Not Detected	-----	3.73E-002
TA-182	Not Detected	-----	1.65E-001
TA-183	Not Detected	-----	2.57E-001
TL-201	Not Detected	-----	2.02E-001
Y-88	Not Detected	-----	3.02E-002
ZN-65	Not Detected	-----	1.08E-001
ZR-95	Not Detected	-----	6.07E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 6:03:25 PM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135)
 Customer Sample ID : 059705-003
 Lab Sample ID : 20119114

 Sample Description : 6644/1080-DF1-BH1-5-S
 Sample Quantity : 691.900 gram
 Sample Date/Time : 8/26/02 11:25:00 AM
 Acquire Start Date/Time : 8/27/02 4:23:11 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	-----	5.26E-001
RA-226	1.75E+000	5.69E-001	7.68E-001
PB-214	6.64E-001	1.05E-001	6.76E-002
BI-214	5.85E-001	1.02E-001	5.92E-002
PB-210	Not Detected	-----	8.87E+000
TH-232	7.16E-001	3.45E-001	1.98E-001
RA-228	6.25E-001	1.43E-001	1.48E-001
AC-228	6.16E-001	1.35E-001	1.04E-001
TH-228	5.50E-001	2.17E-001	4.79E-001
RA-224	7.70E-001	1.98E-001	9.30E-002
PB-212	7.39E-001	1.11E-001	3.89E-002
BI-212	8.39E-001	3.17E-001	4.10E-001
TL-208	6.31E-001	1.20E-001	9.60E-002
U-235	Not Detected	-----	2.00E-001
TH-231	Not Detected	-----	6.50E+000
PA-231	Not Detected	-----	1.45E+000
TH-227	Not Detected	-----	3.45E-001
RA-223	Not Detected	-----	1.19E-001
RN-219	Not Detected	-----	3.74E-001
PB-211	Not Detected	-----	8.64E-001
TL-207	Not Detected	-----	1.52E+001
AM-241	Not Detected	-----	1.72E-001
PU-239	Not Detected	-----	3.62E+002
NP-237	Not Detected	-----	1.92E+000
PA-233	Not Detected	-----	5.94E-002
TH-229	Not Detected	-----	2.03E-001

[Summary Report] - Sample ID: : 20119114

nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.37E-002
AG-110m	Not Detected	-----	3.20E-002
BA-133	Not Detected	-----	4.45E-002
BE-7	Not Detected	-----	2.58E-001
CD-115	Not Detected	-----	1.00E-001
CE-139	Not Detected	-----	2.55E-002
CE-141	Not Detected	-----	4.55E-002
CE-144	Not Detected	-----	2.01E-001
CM-243	Not Detected	-----	1.82E-001
CO-56	Not Detected	-----	3.70E-002
CO-57	Not Detected	-----	2.47E-002
CO-58	Not Detected	-----	3.32E-002
CO-60	Not Detected	-----	4.12E-002
CR-51	Not Detected	-----	2.45E-001
CS-134	Not Detected	-----	4.87E-002
CS-137	Not Detected	-----	3.59E-002
EU-152	Not Detected	-----	7.42E-002
EU-154	Not Detected	-----	2.02E-001
EU-155	Not Detected	-----	1.16E-001
FE-59	Not Detected	-----	8.18E-002
GD-153	Not Detected	-----	6.85E-002
HG-203	Not Detected	-----	3.38E-002
I-131	Not Detected	-----	2.90E-002
IR-192	Not Detected	-----	2.80E-002
K-40	1.52E+001	2.13E+000	3.18E-001
MN-52	Not Detected	-----	4.28E-002
MN-54	Not Detected	-----	3.88E-002
MO-99	Not Detected	-----	3.67E-001
NA-22	Not Detected	-----	4.89E-002
NA-24	Not Detected	-----	1.49E-001
ND-147	Not Detected	-----	2.23E-001
NI-57	Not Detected	-----	1.02E-001
RU-103	Not Detected	-----	3.11E-002
RU-106	Not Detected	-----	2.94E-001
SB-122	Not Detected	-----	5.52E-002
SB-124	Not Detected	-----	3.08E-002
SB-125	Not Detected	-----	9.27E-002
SN-113	Not Detected	-----	3.93E-002
SR-85	Not Detected	-----	3.82E-002
TA-182	Not Detected	-----	1.77E-001
TA-183	Not Detected	-----	1.74E-001
TL-201	Not Detected	-----	1.09E-001
Y-88	Not Detected	-----	3.48E-002
ZN-65	Not Detected	-----	1.17E-001
ZR-95	Not Detected	-----	5.98E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 7:45:43 PM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135) *[Signature]*
 Customer Sample ID : 059706-003
 Lab Sample ID : 20119115

Sample Description : 6644/1080-DF1-BH1-10-S
 Sample Quantity : 799.900 gram
 Sample Date/Time : 8/26/02 11:40:00 AM
 Acquire Start Date/Time : 8/27/02 6:05:30 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	-----	4.47E-001
RA-226	1.23E+000	4.81E-001	6.85E-001
PB-214	5.47E-001	8.78E-002	5.81E-002
BI-214	5.19E-001	9.03E-002	5.46E-002
PB-210	Not Detected	-----	7.67E+000
TH-232	5.69E-001	2.77E-001	1.66E-001
RA-228	3.67E-001	1.32E-001	1.67E-001
AC-228	5.60E-001	1.20E-001	8.88E-002
TH-228	5.59E-001	1.98E-001	3.97E-001
RA-224	5.34E-001	1.48E-001	8.65E-002
PB-212	4.92E-001	7.57E-002	3.53E-002
BI-212	4.75E-001	2.51E-001	3.60E-001
TL-208	3.95E-001	8.31E-002	7.46E-002
U-235	7.77E-002	1.51E-001	1.77E-001
TH-231	Not Detected	-----	5.95E+000
PA-231	Not Detected	-----	1.23E+000
TH-227	Not Detected	-----	2.81E-001
RA-223	Not Detected	-----	1.06E-001
RN-219	Not Detected	-----	3.33E-001
PB-211	Not Detected	-----	7.51E-001
TL-207	Not Detected	-----	1.37E+001
AM-241	Not Detected	-----	1.46E-001
PU-239	Not Detected	-----	3.17E+002
NP-237	Not Detected	-----	1.67E+000
PA-233	Not Detected	-----	5.10E-002
TH-229	Not Detected	-----	1.71E-001

[Summary Report] - Sample ID: : 20119115

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	3.82E-002
AG-110m	Not Detected	-----	2.54E-002
BA-133	Not Detected	-----	3.85E-002
BE-7	Not Detected	-----	2.22E-001
CD-115	Not Detected	-----	8.90E-002
CE-139	Not Detected	-----	2.23E-002
CE-141	Not Detected	-----	3.92E-002
CE-144	Not Detected	-----	1.73E-001
CM-243	Not Detected	-----	1.56E-001
CO-56	Not Detected	-----	3.20E-002
CO-57	Not Detected	-----	2.18E-002
CO-58	Not Detected	-----	3.18E-002
CO-60	Not Detected	-----	3.29E-002
CR-51	Not Detected	-----	2.02E-001
CS-134	Not Detected	-----	4.26E-002
CS-137	Not Detected	-----	2.95E-002
EU-152	Not Detected	-----	6.55E-002
EU-154	Not Detected	-----	1.76E-001
EU-155	Not Detected	-----	9.80E-002
FE-59	Not Detected	-----	7.62E-002
GD-153	Not Detected	-----	5.76E-002
HG-203	Not Detected	-----	2.76E-002
I-131	Not Detected	-----	2.74E-002
IR-192	Not Detected	-----	2.32E-002
K-40	1.43E+001	1.98E+000	2.46E-001
MN-52	Not Detected	-----	3.85E-002
MN-54	Not Detected	-----	3.19E-002
MO-99	Not Detected	-----	3.24E-001
NA-22	Not Detected	-----	4.12E-002
NA-24	Not Detected	-----	1.46E-001
ND-147	Not Detected	-----	1.87E-001
NI-57	Not Detected	-----	9.75E-002
RU-103	Not Detected	-----	2.66E-002
RU-106	Not Detected	-----	2.43E-001
SB-122	Not Detected	-----	4.95E-002
SB-124	Not Detected	-----	2.64E-002
SB-125	Not Detected	-----	7.36E-002
SN-113	Not Detected	-----	3.36E-002
SR-85	Not Detected	-----	3.25E-002
TA-182	Not Detected	-----	1.56E-001
TA-183	Not Detected	-----	1.45E-001
TL-201	Not Detected	-----	9.39E-002
Y-88	Not Detected	-----	2.75E-002
ZN-65	Not Detected	-----	1.04E-001
ZR-95	Not Detected	-----	5.48E-002

Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 8/27/02 9:28:02 PM

* Analyzed by: *[Signature]* / 8/28/02 Reviewed by: *[Signature]* / 8/28/02

Customer : SANDERS M (6135)
 Customer Sample ID : 059707-003
 Lab Sample ID : 20119116

Sample Description : 6644/1080-DF1-BH2-5-S
 Sample Quantity : 738.100 gram
 Sample Date/Time : 8/26/02 1:05:00 PM
 Acquire Start Date/Time : 8/27/02 7:47:49 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	-----	4.83E-001
RA-226	1.62E+000	5.33E-001	7.22E-001
PB-214	5.93E-001	9.60E-002	6.59E-002
BI-214	5.14E-001	9.17E-002	5.95E-002
PB-210	Not Detected	-----	8.58E+000
TH-232	6.70E-001	3.24E-001	1.90E-001
RA-228	6.39E-001	1.44E-001	1.56E-001
AC-228	6.32E-001	1.41E-001	1.19E-001
TH-228	5.41E-001	2.12E-001	4.74E-001
RA-224	8.59E-001	2.10E-001	8.26E-002
PB-212	6.49E-001	9.77E-002	3.57E-002
BI-212	7.73E-001	3.00E-001	3.92E-001
TL-208	5.59E-001	1.08E-001	8.97E-002
U-235	Not Detected	-----	1.93E-001
TH-231	Not Detected	-----	6.46E+000
PA-231	Not Detected	-----	1.45E+000
TH-227	Not Detected	-----	3.18E-001
RA-223	Not Detected	-----	1.18E-001
RN-219	Not Detected	-----	3.81E-001
PB-211	Not Detected	-----	8.58E-001
TL-207	Not Detected	-----	1.50E+001
AM-241	Not Detected	-----	1.65E-001
PU-239	Not Detected	-----	3.42E+002
NP-237	Not Detected	-----	1.81E+000
PA-233	Not Detected	-----	5.70E-002
TH-229	Not Detected	-----	1.88E-001

{Summary Report} - Sample ID: : 20119116

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.25E-002
AG-110m	Not Detected	-----	3.00E-002
BA-133	Not Detected	-----	4.27E-002
BE-7	Not Detected	-----	2.48E-001
CD-115	Not Detected	-----	1.01E-001
CE-139	Not Detected	-----	2.45E-002
CE-141	Not Detected	-----	4.38E-002
CE-144	Not Detected	-----	1.87E-001
CM-243	Not Detected	-----	1.72E-001
CO-56	Not Detected	-----	3.58E-002
CO-57	Not Detected	-----	2.36E-002
CO-58	Not Detected	-----	3.37E-002
CO-60	Not Detected	-----	3.74E-002
CR-51	Not Detected	-----	2.30E-001
CS-134	Not Detected	-----	4.56E-002
CS-137	Not Detected	-----	3.39E-002
EU-152	Not Detected	-----	7.10E-002
EU-154	Not Detected	-----	1.99E-001
EU-155	Not Detected	-----	1.07E-001
FE-59	Not Detected	-----	7.96E-002
GD-153	Not Detected	-----	6.51E-002
HG-203	Not Detected	-----	3.18E-002
I-131	Not Detected	-----	3.00E-002
IR-192	Not Detected	-----	2.65E-002
K-40	1.56E+001	2.16E+000	3.17E-001
MN-52	Not Detected	-----	3.90E-002
MN-54	Not Detected	-----	3.67E-002
MO-99	Not Detected	-----	3.43E-001
NA-22	Not Detected	-----	4.67E-002
NA-24	Not Detected	-----	1.39E-001
ND-147	Not Detected	-----	2.27E-001
NI-57	Not Detected	-----	9.41E-002
RU-103	Not Detected	-----	2.78E-002
RU-106	Not Detected	-----	2.99E-001
SB-122	Not Detected	-----	5.55E-002
SB-124	Not Detected	-----	3.03E-002
SB-125	Not Detected	-----	8.36E-002
SN-113	Not Detected	-----	3.57E-002
SR-85	Not Detected	-----	3.69E-002
TA-182	Not Detected	-----	1.68E-001
TA-183	Not Detected	-----	1.66E-001
TL-201	Not Detected	-----	1.03E-001
Y-88	Not Detected	-----	2.77E-002
ZN-65	Not Detected	-----	1.14E-001
ZR-95	Not Detected	-----	6.25E-002

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/27/02 11:10:21 PM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135)
 Customer Sample ID : 059708-003
 Lab Sample ID : 20119117

Sample Description : 6644/1080-DF1-BH2-10-S
 Sample Quantity : 746.700 gram
 Sample Date/Time : 8/26/02 1:20:00 PM
 Acquire Start Date/Time : 8/27/02 9:30:08 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	-----	4.75E-001
RA-226	1.24E+000	5.15E-001	7.44E-001
U-234	6.15E-001	9.85E-002	6.63E-002
Th-230	5.53E-001	9.35E-002	4.55E-002
PB-210	Not Detected	-----	7.78E+000
TH-232	5.46E-001	2.76E-001	1.97E-001
RA-228	3.67E-001	1.28E-001	1.55E-001
AC-228	Not Detected	-----	1.94E-001
TH-228	5.36E-001	1.98E-001	4.27E-001
RA-224	5.56E-001	1.59E-001	1.10E-001
PB-212	5.12E-001	7.92E-002	3.44E-002
BI-212	5.58E-001	2.61E-001	3.59E-001
TL-208	4.48E-001	9.21E-002	8.06E-002
U-235	1.14E-001	1.58E-001	1.86E-001
TH-231	Not Detected	-----	5.80E+000
PA-231	Not Detected	-----	1.29E+000
TH-227	Not Detected	-----	2.89E-001
RA-223	Not Detected	-----	1.06E-001
RN-219	Not Detected	-----	3.71E-001
PB-211	Not Detected	-----	8.14E-001
TL-207	Not Detected	-----	1.42E+001
AM-241	Not Detected	-----	1.56E-001
PU-239	Not Detected	-----	3.18E+002
NP-237	Not Detected	-----	1.72E+000
PA-233	Not Detected	-----	5.20E-002
Th-229	Not Detected	-----	1.81E-001

[Summary Report] - Sample ID: : 20119117

Slide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.09E-002
AG-110m	Not Detected	-----	2.72E-002
BA-133	Not Detected	-----	3.93E-002
BE-7	Not Detected	-----	2.36E-001
CD-115	Not Detected	-----	9.14E-002
CE-139	Not Detected	-----	2.33E-002
CE-141	Not Detected	-----	4.10E-002
CE-144	Not Detected	-----	1.73E-001
CM-243	Not Detected	-----	1.59E-001
CO-56	Not Detected	-----	3.16E-002
CO-57	Not Detected	-----	2.27E-002
CO-58	Not Detected	-----	3.31E-002
CO-60	Not Detected	-----	3.50E-002
CR-51	Not Detected	-----	2.14E-001
CS-134	Not Detected	-----	4.62E-002
CS-137	Not Detected	-----	3.12E-002
EU-152	Not Detected	-----	6.83E-002
EU-154	Not Detected	-----	1.88E-001
EU-155	Not Detected	-----	1.01E-001
FE-59	Not Detected	-----	7.68E-002
GD-153	Not Detected	-----	6.08E-002
HG-203	Not Detected	-----	2.91E-002
I-131	Not Detected	-----	2.76E-002
I-192	Not Detected	-----	2.37E-002
K-40	1.34E+001	1.88E+000	2.77E-001
MN-52	Not Detected	-----	4.08E-002
MN-54	Not Detected	-----	3.39E-002
MO-99	Not Detected	-----	3.32E-001
NA-22	Not Detected	-----	4.49E-002
NA-24	Not Detected	-----	1.52E-001
ND-147	Not Detected	-----	2.02E-001
NI-57	Not Detected	-----	9.84E-002
RU-103	Not Detected	-----	2.77E-002
RU-106	Not Detected	-----	2.73E-001
SB-122	Not Detected	-----	5.38E-002
SB-124	Not Detected	-----	2.79E-002
SB-125	Not Detected	-----	8.47E-002
SN-113	Not Detected	-----	3.31E-002
SR-85	Not Detected	-----	3.34E-002
TA-182	Not Detected	-----	1.67E-001
TA-183	Not Detected	-----	1.59E-001
TL-201	Not Detected	-----	1.01E-001
Y-88	Not Detected	-----	2.63E-002
ZN-65	Not Detected	-----	1.14E-001
ZR-95	Not Detected	-----	5.74E-002

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 8/28/02 12:52:39 AM

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]*

 Customer : SANDERS M (6135)
 Customer Sample ID : 059709-003
 Lab Sample ID : 20119118

Sample Description : 6644/1080-DF1-BH3-10-S
 Sample Quantity : 664.900 gram
 Sample Date/Time : 8/26/02 1:40:00 PM
 Acquire Start Date/Time : 8/27/02 11:12:26 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	-----	5.15E-001
RA-226	1.32E+000	5.01E-001	7.01E-001
PB-214	6.95E-001	1.09E-001	6.52E-002
BI-214	6.25E-001	1.08E-001	6.16E-002
PB-210	Not Detected	-----	9.01E+000
TH-232	6.50E-001	3.23E-001	2.18E-001
RA-228	5.93E-001	1.42E-001	1.52E-001
AC-228	6.06E-001	1.37E-001	1.11E-001
TH-228	8.63E-001	2.54E-001	4.64E-001
RA-224	7.31E-001	1.95E-001	1.07E-001
PB-212	6.52E-001	9.91E-002	3.79E-002
BI-212	7.26E-001	2.64E-001	3.20E-001
TL-208	5.05E-001	1.04E-001	9.15E-002
U-235	Not Detected	-----	2.03E-001
TH-231	Not Detected	-----	6.53E+000
PA-231	Not Detected	-----	1.35E+000
TH-227	Not Detected	-----	3.35E-001
RA-223	Not Detected	-----	1.22E-001
RN-219	Not Detected	-----	4.05E-001
PB-211	Not Detected	-----	6.87E-001
TL-207	Not Detected	-----	1.57E+001
AM-241	Not Detected	-----	1.71E-001
PU-239	Not Detected	-----	3.67E+002
NP-237	Not Detected	-----	1.95E+000
PA-233	Not Detected	-----	5.65E-002
TH-229	Not Detected	-----	1.97E-001

[Summary Report] - Sample ID: : 20119118

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.45E-002
AG-110m	Not Detected	-----	3.03E-002
BA-133	Not Detected	-----	4.50E-002
BE-7	Not Detected	-----	2.47E-001
CD-115	Not Detected	-----	1.06E-001
CE-139	Not Detected	-----	2.53E-002
CE-141	Not Detected	-----	4.61E-002
CE-144	Not Detected	-----	1.91E-001
CM-243	Not Detected	-----	1.80E-001
CO-56	Not Detected	-----	3.63E-002
CO-57	Not Detected	-----	2.46E-002
CO-58	Not Detected	-----	3.33E-002
CO-60	Not Detected	-----	3.93E-002
CR-51	Not Detected	-----	2.35E-001
CS-134	Not Detected	-----	4.97E-002
CS-137	Not Detected	-----	3.51E-002
EU-152	Not Detected	-----	7.38E-002
EU-154	Not Detected	-----	2.07E-001
EU-155	Not Detected	-----	1.13E-001
FE-59	Not Detected	-----	8.63E-002
GD-153	Not Detected	-----	6.60E-002
HG-203	Not Detected	-----	3.16E-002
I-131	Not Detected	-----	3.12E-002
IR-192	Not Detected	-----	2.70E-002
K-40	1.38E+001	1.94E+000	2.88E-001
MN-52	Not Detected	-----	4.29E-002
MN-54	Not Detected	-----	3.86E-002
MO-99	Not Detected	-----	3.92E-001
NA-22	Not Detected	-----	5.01E-002
NA-24	Not Detected	-----	1.93E-001
ND-147	Not Detected	-----	2.30E-001
NI-57	Not Detected	-----	1.02E-001
RU-103	Not Detected	-----	3.13E-002
RU-106	Not Detected	-----	3.09E-001
SB-122	Not Detected	-----	6.25E-002
SB-124	Not Detected	-----	2.87E-002
SB-125	Not Detected	-----	8.95E-002
SN-113	Not Detected	-----	3.86E-002
SR-85	Not Detected	-----	3.64E-002
TA-182	Not Detected	-----	1.78E-001
TA-183	Not Detected	-----	1.76E-001
TL-201	Not Detected	-----	1.11E-001
Y-88	Not Detected	-----	3.20E-002
ZN-65	Not Detected	-----	1.22E-001
ZR-95	Not Detected	-----	6.16E-002

 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 8/28/02 2:34:58 AM

* Analyzed by: *[Signature]* Reviewed by: *[Signature]*

Customer : SANDERS M (6135)
 Customer Sample ID : 059710-003
 Lab Sample ID : 20119119

Sample Description : 6644/1080-DF1-BH3-11-S
 Sample Quantity : 741.300 gram
 Sample Date/Time : 8/26/02 2:10:00 PM
 Acquire Start Date/Time : 8/28/02 12:54:44 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	8.68E-001	3.03E-001	4.17E-001
RA-226	1.05E+000	4.60E-001	6.67E-001
PB-214	5.32E-001	8.58E-002	5.82E-002
BI-214	5.40E-001	9.39E-002	5.52E-002
PB-210	Not Detected	-----	8.01E+000
TH-232	4.67E-001	2.37E-001	1.71E-001
RA-228	5.13E-001	1.29E-001	1.58E-001
AC-228	Not Detected	-----	2.04E-001
TH-228	5.97E-001	2.13E-001	4.42E-001
RA-224	7.03E-001	1.80E-001	7.48E-002
PB-212	5.55E-001	8.50E-002	3.64E-002
BI-212	5.26E-001	2.75E-001	3.93E-001
TL-208	4.81E-001	9.60E-002	8.05E-002
U-235	2.57E-001	1.64E-001	1.96E-001
TH-231	Not Detected	-----	6.10E+000
PA-231	Not Detected	-----	1.30E+000
TH-227	Not Detected	-----	3.02E-001
RA-223	Not Detected	-----	1.12E-001
RN-219	Not Detected	-----	3.70E-001
PB-211	Not Detected	-----	8.29E-001
TL-207	Not Detected	-----	1.38E+001
AM-241	Not Detected	-----	1.61E-001
PU-239	Not Detected	-----	3.33E+002
NP-237	Not Detected	-----	1.76E+000
PA-233	Not Detected	-----	5.57E-002
TH-229	Not Detected	-----	1.80E-001

[Summary Report] - Sample ID: : 20119119

Nuclide Name	Activity (pCi/gram)	2-sigma Error	MDA (pCi/gram)
AG-108m	Not Detected	-----	4.15E-002
AG-110m	Not Detected	-----	2.79E-002
BA-133	Not Detected	-----	4.00E-002
BE-7	Not Detected	-----	2.23E-001
CD-115	Not Detected	-----	9.66E-002
CE-139	Not Detected	-----	2.30E-002
CE-141	Not Detected	-----	4.36E-002
CE-144	Not Detected	-----	1.76E-001
CM-243	Not Detected	-----	1.56E-001
CO-56	Not Detected	-----	3.32E-002
CO-57	Not Detected	-----	2.25E-002
CO-58	Not Detected	-----	3.64E-002
CO-60	Not Detected	-----	3.83E-002
CR-51	Not Detected	-----	2.27E-001
CS-134	Not Detected	-----	4.42E-002
CS-137	Not Detected	-----	3.14E-002
EU-152	Not Detected	-----	6.75E-002
EU-154	Not Detected	-----	1.92E-001
EU-155	Not Detected	-----	1.04E-001
FE-59	Not Detected	-----	7.75E-002
GE-153	Not Detected	-----	6.09E-002
HG-203	Not Detected	-----	2.85E-002
I-131	Not Detected	-----	2.90E-002
IR-192	Not Detected	-----	2.57E-002
K-40	1.48E+001	2.06E+000	2.50E-001
MN-52	Not Detected	-----	3.91E-002
MN-54	Not Detected	-----	3.50E-002
MO-99	Not Detected	-----	3.51E-001
NA-22	Not Detected	-----	4.59E-002
NA-24	Not Detected	-----	1.82E-001
ND-147	Not Detected	-----	2.13E-001
NI-57	Not Detected	-----	1.09E-001
RU-103	Not Detected	-----	2.79E-002
RU-106	Not Detected	-----	2.66E-001
SB-122	Not Detected	-----	5.63E-002
SB-124	Not Detected	-----	2.64E-002
SB-125	Not Detected	-----	8.28E-002
SN-113	Not Detected	-----	3.63E-002
SR-85	Not Detected	-----	3.34E-002
TA-182	Not Detected	-----	1.69E-001
TA-183	Not Detected	-----	1.68E-001
TL-201	Not Detected	-----	1.05E-001
Y-88	Not Detected	-----	2.97E-002
ZN-65	Not Detected	-----	1.14E-001
ZR-95	Not Detected	-----	5.72E-002

 * Sandia National Laboratories *
 Radiation Protection Sample Diagnostics Program *
 8/28/02 6:54:27 AM *

* Analyzed by: *[Signature]* 8/28/02 Reviewed by: *[Signature]* 8/28/02 *

Customer : SANDERS M (6135)
 Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
 Lab Sample ID : 20119122

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 : 8/28/02 6:44:11 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	-----	4.05E+003
RA-226	Not Detected	-----	5.69E+003
PB-214	Not Detected	-----	5.78E+002
BI-214	Not Detected	-----	4.56E+002
PB-210	Not Detected	-----	2.69E+005
TH-232	Not Detected	-----	1.86E+003
RA-228	Not Detected	-----	1.72E+003
AC-228	Not Detected	-----	1.03E+003
TH-228	Not Detected	-----	4.29E+005
RA-224	Not Detected	-----	1.66E+004
PB-212	Not Detected	-----	3.23E+004
BI-212	Not Detected	-----	2.08E+005
TL-208	Not Detected	-----	5.15E+004
U-235	Not Detected	-----	1.51E+003
TH-231	Not Detected	-----	7.08E+004
PA-231	Not Detected	-----	1.26E+004
TH-227	Not Detected	-----	2.54E+003
RA-223	Not Detected	-----	1.00E+026
RN-219	Not Detected	-----	5.62E+003
PB-211	Not Detected	-----	1.27E+004
TL-207	Not Detected	-----	1.66E+005
AM-241	8.14E+004	1.21E+004	4.00E+003
PU-239	Not Detected	-----	2.69E+006
NP-237	Not Detected	-----	1.43E+004
PA-233	Not Detected	-----	5.21E+002
TH-229	Not Detected	-----	1.52E+003

[Summary Report] - Sample ID: : 20119122

Nuclide Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	2.28E+002
AG-110m	Not Detected	-----	2.33E+008
BA-133	Not Detected	-----	7.80E+002
BE-7	Not Detected	-----	1.00E+026
CD-115	Not Detected	-----	1.00E+026
CE-139	Not Detected	-----	5.33E+011
CE-141	Not Detected	-----	1.00E+026
CE-144	Not Detected	-----	5.59E+007
CM-243	Not Detected	-----	1.88E+003
CO-56	Not Detected	-----	1.78E+019
CO-57	Not Detected	-----	1.20E+007
CO-58	Not Detected	-----	4.95E+020
CO-60	7.90E+004	1.03E+004	6.71E+002
CR-51	Not Detected	-----	1.00E+026
CS-134	Not Detected	-----	1.17E+004
CS-137	7.15E+004	9.04E+003	2.84E+002
EU-152	Not Detected	-----	1.09E+003
EU-154	Not Detected	-----	2.54E+003
EU-155	Not Detected	-----	4.91E+003
FE-59	Not Detected	-----	1.00E+026
GD-153	Not Detected	-----	1.54E+008
HG-203	Not Detected	-----	1.00E+026
I-131	Not Detected	-----	1.00E+026
IR-192	Not Detected	-----	9.71E+019
K-40	Not Detected	-----	1.18E+003
MN-52	Not Detected	-----	1.00E+026
MN-54	Not Detected	-----	3.57E+006
MO-99	Not Detected	-----	1.00E+026
NA-22	Not Detected	-----	3.68E+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	-----	7.41E+006
SB-122	Not Detected	-----	1.00E+026
SB-124	Not Detected	-----	1.00E+026
SB-125	Not Detected	-----	1.94E+004
SN-113	Not Detected	-----	7.35E+013
SR-85	Not Detected	-----	1.00E+026
TA-182	Not Detected	-----	1.56E+014
TA-183	Not Detected	-----	1.00E+026
TL-201	Not Detected	-----	1.00E+026
Y-88	Not Detected	-----	2.14E+014
ZN-65	Not Detected	-----	1.20E+008
ZR-95	Not Detected	-----	1.00E+026

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

Report Date : 8/28/02 6:54:32 AM
 QA File : C:\GENIE2K\CAMFILES\LCS2.QAF
 Analyst : RPREESE
 Sample ID : 20119122
 Sample Quantity : 1.00 Each
 Sample Date : 11/01/90 12:00:00 PM
 Measurement Date : 8/28/02 6:44:11 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 Activity	8.247E-002	3.739E-003	8.135E-002	< : : : >
CS-137 Activity	7.191E-002	3.244E-003	7.149E-002	< ✓ : : : >
CO-60 Activity	8.019E-002	3.861E-003	7.963E-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: _____

[Handwritten Signature]
 8/28/02

 * Sandia National Laboratories *
 * Radiation Protection Sample Diagnostics Program *
 * 8/28/02 7:00:14 AM *

*
 * Analyzed by: *[Signature]* Reviewed by: *[Signature]* *

Customer : SANDERS M (6135)
 Customer Sample ID : LAB_CONTROL_SAMPLE_USING_CG-134
 Lab Sample ID : 20119123

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 : 8/28/02 6:50:01 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	-----	2.67E+003
RA-226	Not Detected	-----	5.60E+003
PB-214	Not Detected	-----	6.61E+002
BI-214	Not Detected	-----	6.12E+002
PB-210	Not Detected	-----	9.85E+004
TH-232	Not Detected	-----	2.09E+003
RA-228	Not Detected	-----	2.44E+003
AC-228	Not Detected	-----	1.46E+003
TH-228	Not Detected	-----	4.87E+005
RA-224	Not Detected	-----	2.28E+004
PB-212	Not Detected	-----	3.23E+004
BI-212	Not Detected	-----	2.98E+005
TL-208	Not Detected	-----	6.28E+004
U-235	Not Detected	-----	1.38E+003
TH-231	Not Detected	-----	4.08E+004
PA-231	Not Detected	-----	1.39E+004
TH-227	Not Detected	-----	2.55E+003
RA-223	Not Detected	-----	1.00E+026
RN-219	Not Detected	-----	6.72E+003
PB-211	Not Detected	-----	1.52E+004
TL-207	Not Detected	-----	2.34E+005
AM-241	8.92E+004	1.29E+004	1.89E+003
PU-239	Not Detected	-----	2.35E+006
NP-237	Not Detected	-----	1.22E+004
PA-233	Not Detected	-----	5.88E+002
TH-229	Not Detected	-----	1.25E+003

[Summary Report] - Sample ID: : 20119123

Isotope Name	Activity (pCi/Each)	2-sigma Error	MDA (pCi/Each)
AG-108m	Not Detected	-----	3.27E+002
AG-110m	Not Detected	-----	2.71E+008
BA-133	Not Detected	-----	9.06E+002
BE-7	Not Detected	-----	1.00E+026
CD-115	Not Detected	-----	1.00E+026
CE-139	Not Detected	-----	4.98E+011
CE-141	Not Detected	-----	1.00E+026
CE-144	Not Detected	-----	4.95E+007
CM-243	Not Detected	-----	2.10E+003
CO-56	Not Detected	-----	2.38E+019
CO-57	Not Detected	-----	1.02E+007
CO-58	Not Detected	-----	6.61E+020
CO-60	7.84E+004	1.04E+004	9.72E+002
CR-51	Not Detected	-----	1.00E+026
CS-134	Not Detected	-----	1.50E+004
CS-137	6.74E+004	8.56E+003	3.92E+002
EU-152	Not Detected	-----	9.28E+002
EU-154	Not Detected	-----	3.68E+003
EU-155	Not Detected	-----	4.16E+003
FE-59	Not Detected	-----	1.00E+026
GD-153	Not Detected	-----	1.02E+008
HG-203	Not Detected	-----	1.00E+026
I-131	Not Detected	-----	1.00E+026
IR-192	Not Detected	-----	1.12E+020
I-40	Not Detected	-----	1.31E+003
MN-52	Not Detected	-----	1.00E+026
MN-54	Not Detected	-----	4.80E+006
MO-99	Not Detected	-----	1.00E+026
NA-22	Not Detected	-----	4.56E+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	-----	8.73E+006
SB-122	Not Detected	-----	1.00E+026
SB-124	Not Detected	-----	1.00E+026
SB-125	Not Detected	-----	2.32E+004
SN-113	Not Detected	-----	8.83E+013
SR-85	Not Detected	-----	1.00E+026
TA-182	Not Detected	-----	2.13E+014
TA-183	Not Detected	-----	1.00E+026
TL-201	Not Detected	-----	1.00E+026
Y-88	Not Detected	-----	2.21E+014
ZN-65	Not Detected	-----	1.74E+008
ZR-95	Not Detected	-----	1.00E+026


 Sandia National Laboratories
 Radiation Protection Sample Diagnostics Program
 Quality Assurance Report

Report Date : 8/28/02 7:00:18 AM
 QA File : C:\GENIE2K\CAMFILES\LCS1.QAF
 Analyst : RPREESE
 Sample ID : 20119123
 Sample Quantity : 1.00 Each
 Sample Date : 11/1/90 12:00:00 PM
 Measurement Date : 8/28/02 6:50:01 AM
 Elapsed Live Time : 600 seconds
 Elapsed Real Time : 604 seconds

Parameter	Mean	1S Error	New Value	< LU : SD : UD : BS >
AM-241 ACTIVITY	8.570E-002	3.463E-003	8.924E-002	< : : : >
CS-137 Activity	6.836E-002	1.367E-003	6.744E-002	< ✓ : : : >
CO-60 Activity	7.657E-002	3.478E-003	7.643E-002	< : : : >

Tags 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: _____

 8/28/02